Upper Wakulla River and Wakulla Spring Basin Management Action Plan Updates

April 9, 2024 at 10:00 AM EDT

In-person
DEP Carr Building
Conference Room 170
3800 Commonwealth Blvd.
Tallahassee, FL 32399

Via Webinar
Webinar Registration Link:
https://register.gotowebinar.com/register/2897917264481678431

Agenda

- Wakulla Spring 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 Wakulla Spring BMAP, contact: Sam Hankinson at (850) 245-8086
Samuel.Hankison@FloridaDEP.gov.

WEBINAR HOUSEKEEPING

Attendee Participation

Open your control panel.

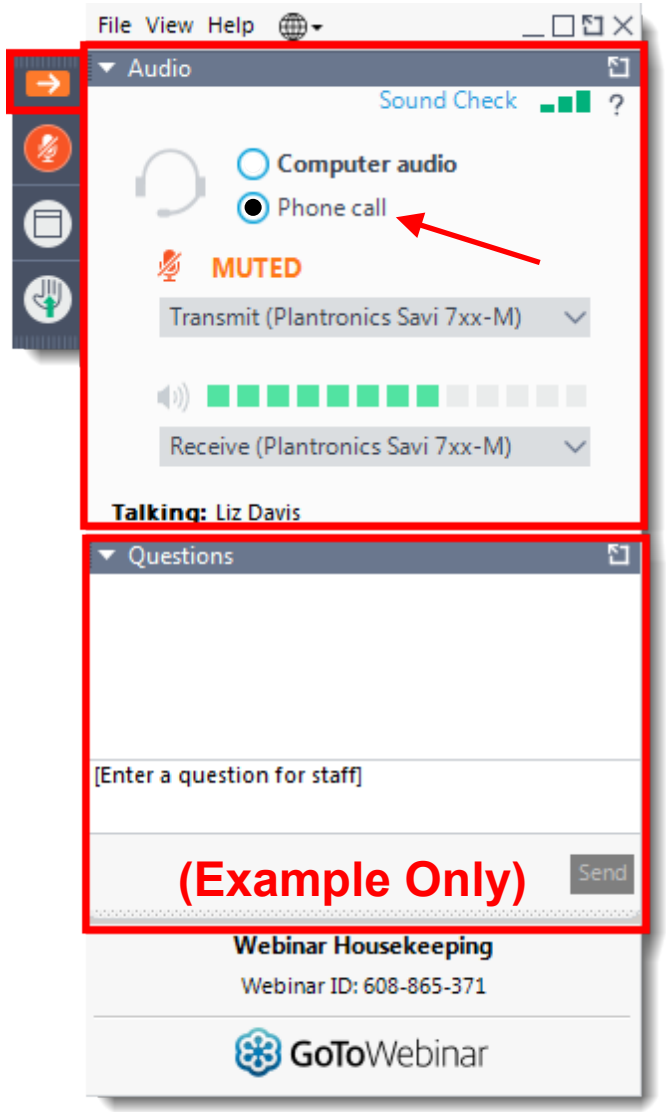
Join audio:

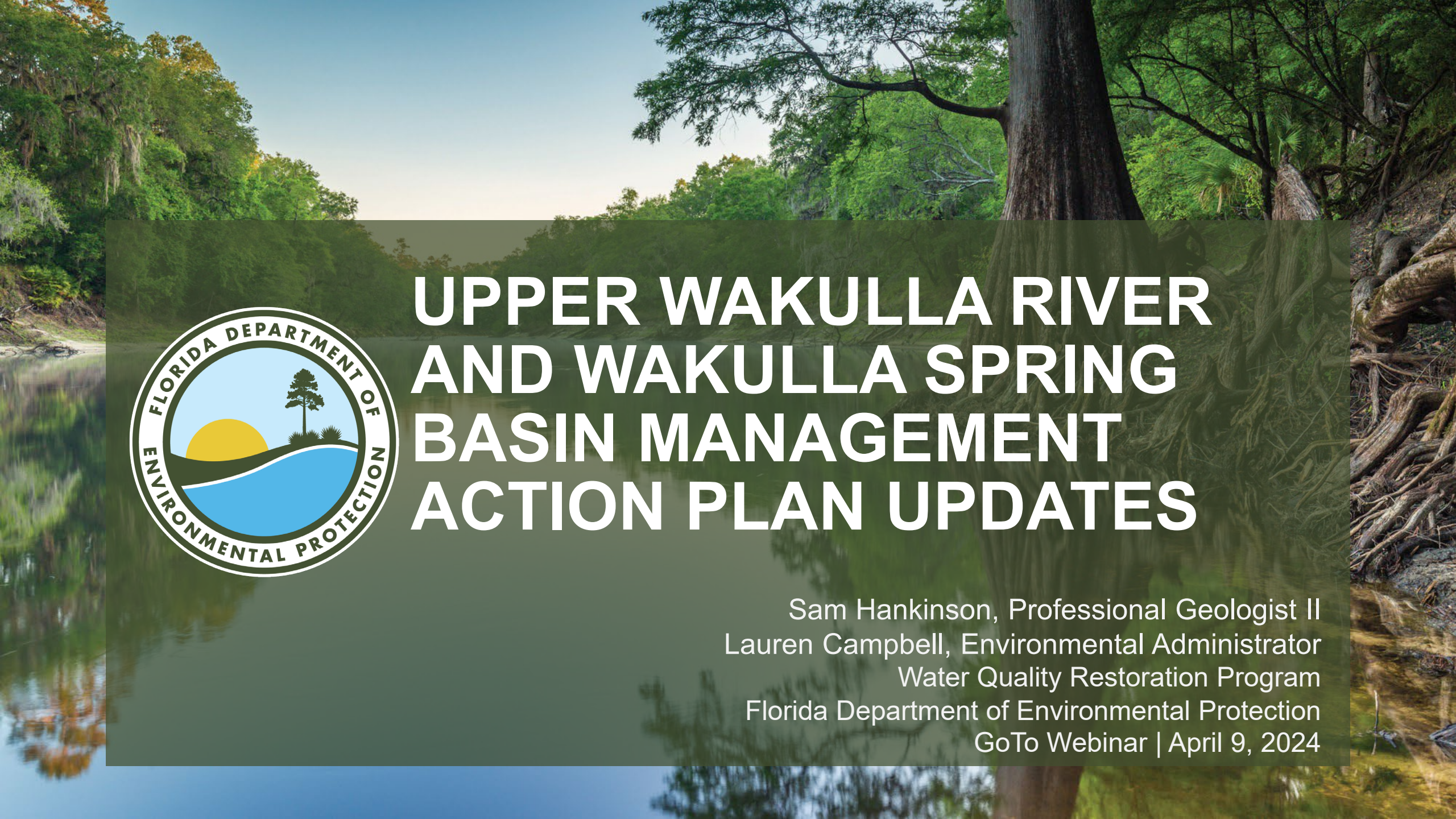
- Choose **Phone Call** and dial using the information provided.
- Or choose **Computer Audio** to use your computer's speakers for audio.
- Attendee audio will be muted.

Submit questions and comments via the Questions panel.

If 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.





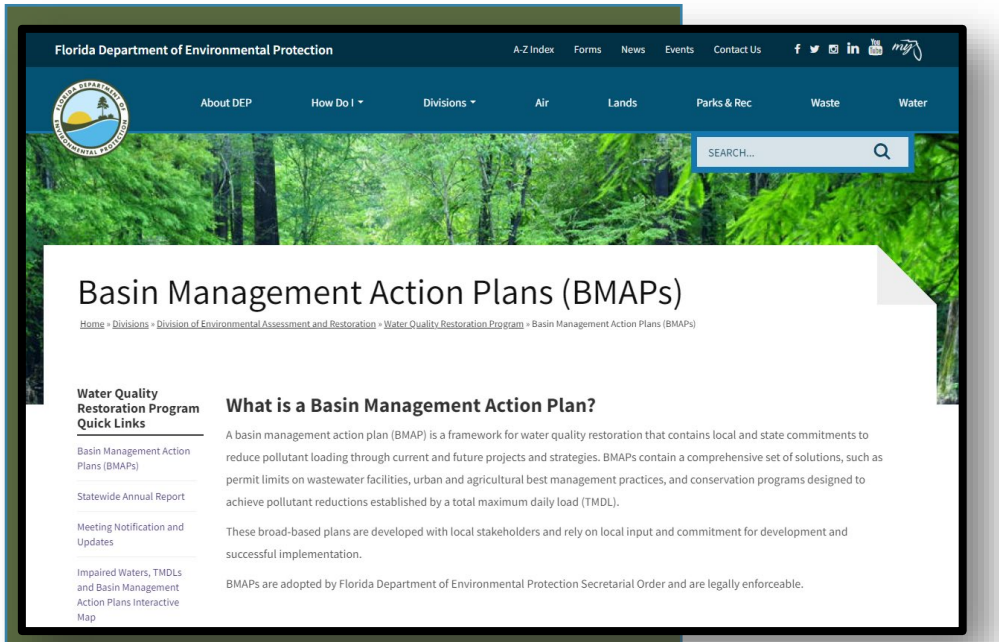
UPPER WAKULLA RIVER AND WAKULLA SPRING BASIN MANAGEMENT ACTION PLAN UPDATES

Sam Hankinson, Professional Geologist II
Lauren Campbell, Environmental Administrator
Water Quality Restoration Program
Florida Department of Environmental Protection
GoTo Webinar | April 9, 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.

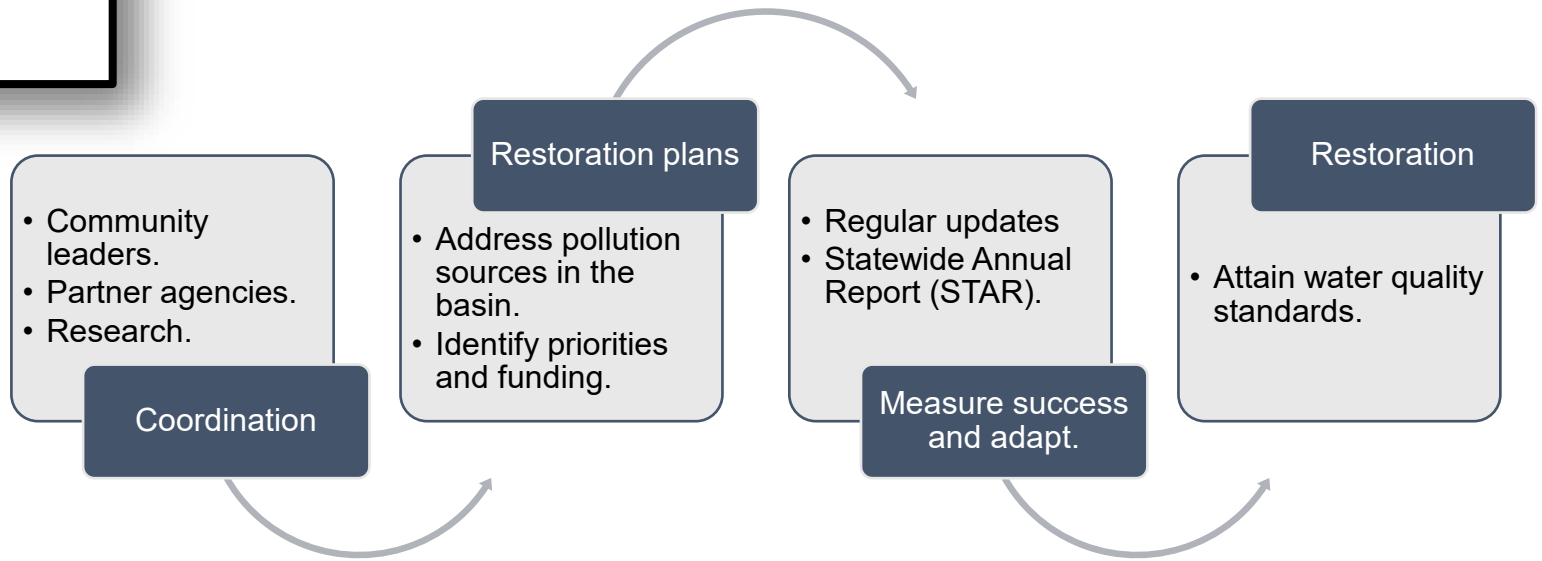
BASIN MANAGEMENT ACTION PLANS (BMAPs)



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:

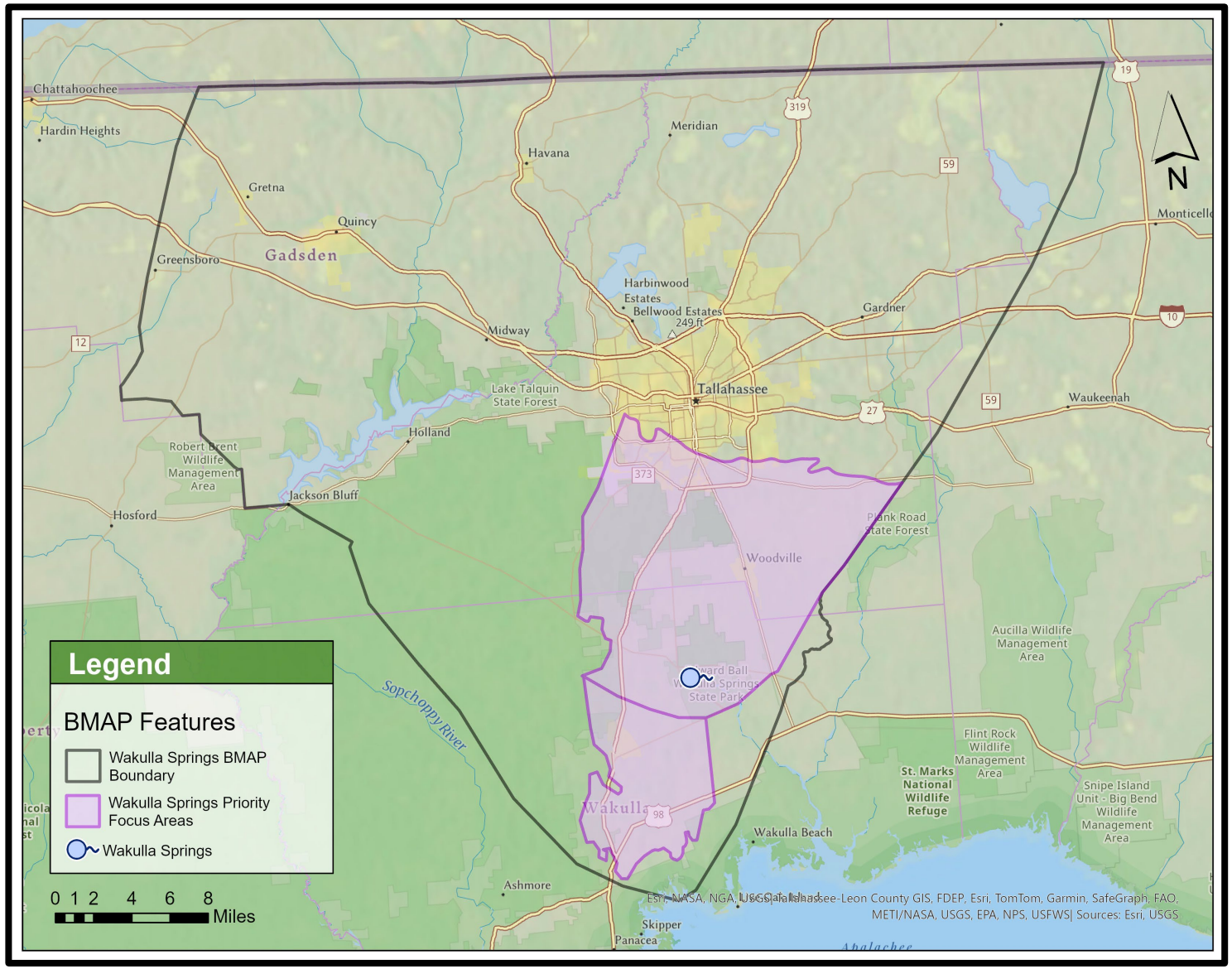
- Implementation timeline.
- Commitment to projects.
- Expected water quality improvement from projects and management strategies.

Process to assess progress toward achieving the TMDL:

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

WAKULLA SPRING BMAP

- Approximately 848,445 acres/1,325 square miles.
- Two Priority Focus Areas (PFAs).
- TMDL is 0.35 mg/L of nitrate, as a monthly (arithmetic) mean.



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 Treatment and Disposal System (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).

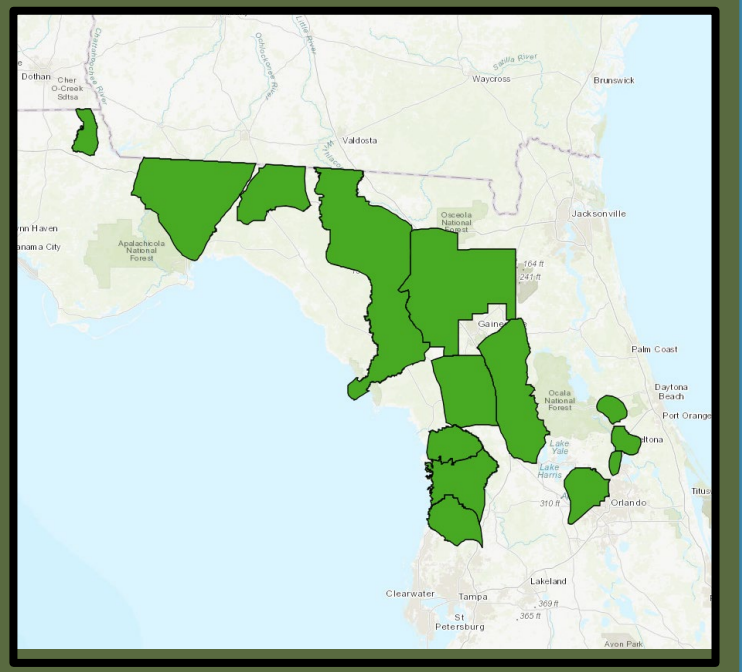
Strengthens Water Quality Protections and BMAPs.

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.])

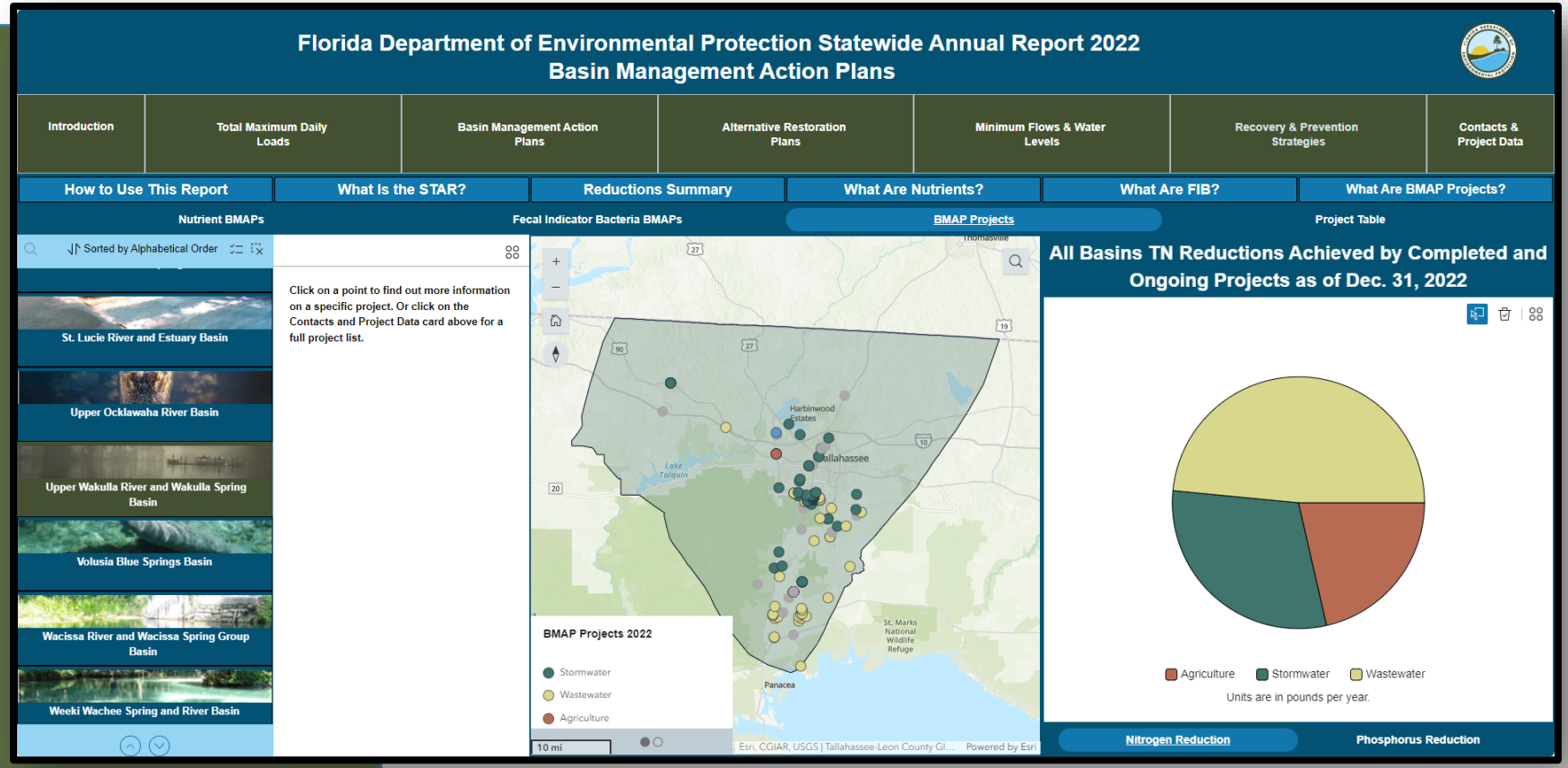


- New conventional OSTDS where sewer is available.
- New domestic wastewater disposal facilities with permitted capacities of 100,000 gallons per day or more, unless they meet Advanced Wastewater Treatment (AWT) standards.
- New HAZMAT disposal facilities.
- Land application of Class A or B biosolids 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.

STATEWIDE ANNUAL REPORT (STAR)
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

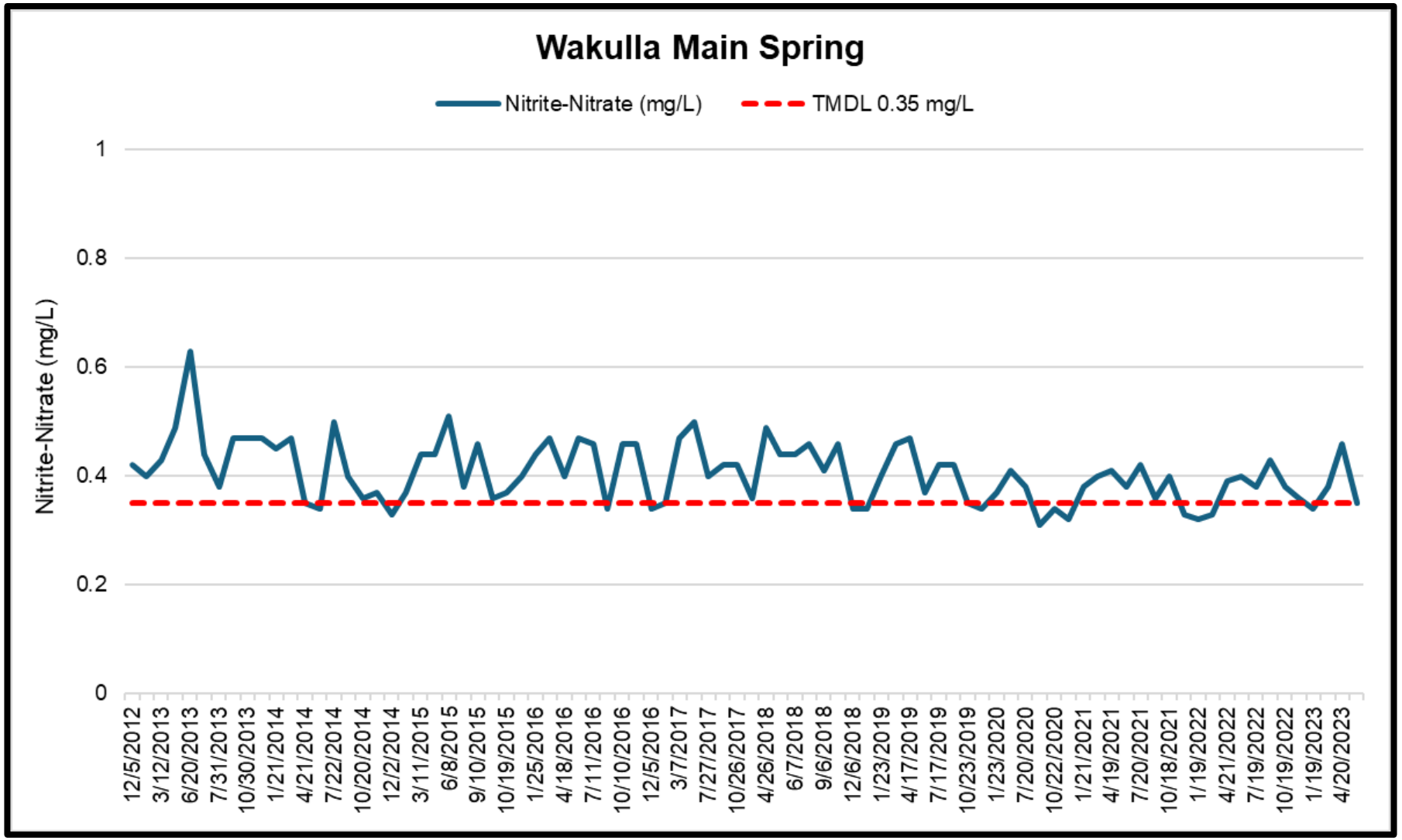
WAKULLA SPRING BMAP

Project Status	Count of Projects
Planned	17
Ongoing	60
Underway	30
Completed	48
Total	**155**

As of Dec. 31, 2023, verified projects in the Wakulla Spring BMAP have reduced **22,835 lbs./yr.** of total nitrogen (TN).

WATER QUALITY DATA

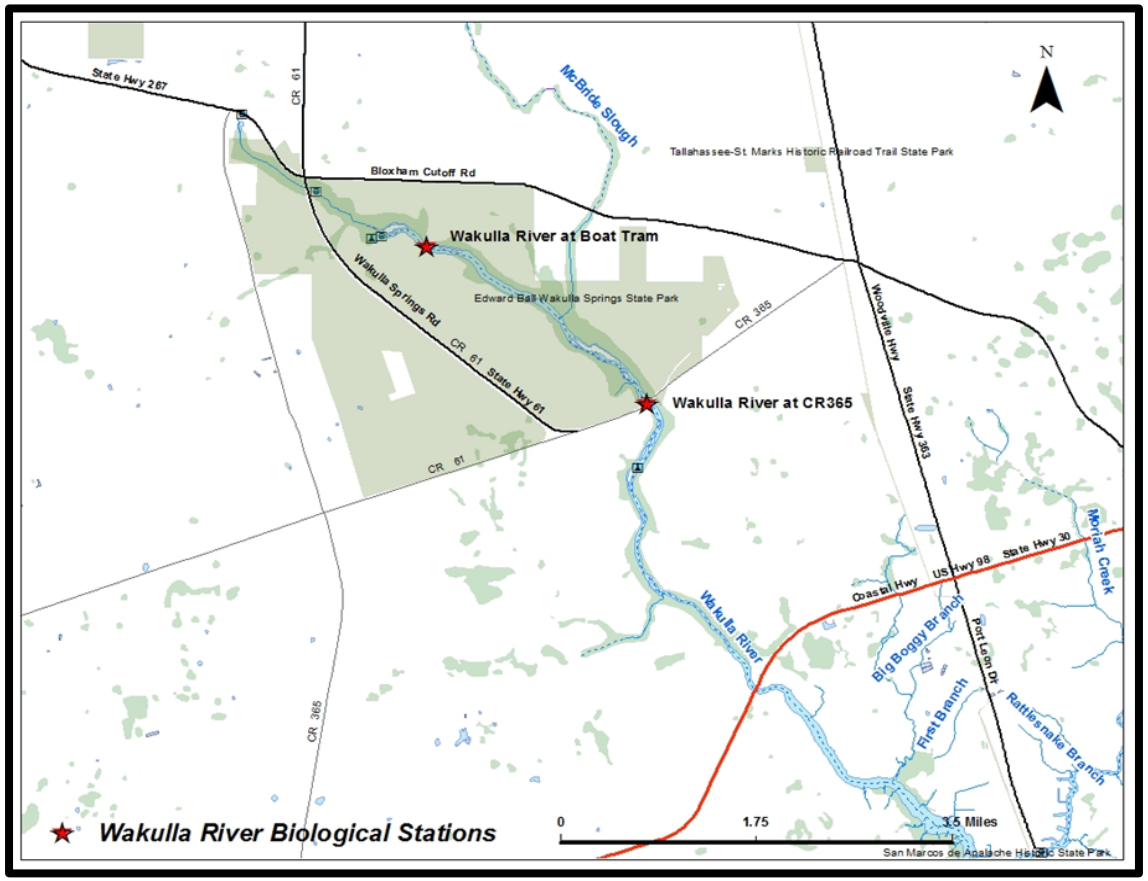
WAKULLA MAIN SPRING NITRATE DATA



WAKULLA SPRING DATA

BIOLOGICAL DATA

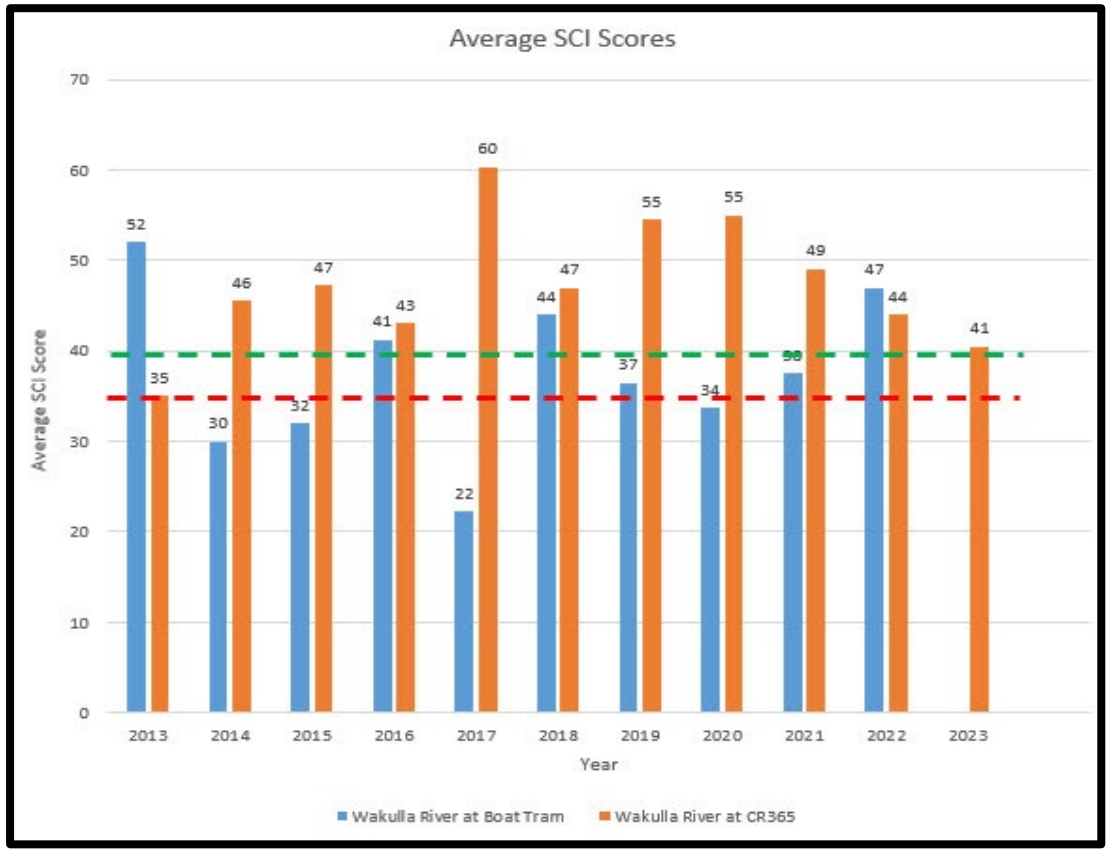
- Beginning in October 2013, the department, in collaboration with the Northwest Florida Water Management District (NWFWMD), collected quarterly water chemistry and biological samples at two locations (CR365 and Boat Tram Site) in the Wakulla River to monitor and measure the effects of current and future nutrient reductions on the biological communities in the Wakulla River.

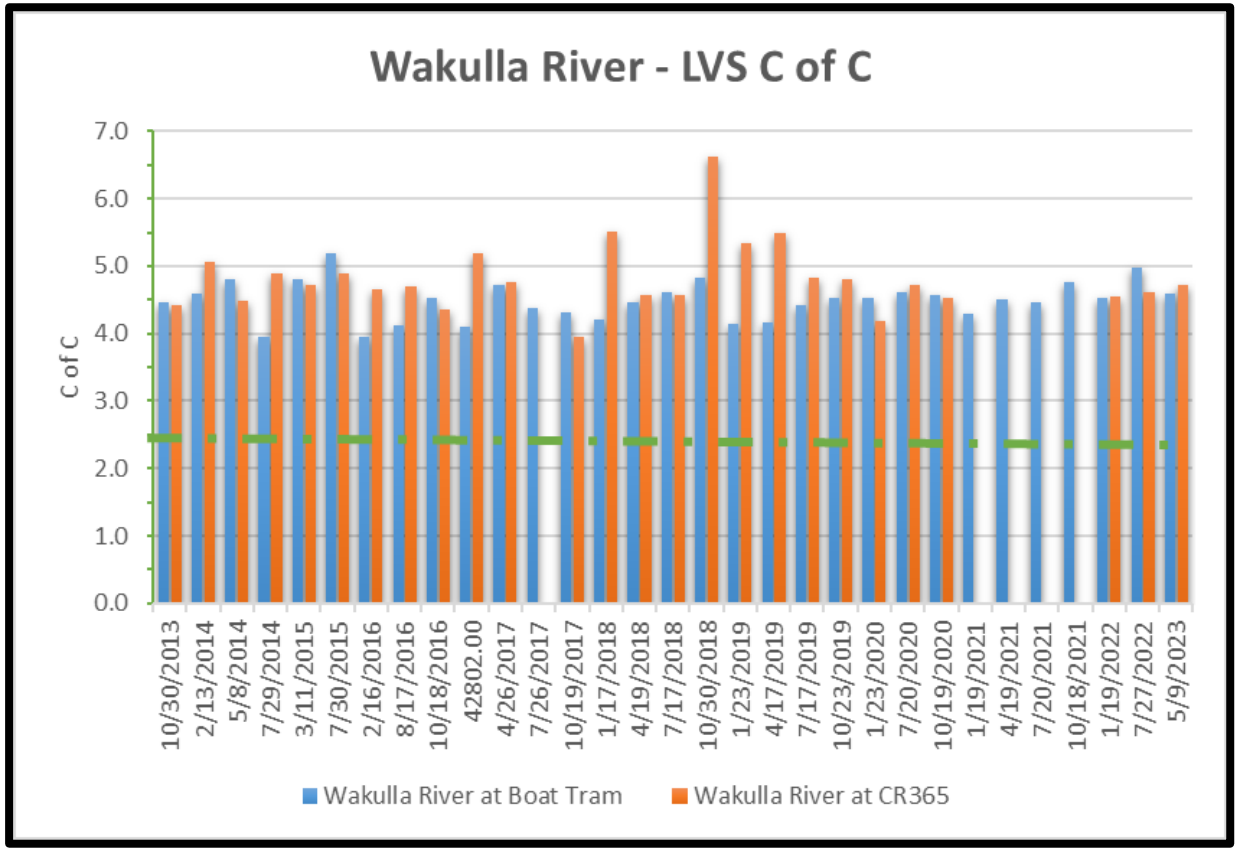


WAKULLA SPRING DATA
BIOLOGICAL DATA

- The overall average Stream Condition Index (SCI) score remains at 42, passing the average minimum impairment threshold of 40.

- The Linear Vegetation Survey (LVS) average score is 4.5 which is greater than or equal to 2.5, the threshold for balanced flora. The LVS metrics meet the evidentiary thresholds.



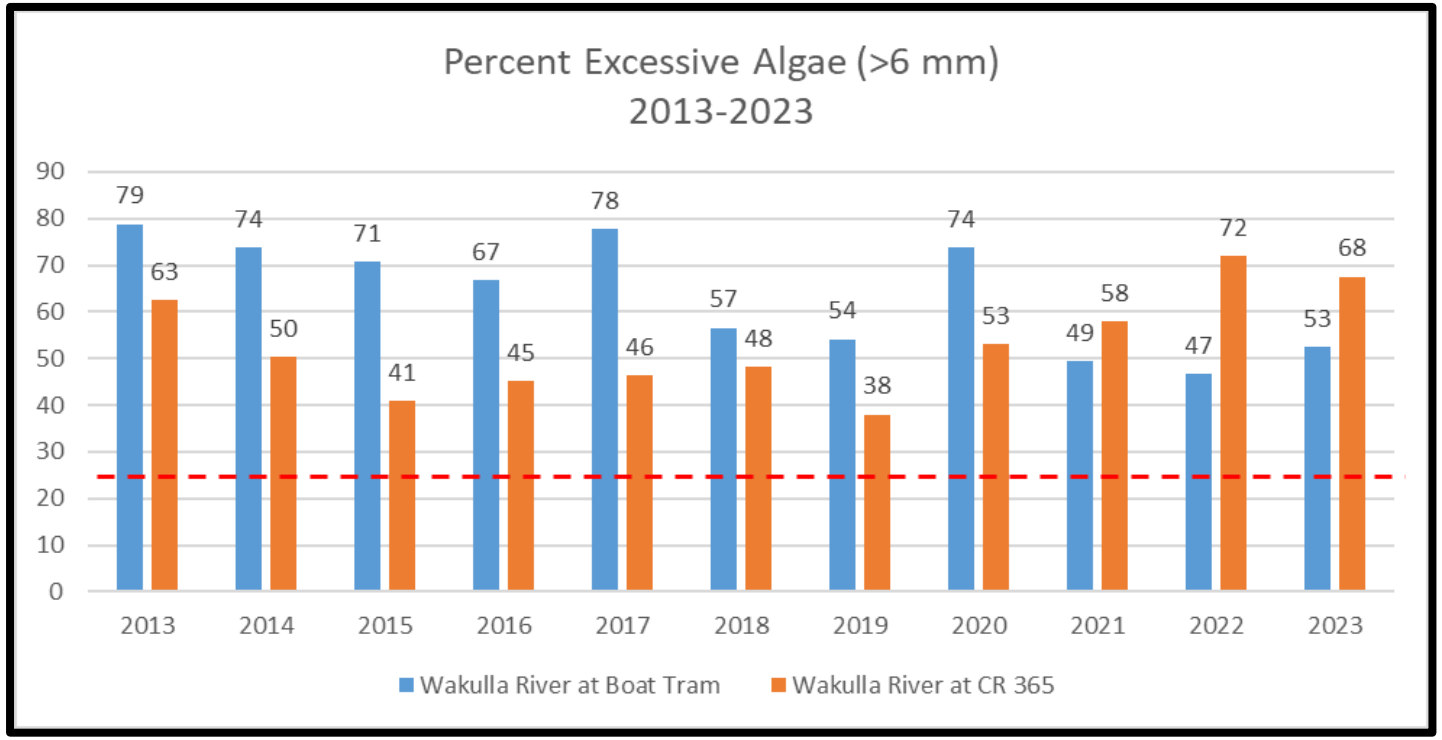


WAKULLA SPRING DATA

BIOLOGICAL DATA

- The Rapid Periphyton Survey (RPS) indicates an imbalance in the floral community based on the abundance of excessive algal growth.

- No years indicate an imbalance in floral communities based on chlorophyll *a*. If a stream exhibits annual geometric mean (AGM) chlorophyll *a* concentrations below the 90th percentile values (3.2-3.5 µg/L) observed at minimally disturbed and healthy sites, that chlorophyll *a* concentration shows no imbalance of flora.



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.

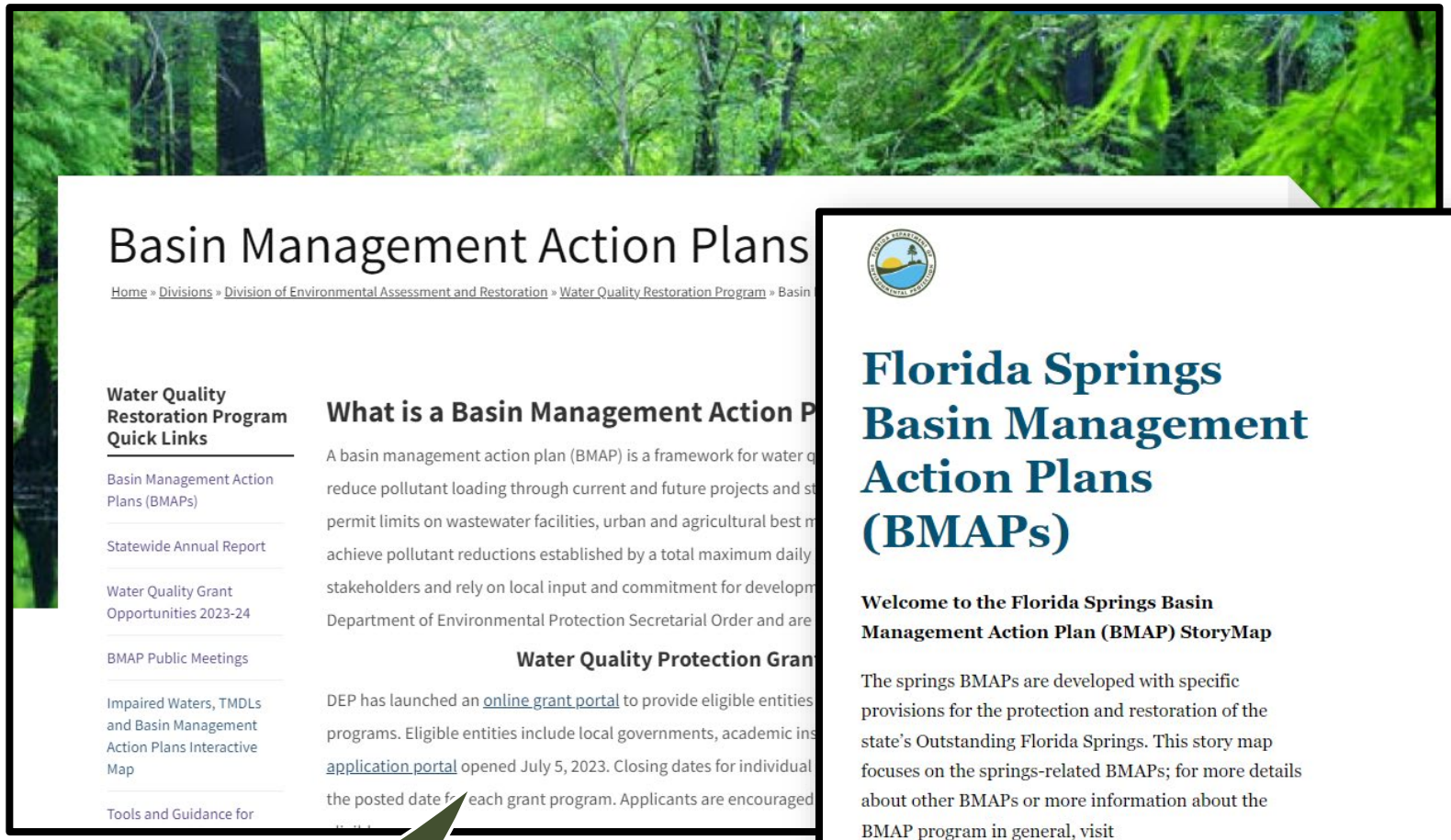
- If your entity is collecting ambient water quality data, please upload it to WIN.

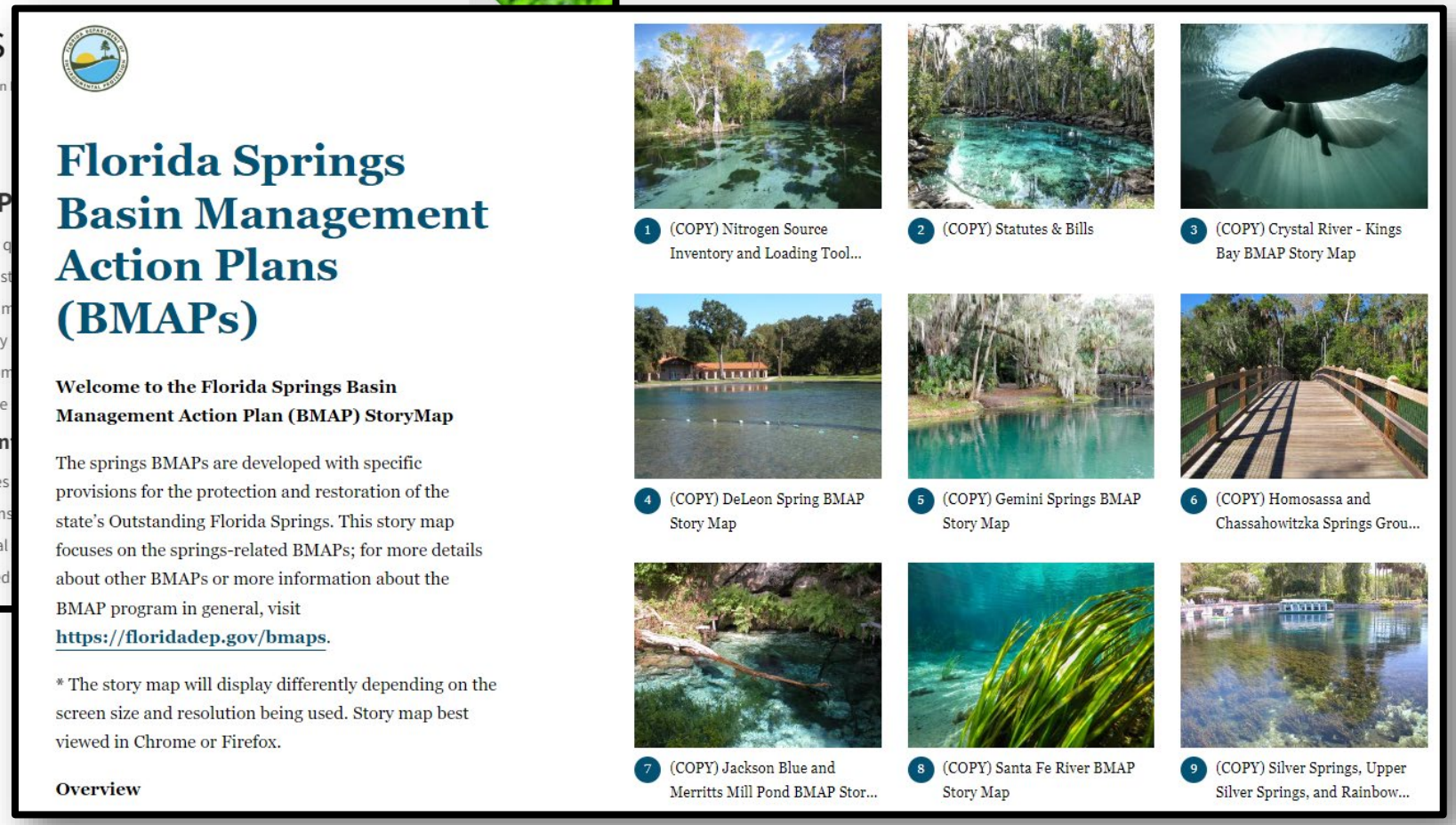
WIN COORDINATORS

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

RESOURCES

BMAP WEBSITE AND STORYMAP





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 projects.
- Incorporate Clean Waterways Act (SB 712) requirements.
- Incorporate HB 1379 requirements.
- Incorporate regional projects.

- Water quality data evaluation:
  - Evaluation of the monit oring 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.
  - Wastewater treatment facilities.
  - OSTDS.
  - Urban turfgrass fertilizer.
  - Sports turfgrass fertilizer.
  - Farm fertilizer.
  - Livestock waste.
  - Biosolids (no sites in Wakulla BMAP).
- Draft results.

NSILT GENERAL PROCESS SUMMARY

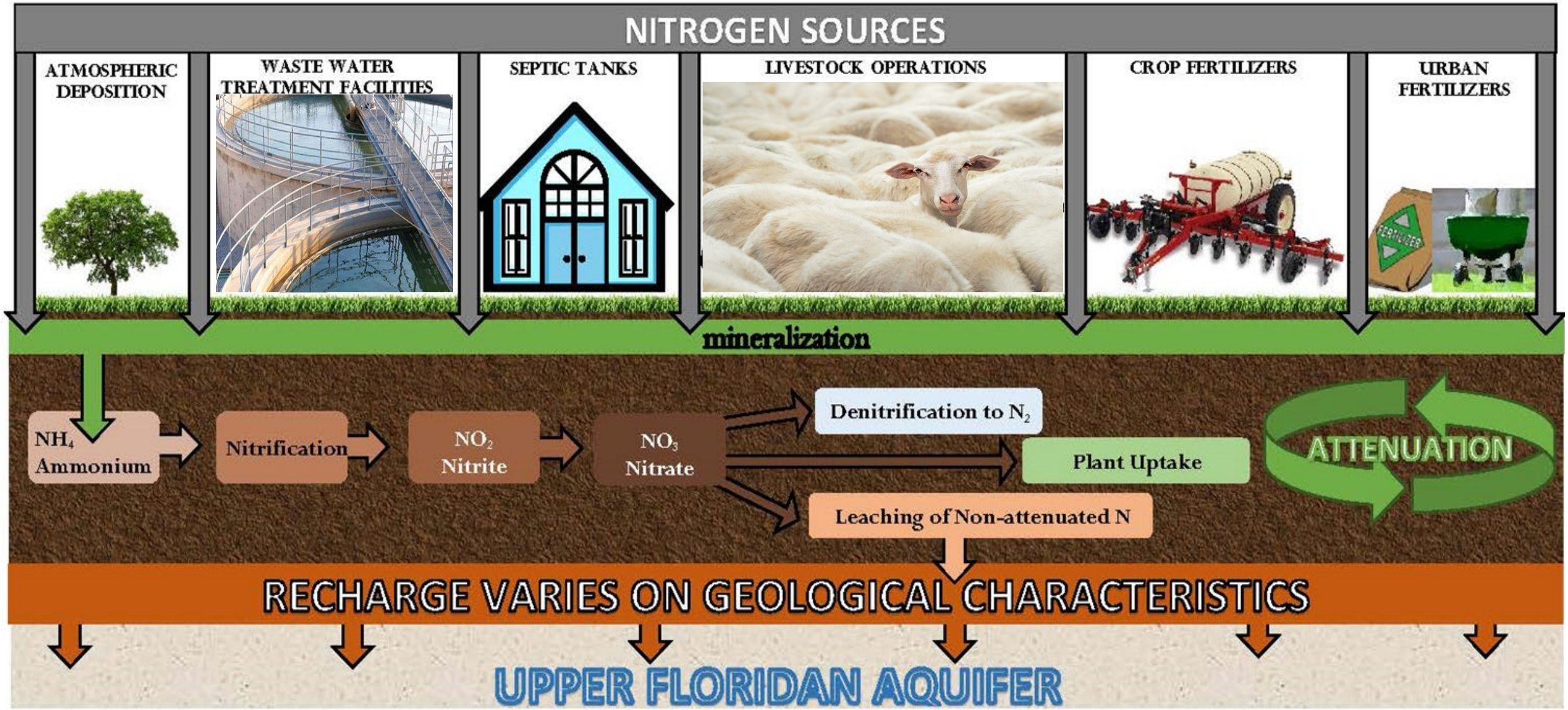
Estimate loading to land surface for each source category.

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

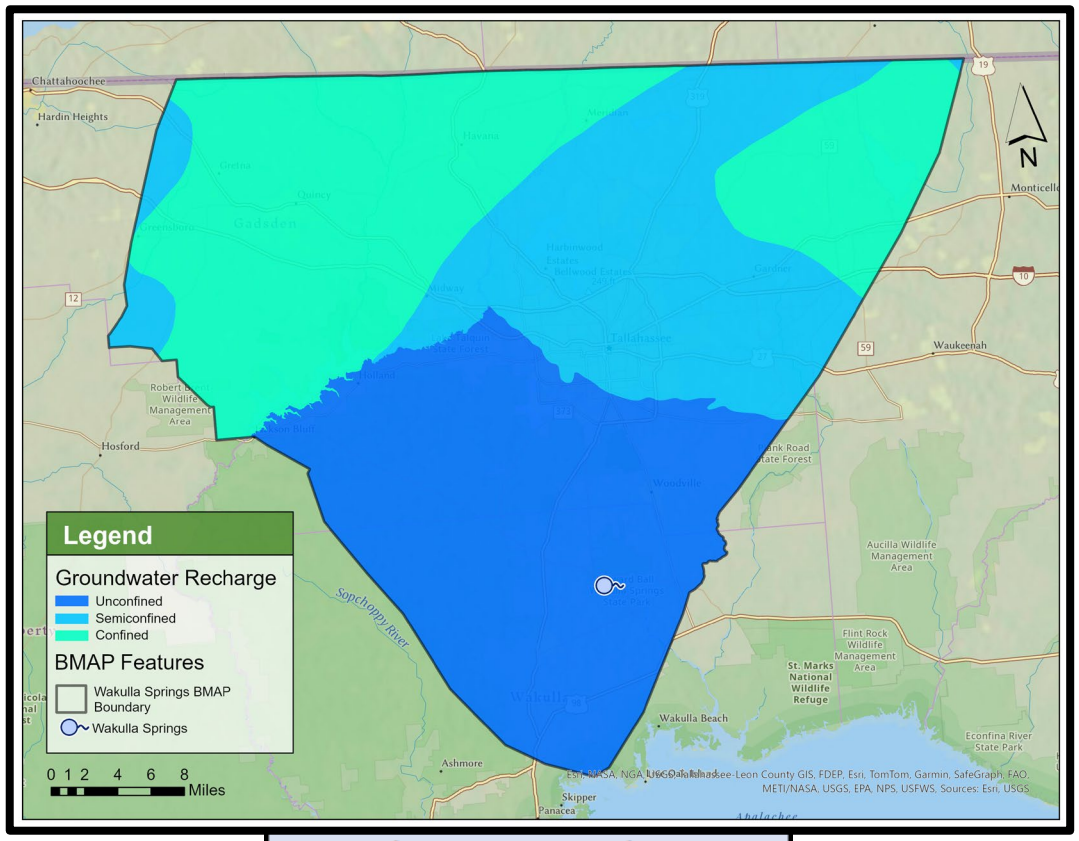
Apply a location specific recharge factor to surface loading estimate.

LOADING TO GROUNDWATER.

NITROGEN CYCLE AND ATTENUATION



RECHARGE TO GROUNDWATER

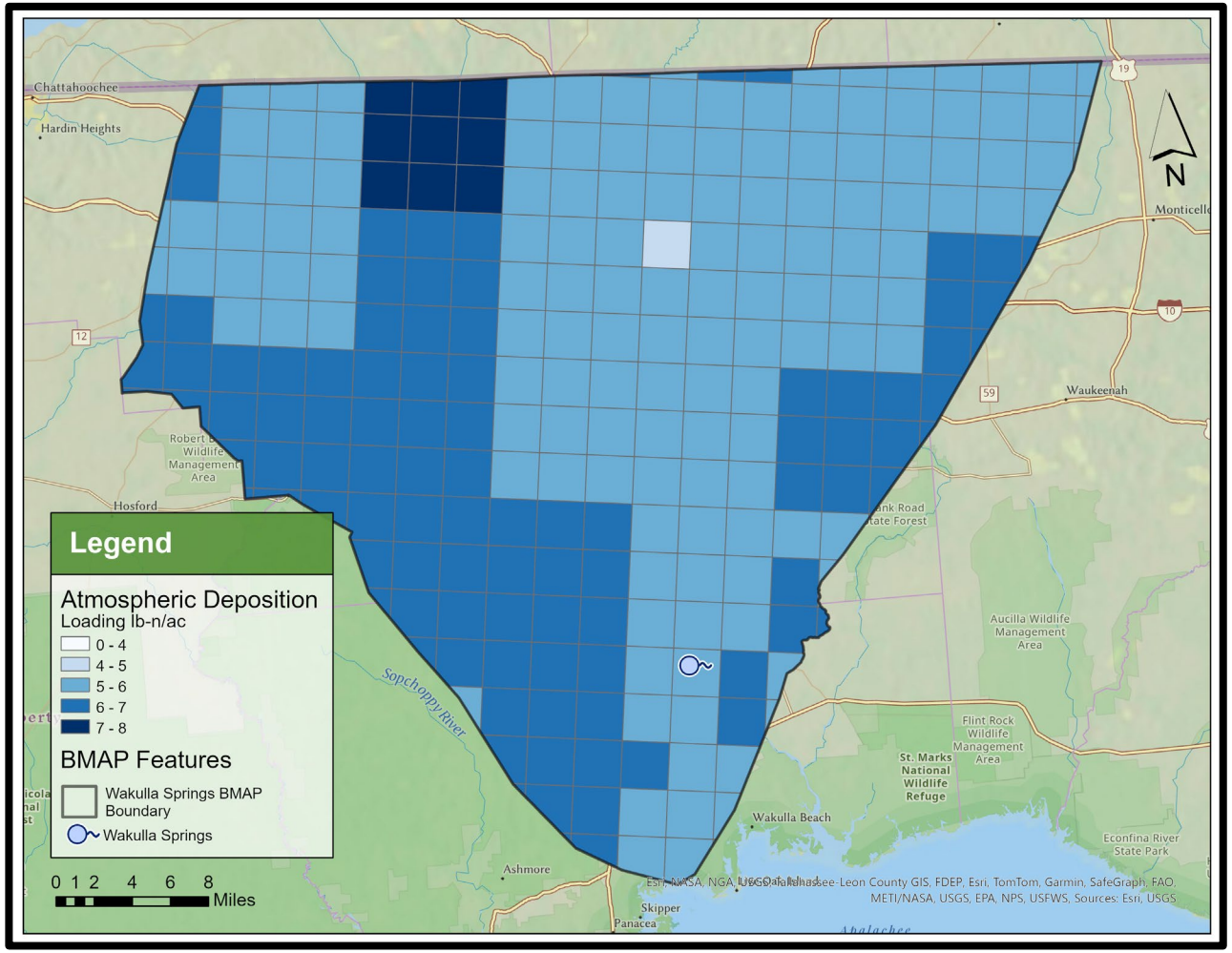


Recharge to Groundwater	
Category	Rate
Unconfined	90%
Semiconfined	40%
Confined	10%

- The Wakulla Spring BMAP is divided into three recharge categories based on the confinement of the Floridan aquifer.
- In unconfined areas, it is estimated that between 9 and 20 inches of water will recharge to the Floridan aquifer annually.
- In semiconfined areas it is estimated that between 3 and 8 inches of water will recharge the aquifer annually.
- In confined areas it is estimated that 0 to 2 inches of water will recharge the Floridan aquifer annually.
- Due to the variability in the quantity of water recharging the Floridan aquifer, various recharge rates are applied.
- Delineation of unconfined, semiconfined, and confined areas and associated recharge rates are consistent with the previous NSILT report.

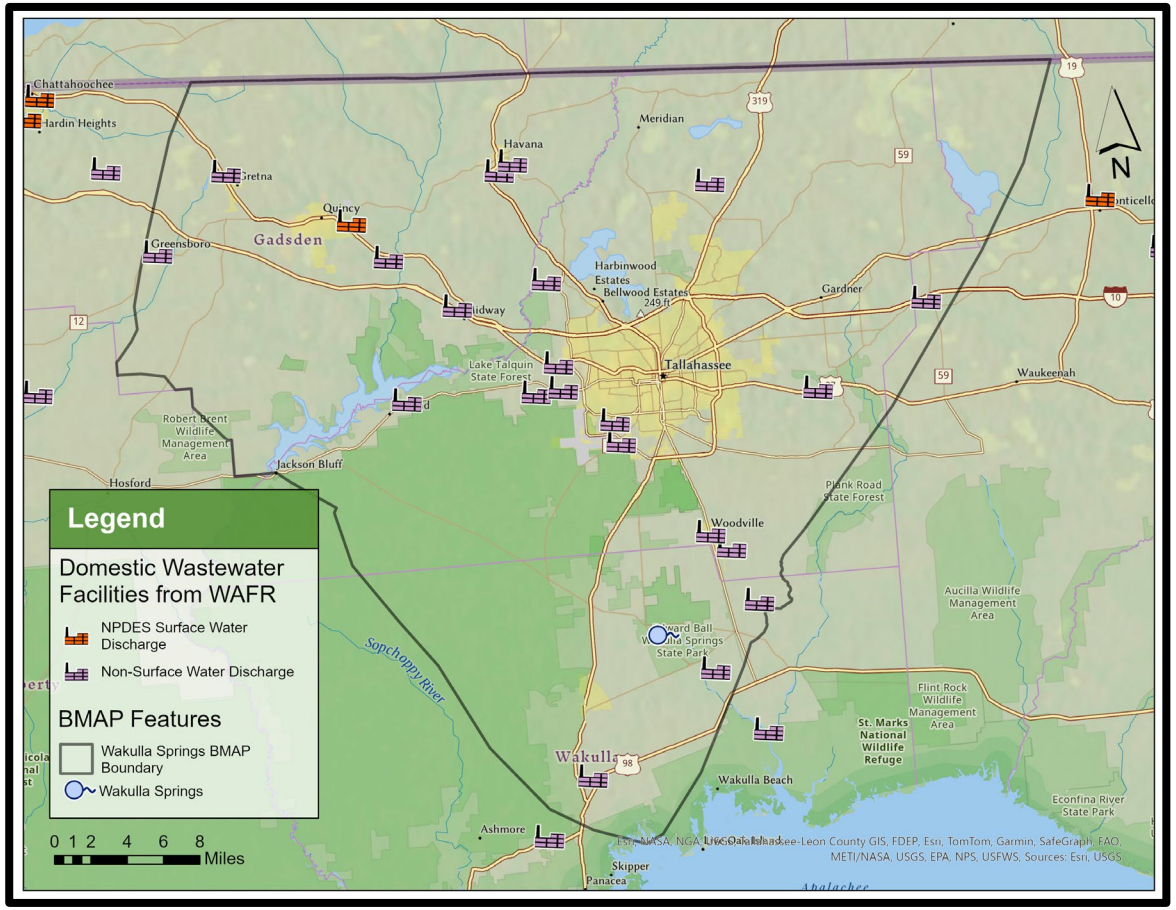
ATMOSPHERIC DEPOSITION (AD)

- Atmospheric deposition of nitrogen was estimated using a nationwide model developed by the Total Deposition Science Committee and U.S. Environmental Protection Agency (EPA) called the Total Deposition (TDEP) model.
- AD estimates from 2019 and 2020 were averaged to estimate annual loading in the Wakulla Spring BMAP.
- An estimated 5,030,310 pounds of nitrogen from AD are loaded annually at the land surface within the Wakulla Spring BMAP.
- An estimated 232,007 pounds of nitrogen are loaded to the Floridan aquifer annually from AD after attenuation and recharge have been considered.
- Methodology is consistent with previous NSILT.



WASTEWATER TREATMENT FACILITIES

- Wastewater Facility Regulation (WAFR) information was reviewed to determine the location of all Wastewater Treatment 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, Rapid Infiltration Basins (RIB), sprayfield, absorption field or wetland. Each method has its own estimated attenuation factor.



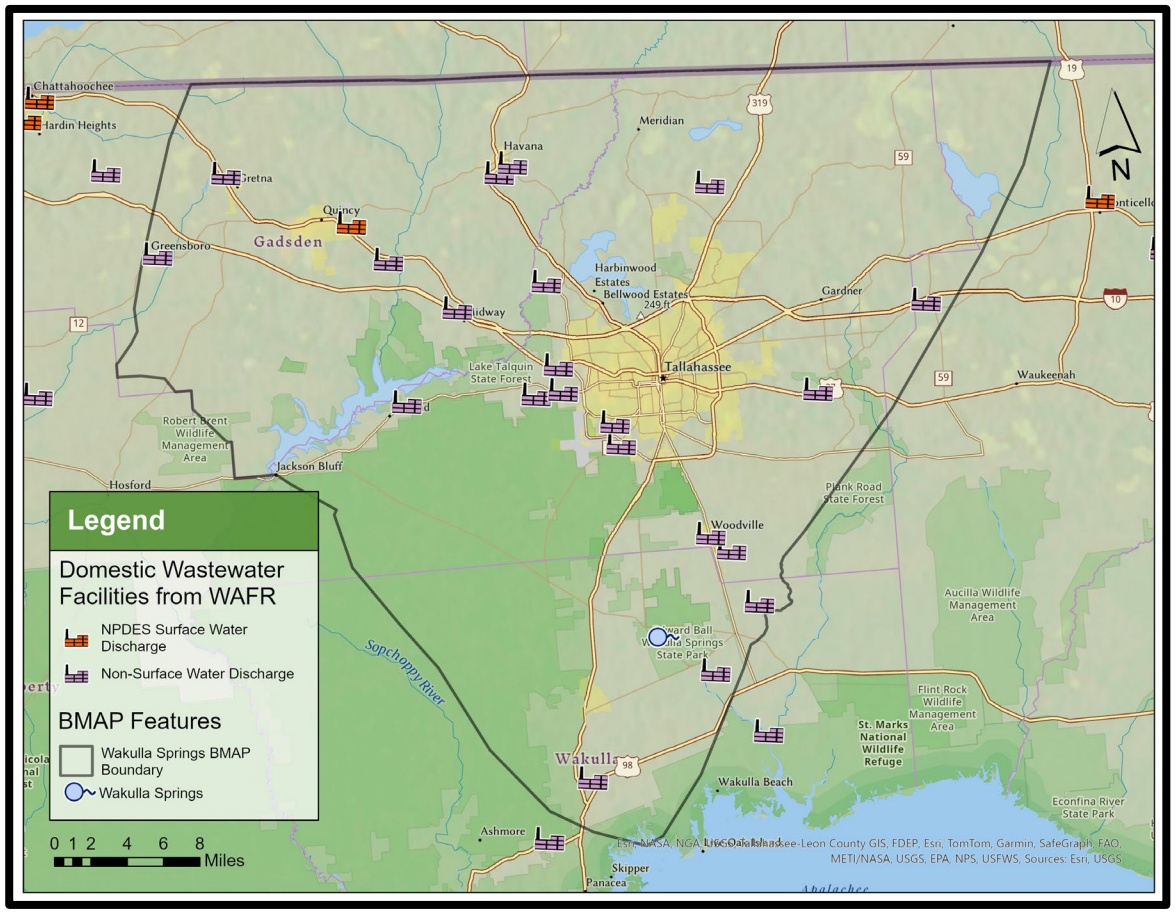
Wastewater Treatment Effluent Attenuation				
Reuse	RIB	Sprayfield	Absorption Field	Wetland
75%	25%	60%	50%	85%

WASTEWATER TREATMENT FACILITIES

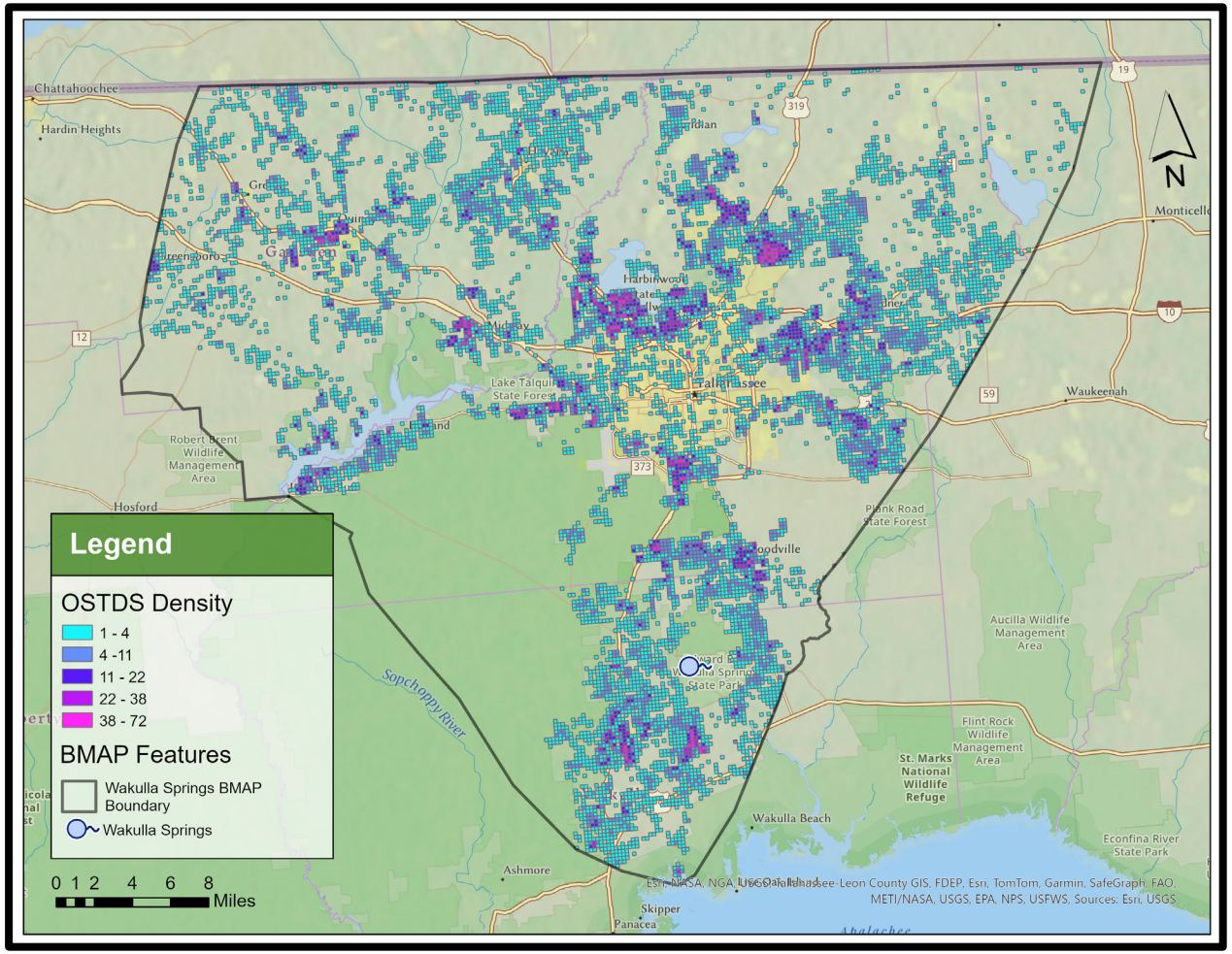
Wakulla Spring BMAP Waste Water Treatement Facility Loading to Land Surface Summary					
County	Facility ID	Facility Name	Disposal Type	Recharge Type at Disposal Site	Total Nitrogen Load (lbs/yr)
Gadsden	FLA010074	Greensboro Elementary School WWTP	Absorption Field	Low	49
Gadsden	FLA010079	Rentz MHP WWTP	Absorption Field	Low	198
Gadsden	FLA010085	Havana Middle School WWTP	RIB	Low	69
Jefferson	FLA010134	Capital City Plaza WWTP	RIB	Low	37
Leon	FLA010136	Woodville Elementary School WWTP	Absorption Field	High	27
Leon	FLA010137	Disc Village WWTP	RIB	High	66
Leon	FLA010138	Fort Braden Elementary School WWTP	Absorption Field	High	92
Leon	FLA010139	T P Smith Water Reclamation Facility	Reuse (golf, residential, etc.)	High	52,659
Leon	FLA010139	T P Smith Water Reclamation Facility	Reuse (golf, residential, etc.)	Medium	247
Leon	FLA010139	T P Smith Water Reclamation Facility	Reuse (golf, residential, etc.)	High	1,382
Leon	FLA010139	T P Smith Water Reclamation Facility	Reuse (golf, residential, etc.)	Medium	543
Leon	FLA010148	Lake Bradford Estates MHP WWTP	Absorption Field	High	531
Leon	FLA010151	Grand Village Mobile Home Park WWTP	RIB	High	413
Leon	FLA010152	Western Estates MHP WWTP	Absorption Field	High	106
Leon	FLA010159	Meadows - At - Woodrun WWTF	RIB	Medium	650
Leon	FLA010167	Sandstone Ranch WWTF	RIB	High	502
Leon	FLA010171	Lake Jackson WWTP	RIB	Medium	9,915
Leon	FLA010173	Killearn Lakes WWTP	Sprayfield	Medium	12,664
Leon	FLA010173	Killearn Lakes WWTP	RIB	Medium	527
Wakulla	FLA010229	Wakulla Middle School WWTP	Absorption Field	High	94
Wakulla	FLA010241	River Plantation Estates WWTP	RIB	High	246
Wakulla	FLA016544	Winco Utilities, Inc WWTP	Sprayfield	High	3,923
Gadsden	FLA100765	Havana WWTF	Sprayfield	Low	3,392
Gadsden	FLA100781	Gretna, City of - WWTP	Reuse (golf, residential, etc.)	Low	1,550
Gadsden	FLA187941	Gadsden East WWTF	RIB	Low	2,491

WASTEWATER TREATMENT FACILITIES

- An estimated 92,373 pounds of nitrogen are applied to the land surface from all WWTFs and all disposal methods.
- Within the Wakulla Spring BMAP, use of reclaimed water on golf courses or public access is the predominant effluent disposal method (61%), followed by sprayfields (21.6%), RIBs (16.1%) and absorption fields (1.2%).
- After recharge and attenuation factors are applied, it is estimated that 20,597 pounds of nitrogen are loaded to the Floridan aquifer from WWTFs.



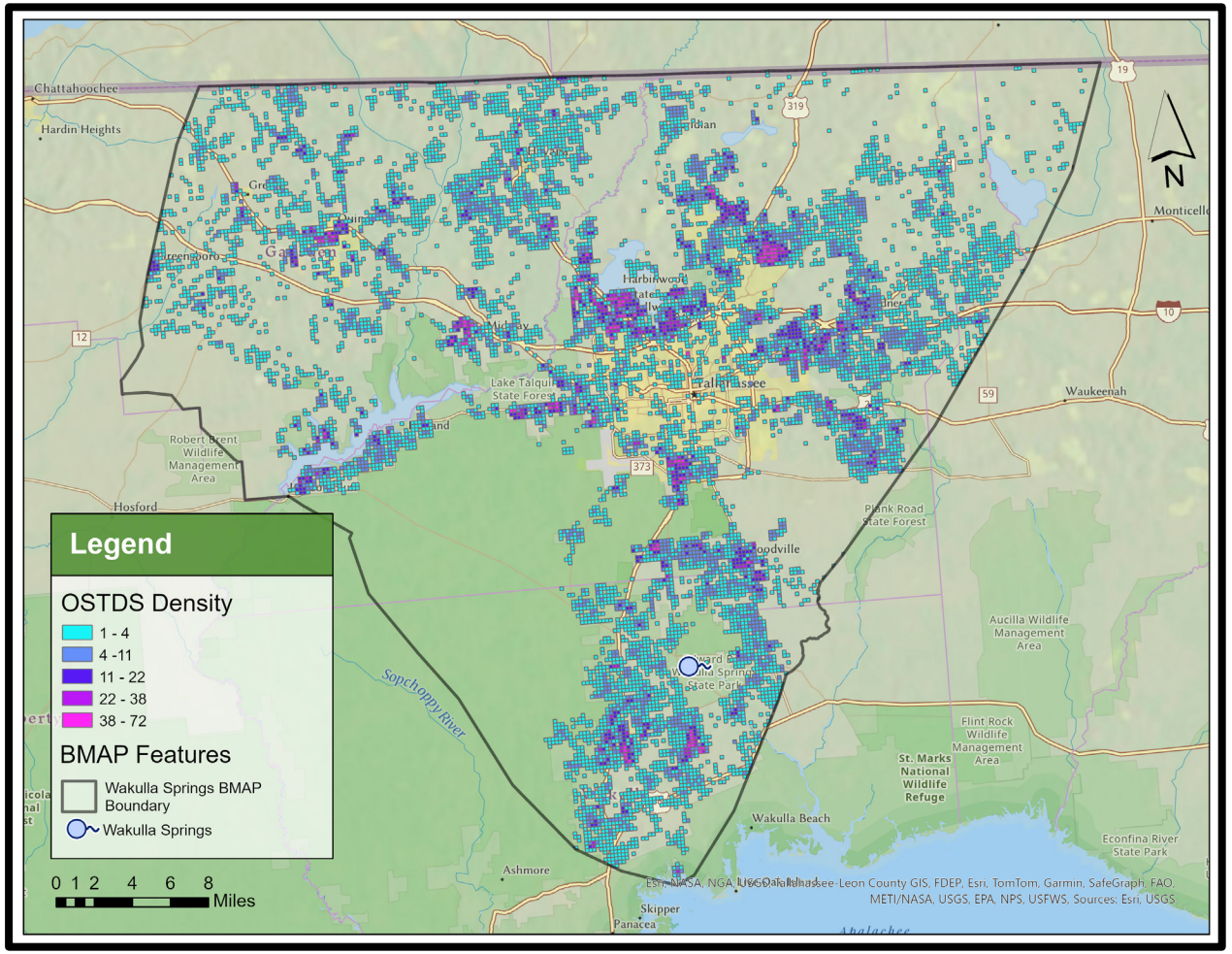
ONSITE SEWAGE TREATMENT AND DISPOSAL SYSTEMS



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

- Florida Water Management Inventory (FLWMI) data was used to estimate the number of OSTDS within the Wakulla Spring BMAP (updated in 2021).
- 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) by county.
- Estimated loading of 10 lb.-N/year per person (Armstrong, 2015).
- Estimated load per tank is based on multiplying the average pph by the estimated 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%.

ONSITE SEWAGE TREATMENT AND DISPOSAL SYSTEMS

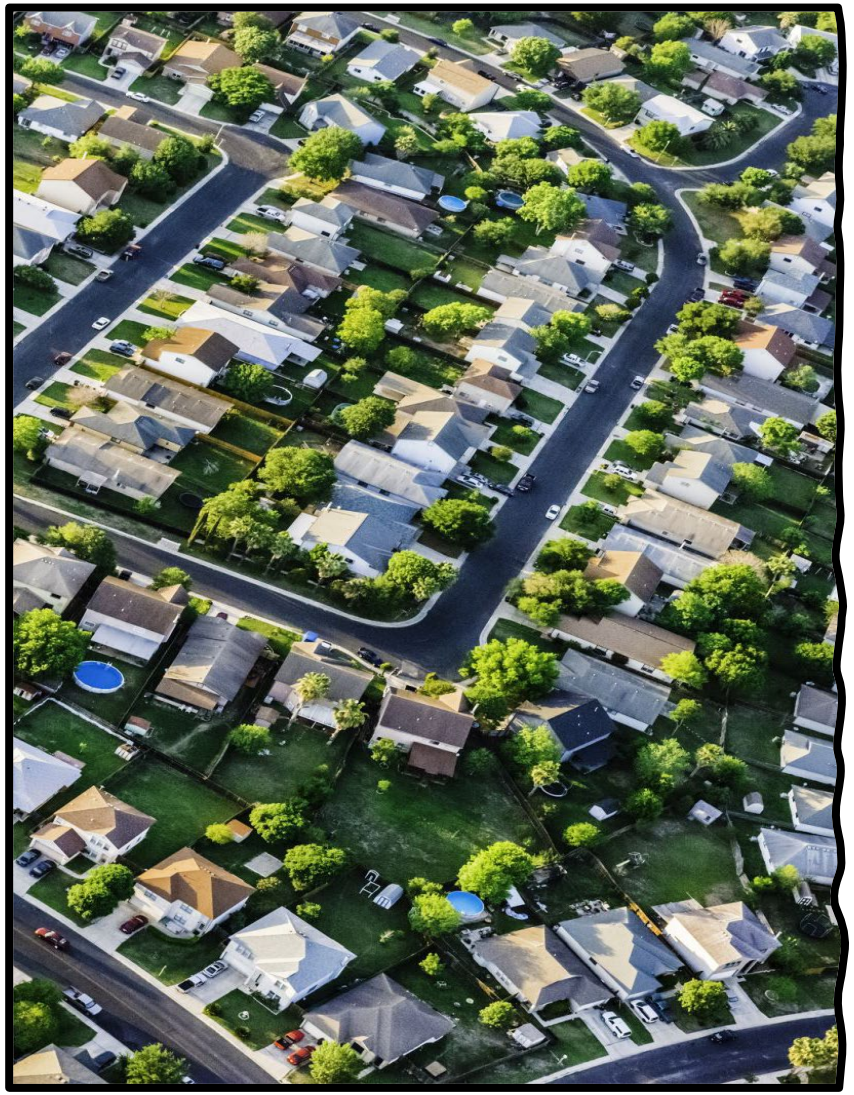


*Density is per 300-meter by 300-meter grid cells.

- An estimated 49,593 OSTDS are within the Wakulla Spring BMAP.
- There are 423 enhanced nutrient reducing OSTDS within the BMAP.
- An estimated 1,196,788 pounds of nitrogen are loaded to drainfields annually from OSTDS within the Wakulla Spring BMAP.
- An estimated 413,225 pounds of nitrogen are loaded to groundwater annually after recharge and attenuation factors are applied.

URBAN TURFGRASS 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%.



Microsoft Stock Image, 2023

URBAN TURFGRASS FERTILIZER
SINGLE FAMILY RESIDENTIAL

- 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 the Wakulla Spring BMAP.
- 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	19.00%
Self	16.00%
None	65.00%

Self Application Rates	Percent of Self Lawn Care Source	Application Rate (lbs/N/ac/application)	Number of Applications
BMP	20.00%	26.136	1.880
Low	75.00%	30.490	1.880
High	5.00%	43.560	1.880

URBAN TURFGRASS FERTILIZER
NON-SINGLE FAMILY RESIDENTIAL

- Water management district 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.
- Fourteen 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%
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 14 land cover codes to then estimate the area expected to receive fertilization.

URBAN TURFGRASS FERTILIZER

- 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.
- In total, it is estimated that 416,384 lb-N/year are applied to single family residential areas, and 239,419 lb-N/year are applied to non-single family residential areas within the Wakulla Spring BMAP.
- With attenuation and recharge factors considered, it is estimated that 55,298 lb-N/year is loaded to groundwater from single family residential sources, and 32,957 lb-N/year is loaded to groundwater from non-single family residential sources, for a total of 88,255 lb-N/year loaded to groundwater for UTF.

SPORTS TURFGRASS FERTILIZER

Sports Turfgrass Fertilizer (STF) is a combination of golf course and other sports turfgrass areas:

- BMAP area was evaluated to identify active golf courses.
- Previous NSILT estimates of non-golf 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 for STF where information was available.

Wakulla Spring	Acres of Sports Turfgrass				Loading (lb-N/year)			
	High	Medium	Low	Discharge	High	Medium	Low	Discharge
Leon	76	183.59	2.22	0	3292	7997	97	0
Wakulla	32	0	0	0	1398	0	0	0
Gadsden	0	2.36	24.25	0	0	103	1056	0

Microsoft Stock Image, 2023

SPORTS TURFGRASS FERTILIZER

Leon									
		Land Area (Ac)				N Input (lb-N/yr)			
Golf Course	Regional Rate or Site Specific	High	Medium	Low	Discharge	High	Medium	Low	Discharge
Seminole	Regional	124	206			11,883	19,741	0	0
Southwood	Regional		277			0	26,545	0	0
Summerbrooke	Regional		171			0	16,387		
Capital City	Regional		189			0	18,112		
Jack Gaiher	Specific	119				1,787	0	0	0
Killearn	Regional		269			0	25,779	0	0
Golden Eagle	Regional		171			0	16,387	0	0
Hilaman	Specific		122			0	3,895	0	0

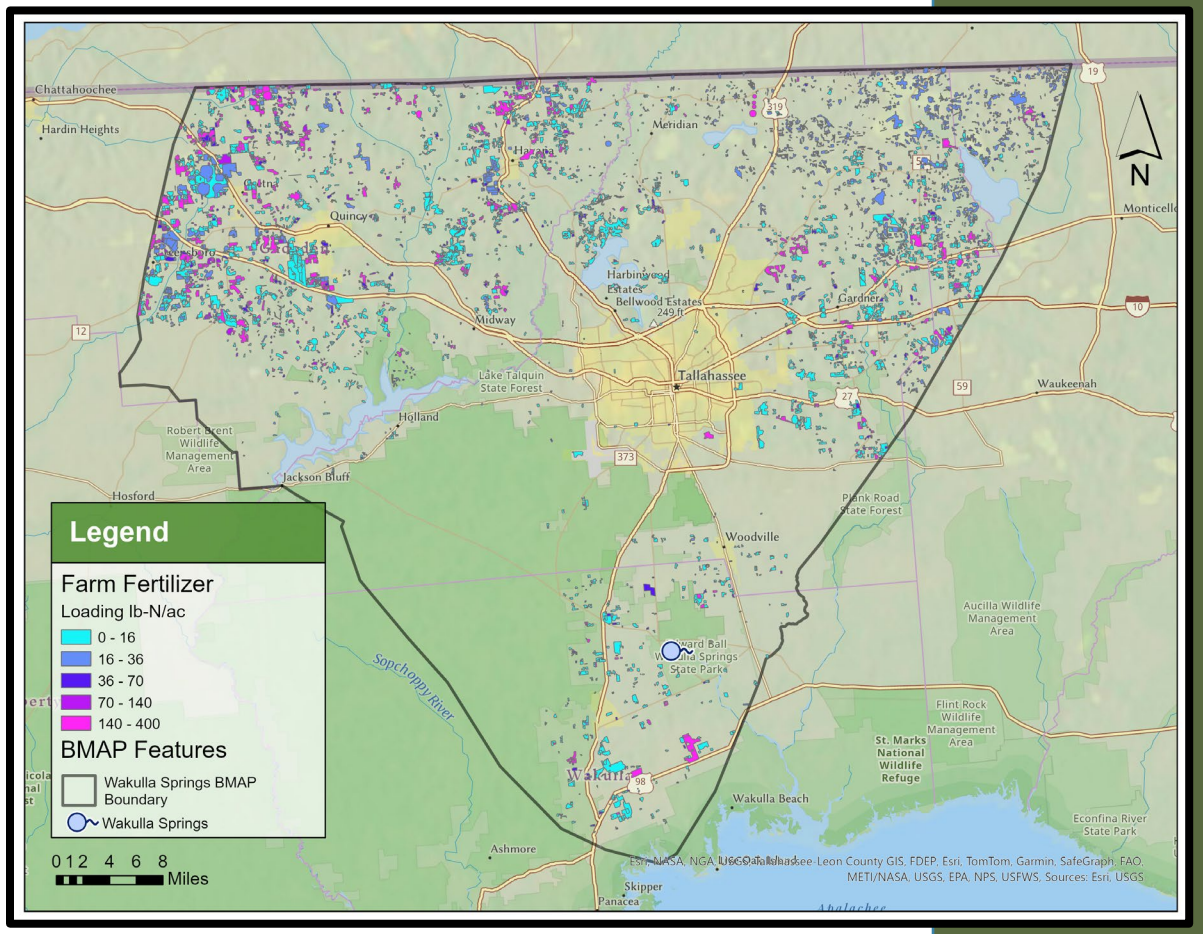
Wakulla									
		Land Area (Ac)				N Input (lb-N/yr)			
Golf Course	Regional Rate or Site Specific	High	Medium	Low	Discharge	High	Medium	Low	Discharge
Wildwood	Regional	163				15,621	0	0	0

Gadsden									
		Land Area (Ac)				N Input (lb-N/yr)			
Golf Course	Regional Rate or Site Specific	High	Medium	Low	Discharge	High	Medium	Low	Discharge
Havana	Regional			92		0	0	8,817	0
Quincy	Specific			195			0	3,719	0

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

- Golf courses operating within the Wakulla Spring BMAP 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).
- It is estimated that 168,673 lb-N/year is applied to the land surface at golf courses.
- When attenuation and recharge are considered, it is estimated that 25,779 lb-N/year is loaded to groundwater from golf courses.

FARM FERTILIZER (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 and updated by the Florida Department of Agriculture and Consumer Services (FDACS), water management districts (WMD) and University of Florida Institute of Food and Agricultural Science (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.
- FF is estimated to attenuate at 80%.

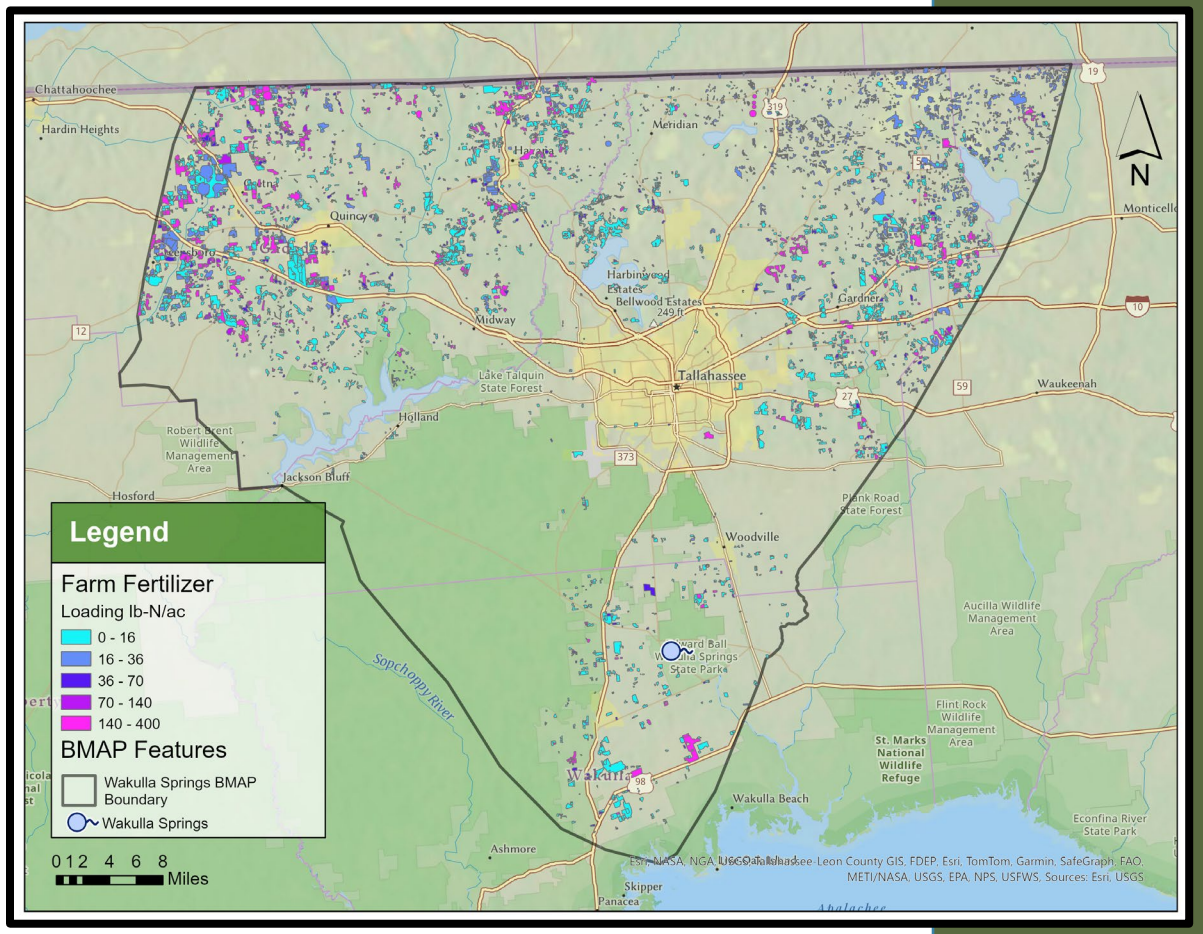
FARM FERTILIZER

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 for fertilizer being applied to containers that hold the nutrients longer.
- Adjustment to fertilizer application rates for pastureland that utilize field rotation.
  - Fertilizer was estimated to be applied to 20% of pasturelands annually.

FARM FERTILIZER



- In total, it is estimated that 2,909,724 pounds of nitrogen are applied to the land surface from FF within the Wakulla Spring BMAP.
- When recharge and attenuation are applied, it is estimated that 136,907 pounds of nitrogen are loaded to the Floridan aquifer annually from FF.

FARM FERTILIZER

Crop	Fertilizer Application Rate (lb-N/ac)	Acres in BMAP
Improved Pastures	50	13,084
Hay	180	8,638
Wildlife Strip Crops	30	7,775
Peanuts	20	3,703
Grass Pasture	80	2,918
Cropland Pastureland	50	2,909
Cotton	110	1,156
Horse Farms	50	812
Sod	200	717
Container Nursery	150	707

- The most common crop types by acreage within the Wakulla Spring BMAP are improved pastures, hay and wildlife strip crops.
- When the fertilizer application rates and the adjustments for pasture and nursery crops are considered, hay is the crop with the highest estimated nitrogen loading to land surface within the BMAP.
- When attenuation and recharge factors are applied, hay is estimated to be the crop contributing the greatest load to groundwater within the basin.

Crop	Fertilizer Application Rate (lb-N/ac)	Loading to Land Surface (lb-N/year)
Hay	180	1,554,793
Wildlife Strip Crops	30	233,244
Cropland Pastureland	50	145,466
Sod	200	143,358
Improved Pastures	50	130,837
Cotton	110	127,153
Corn (non-irrigated)	180	96,394
Field Corn	240	76,856
Peanuts	20	74,060
Vegetables	150	47,559

Crop	Fertizer Application Rate (lb-N/acre)	Loading to Groundwater (lb-N/year)
Hay	180	78,625
Wildlife Strip Crops	30	10,051
Improved Pastures	50	9,052
Cropland Pastureland	50	8,291
Sod	200	4,819
Cotton	110	3,996
Grass Pasture	80	3,081
Corn (irrigated)	240	2,858
Corn(non-irrigated)	180	2,634
Peanuts	20	2,627

LIVESTOCK WASTE

- 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 the BMAP and adjust USDA livestock 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%.
- Dairy loading was considered separately from LW; however, it was determined that there were no dairy operations within the Wakulla BMAP area.

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

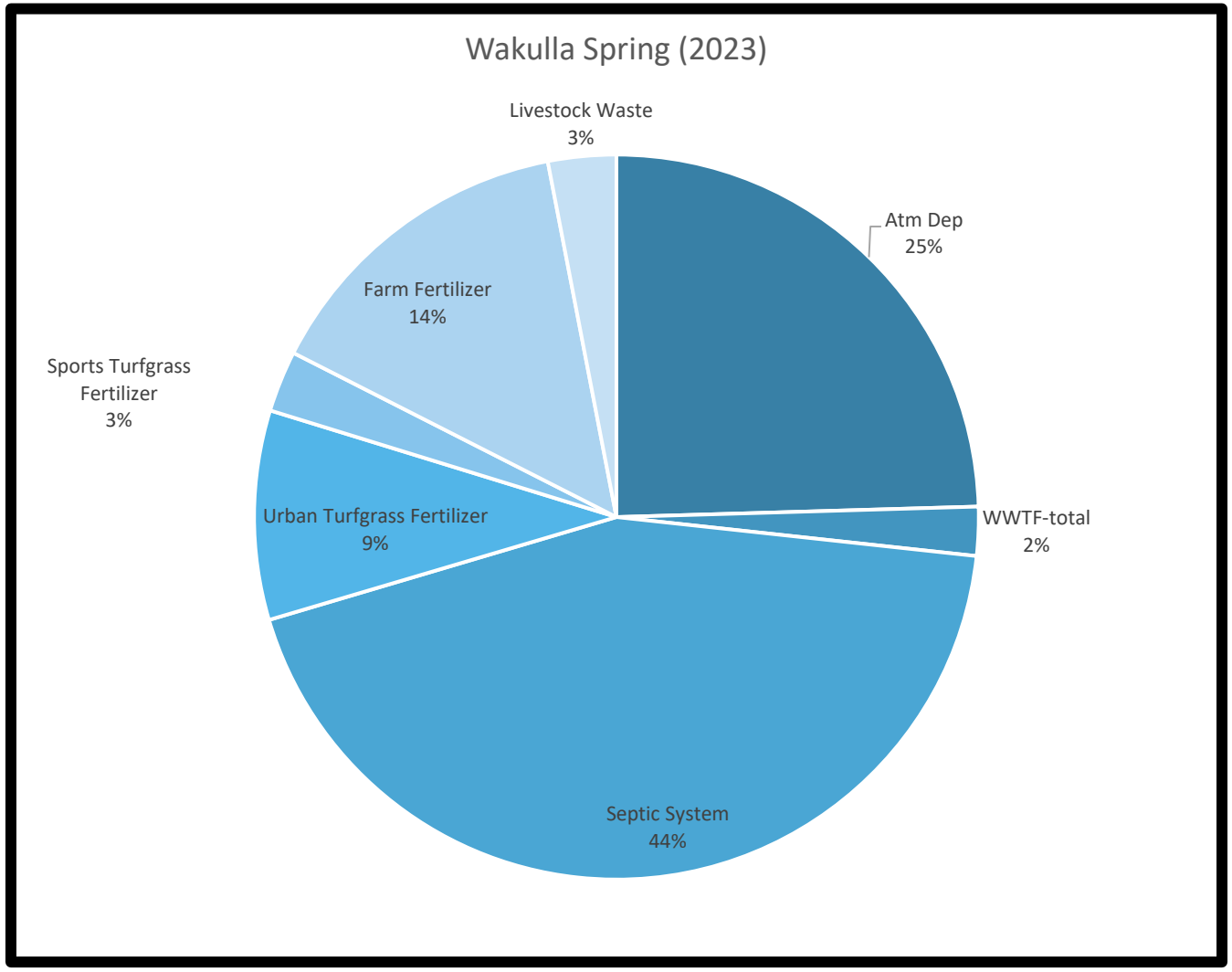
LIVESTOCK WASTE

Livestock Type	Estimated Livestock Population				
	Gadsden	Jefferson	Leon	Wakulla	Total
Beef Cattle	2,550	7,560	1,050	550	11,710
"Other" Cattle	83	3,360	608	425	4,475
Calves	1,418	5,880	893	525	8,715
Donkeys	170	172	80	49	471
Horses	463	1,046	717	218	2,444
Chicken, Broilers	13	16	47	231	307
Chicken, Layers	0	1,952	1,182	3,088	6,222
Goats	628	793	1,171	115	2,707
Hogs	157	156	256	32	601
Sheep	351	336	36	56	779
Turkeys	0	35	0	68	103

Livestock Type	Loading to Land Surface (lb-N/year)	Loading to Groundwater (lb-N/year)
Beef Cattle	501,907	13,586
"Other" Cattle	137,100	6,416
Calves	35,460	1,120
Donkeys	10,094	309
Horses	134,849	4,666
Chicken, Broilers	190	15
Chicken, Layers	4,363	312
Goats	23,474	705
Hogs	29,370	888
Sheep	29,105	694
Turkeys	135	12

- An estimated 906,047 pounds of nitrogen are deposited on the land surface from LW within the Wakulla Spring BMAP.
- When recharge and attenuation are applied, an estimated 28,722 pounds of nitrogen are loaded to groundwater from LW.

DRAFT NSILT LOADING



Wakulla Springs BMAP Area	
Source	**Annual Loading (lb-N/year)**
Atmospheric Deposition	232,007
Wastewater Treatment Facilities	20,597
OSTDS	413,225
Urban Turfgrass Fertilizer	88,255
Sports Turfgrass Fertilizer	25,799
Farm Fertilizer	136,907
Livestock Waste	28,722
Total	945,512

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.

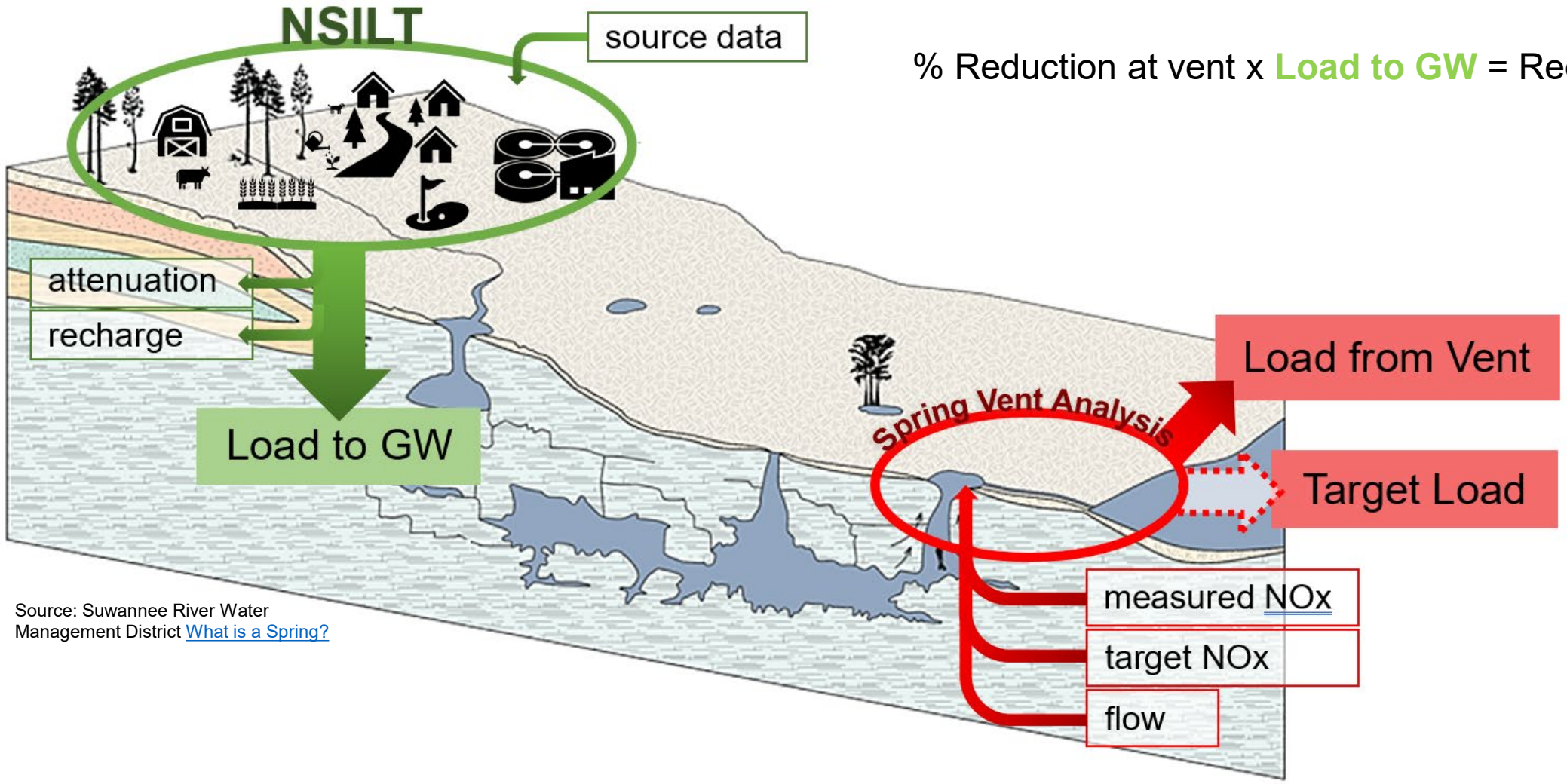
Applied the spring vent percent reduction to the updated NSILT loading.

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

Description	DRAFT Nitrogen Loads (lb-N/yr)	Notes Regarding Data Used
Total Load at Spring Vent	**627,101**	Upper 95% confidence interval - nitrate data from 2014 to 2022 and flow data from 2012 to 2022 (0.41 mg/L and 784 cubic feet per second (CFS)).
TMDL Load	**539,806**	TMDL target is 0.35 mg/L and using the same flow data from 2012 to 2022.
Required Reduction	**87,295**	Total Required Reduction of 14% is needed to meet the TMDL at the spring vent.

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.

WWTF

- Reduction strategy based on BMAP effluent requirements in the BMAP document.

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 and cost-share practices.

AD

- Anticipated reductions to be addressed by reductions from other sources.

BMAP UPDATES

ALLOCATION AND REDUCTION APPROACH

UTF

- Apply the 14% reduction to the total UTF load to groundwater and allocate to the applicable local governments.

STF

- Apply the 14% 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 their implementation of BMPs and a Nutrient Management Plan (NMP) to address their loading.

BMAP UPDATES
FUTURE GROWTH

Domestic Wastewater Projections:

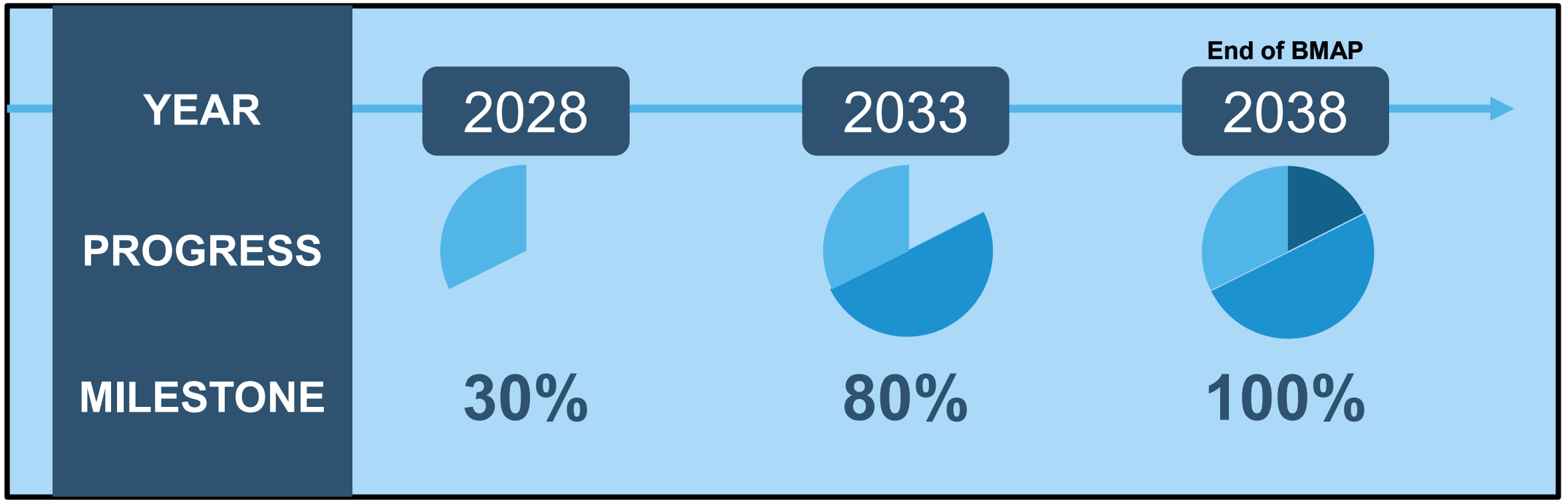
- Use wastewater to estimate future growth projections.
- Start with population growth for each county from Bureau of Economic and Business Research (BEBR)
  - 2040 Medium Growth Projections.
- Proportion growth for each entity based on land area.
- Distinguish the future population expected to be served 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:

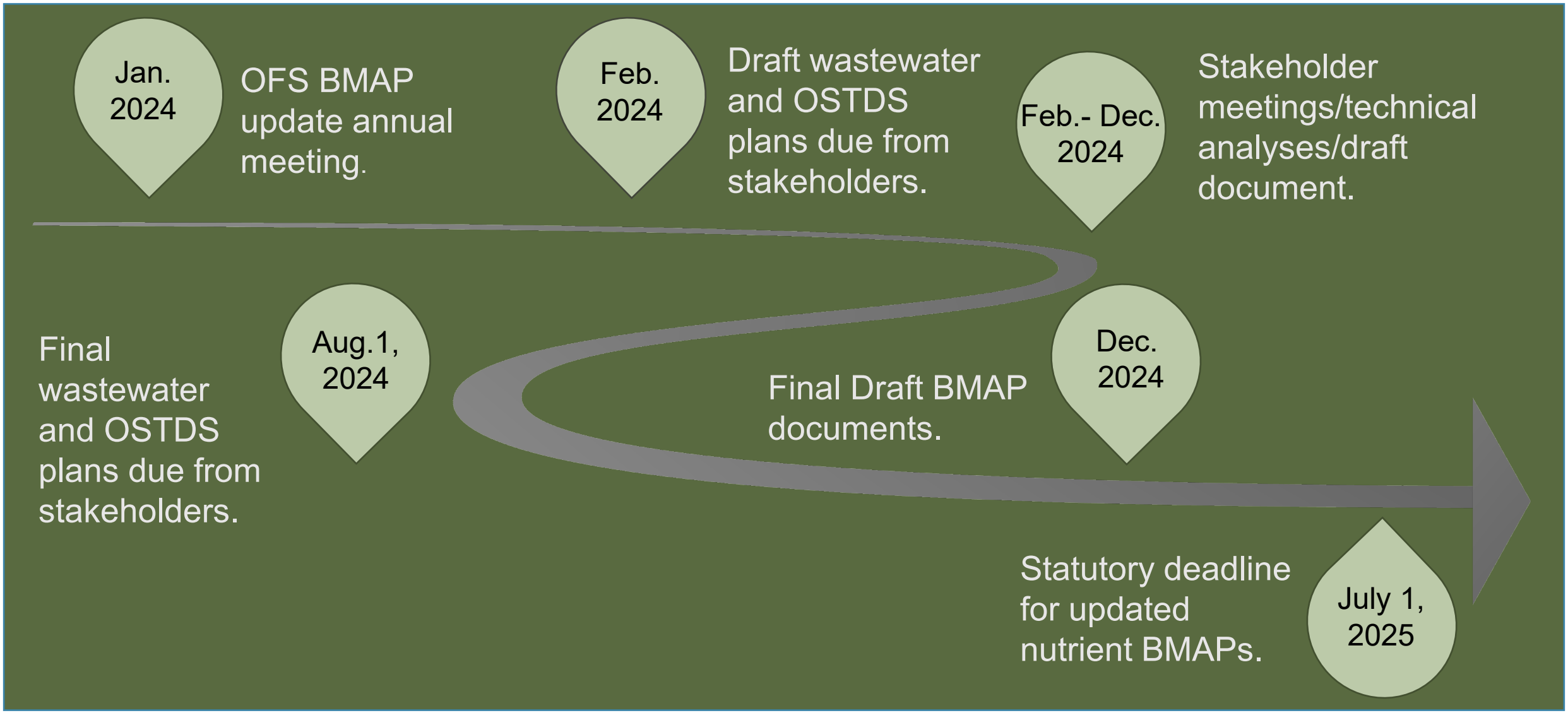
- Exploring different tools to estimate future changes in agricultural acreage in the BMAPs to estimate changes in agricultural loading.

BMAP UPDATES

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



SPRINGS BMAP UPDATES TIMELINE



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THANK YOU

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Florida Department of Environmental Protection (DEP)
Upper Wakulla River and Wakulla Springs Basin Management Action Plan (BMAP)
Question and Answer (Q&A) Summary
Public Meeting on April 9, 2024
10:00 am – 12:00 pm
In Person and Via GoToWebinar
DEP Carr Building
3800 Commonwealth Ave, Tallahassee, Florida

Attendees

Richmond Abellera, DEP
Kelly Aue, UF
Lisa Bally, Applied Technology and Management
Michael Barr, DEP
Evelyn Becerra, DEP
Maria Berteli, DEP
Adam Blalock, DEP
Eric Blount, City of Palm Bay
Mona Brittingham, Citizen
Ian Burse, DEP
Tiffany Busby, Wildwood Consulting
Jodie Cahoon, City of Tallahassee
Lauren Campbell, DEP
Stacy Cecil, SJRWMD
The Florida Channel,
Kathleen Coates, NWFWMD
Chris Colson, Talquin Electric
Melissa Corbett, Wakulla County
Tony Countryman, NWFWMD
Kevin Coyne, AMP
Kelly Crain, City of Tallahassee
Chris Denmark, FDACS
Chloe Dougherty, Florida Springs Council
SB Dyer, DEP
Zachary Easton, DEP
Yesenia Escribano, FDACS
Julie Espy, SAS
Amanda Exposito-Ferree, Atkins Realis
Nawfal Ezzagaghi, Leon County
Jessica Ferris, Citizen
Jessica Fetgatter, DEP
Kelly Flowers, Jones Edmunds
David Frady, DEP
Pauline Frendreiss, Citizen
Ken Friedman, NWFWMD
Anthony Gaudio, Wakulla Springs Alliance
Tina Gordon, Wildwood Consulting
Tiffany Grantham, Citizen
Trisha Green, DEP
Jade Greene, DEP
Raichel Gulde, RES
Terry Hansen, Citizen
Chad Hanson, Citizen
Maddy Hart, FDACS
Mark Heidecker, City of Tallahassee
Margarita Hernandez, DEP
Alicia Hogue, DEP
Robin Holland, FDACS
Phil Homann, DEP
Moira Homann, DEP
Dana Hutchinson, Citizen
Jason Icerman, City of Tallahassee
Garrett Iflad, NWFWMD
Joy Jackson, DEP
Thomas Jacobs, Citizen
Nathan Jagoda, DEP
Cal Jameson, Wakulla Soil and Water Conservation District
Chandler Keenan, DEP
Kellie Keys, Coastal Plains Institute
Angela Knecht, DEP
Tricia Kyzar, UF
Debbie Lightsey, Wakulla Springs Alliance
Jen Lomberk, Matanzas Riverkeeper
Mary Beth Lupo, FGS

Celeste Lyon, RES for FDOT
Amanda Marshall, FDOT
Sean McGlynn, McGlynn Labs
Stephen Monroe, FDACS
Jessica Mostyn, DEP
Ryne Nimmo, DEP
Jarek Nowak, FDACS
Kevin ODonnell, DEP
Melanie Orozco, DEP
Anna Padilla, Leon County
Amanda Peck, DEP
Somer Pell, Wakulla County
Elizabeth Perison, Cameron Cole
Nicolas Pisarello, Geosyntec
Benjamin Ralys, DEP
Roderick Reardon, Reardon Engineering
Allyson Reinert, DEP
Johnny Richardson, Leon County
Danielle Rogers, SWFWMD
Donald Rogers, FDOT
Thomas Rogers, FDOT
Zack Sampson, Tampa Bay Times
Jerrick Saquibal, NWFWMD
Charles Sardisco, DEP
Christopher Seufert, Jones Edmunds
Kim Shugar, DEP
Ryan Smart, Florida Springs Council
Caitlin Snyder, DEP
Jennifer Spain, Volusia County
Anita Stine, DEP
Jay Stodghill, Stantec
Kaitlyn Sutton, DEP
James Sutton, NWFWMD
Paul Thorpe, NWFWMD
Paul Thurman, NWFWMD
Riley Timbs, SJRWMD
Debby Tipton, DEP
Wayne Toothman, Leon County
Lisa VanHoudt, DEP
Shreya Vuttaluru, Tampa Bay Times
Edgar Wade, Leon County
Lanita Walker, City of Tallahassee
Brandon Wanner, Stantec
Lindsay Weaver, DEP
Ken Weaver, DEP
Nia Wellendorf, DEP
Brenda Wells, Florida Springs Council
Scott Wesson, Atkins Realis
Benita Whalen, Dispersed H2O
Jessica Woodham, FDOT
Katrina Yancey, DEP
Kelly Young, Volusia County

BMAP Updates

Q: Could the nitrate water quality graph scale be adjusted to make the differential clearer in the future by using 0.3 to 0.7 milligrams per liter (mg/L) as the range? Also, the data being presented looks very different from the data that his organization (the Wakulla Springs Alliance) has measured and uploaded to the DEP Watershed Information Network database. They only see 0.35 mg/L or lower nitrate in their samples when there is a large volume of water. What stations/data were used for the graph that was shown?
A: The data presented in the water quality graph are from Station 67/Wakulla Main Composite. This station is the DEP spring vent site. The data were downloaded from Watershed Information Network and represents an aggregate of the approved data used for assessments.

Q: Is the Florida Geological Survey (FGS) still sampling the individual conduits from the permanent tripods or have some Wakulla conduit stations been discontinued?
A: Dr. Mary-Beth Lupo, FGS, commented that FGS is currently removing some dysfunctional equipment from the Wakulla conduit stations. FGS has remained in constant communication with their sister divisions and research colleagues, and at this time intend to only remove non-

functional equipment. The tubing used by university researchers, DEP Division of Environmental Assessment and Restoration (DEAR), Northwest Florida Water Management District (NWFWMD), and FGS will remain deployed unless it needs to be replaced. FGS remains dedicated to collecting and maintaining quality scientific data for their agency and stakeholders and intend to support FGS's ongoing initiatives. If there are any additional questions regarding FGS activity in the basin, Dr. Lupo encouraged participants to reach out to her directly as an administrator for the Applied Geoscience Services section at FGS at Mary.Lupo@FloridaDEP.gov. DEAR's Tallahassee Regional Operation Center (ROC) continues to monitor the tunnels on a quarterly basis.

Nitrogen Source Inventory Loading Tool (NSILT)

Q: How did DEP derive the 90% attenuation factor used for livestock waste?
A: The attenuation factors used in the NSILT are literature-derived values that consider plant uptake, soil denitrification, and volatilization of nitrogen specific to sources. These rates are also consistent with what was used in the previous NSILT. Maddy Hart from Florida Department of Agriculture and Consumer Services (FDACS) added that FDACS supports the attenuation number for livestock because it is limited to specific areas. These areas are calculated separately from pasture lands which also have a separate fertilizer application rate applied. Maddy Hart (FDACS) offered to provide additional information on the livestock attenuation rate if needed.

Q: In the first NSILT iteration, sinking streams/lakes from Lake Munson and Lost Creek were included as a source, which originally showed loading around 3% of the total loading. The second version of the NSILT included all the sinking lakes which came to around 12% of the total load, but the final analysis removed them completely. Why are these sinking streams and lakes no longer considered?
A: Sinking streams and lakes were removed based on comments from the original NSILT because the loading in those lakes and streams is from the anthropogenic sources like urban turf fertilizer (UTF), agriculture, etc., which are already estimated in the NSILT. Since the original loading source is included in the loading estimates, adding the loading from the streams would double count it. Additionally, some of the sinking streams are located in areas with a lot of natural land cover, so the sources to some streams are not anthropogenic. Further, there was a lack of data to tie the loading from the sinking lakes to the spring vents. Based on all of these considerations, the categories were excluded from further NSILT estimates to avoid double counting loads.

Q: Since atmospheric deposition is the second highest source and Wakulla County was the third fastest growing county in the state last year, how does DEP account for attenuation changes when there will be urban development where some natural lands or agricultural lands are now?
A: The NSILTs are an estimate of current loading, not a future loading projection. Land use will be updated in future iterations and the source-specific attenuation factor for the change in land use will be applied to those updates.

Q: Do the fertilizer assumptions consider local ordinances?

A: Yes, these were taken into account in the NSILT calculations.

Q: Has DEP updated the attenuation factors for current and future land uses in Wakulla County? If DEP is not looking at ongoing land use changes, how can DEP estimate reductions of the current and ongoing projects?
A: The NSILT tool looks at land use and loading as a snapshot in time. The loading in the NSILT reflects the most current land use data available. Future growth is not estimated in the NSILT, but DEP is looking at how to include future growth considerations in the BMAP approach. The total reductions specified in the presentation were limited to completed and ongoing projects; planned and underway projects were not. Ongoing projects refer to those that have already been implemented but need to continue each year to continue providing nutrient reductions. An example of an ongoing project type is street sweeping where you are removing nutrients, but the activity needs to be continued every year, unlike a completed structural project like a stormwater pond where the implementation happens once but continues to provide nutrient benefits. Projects with a status of "Ongoing" have been implemented, but they must be done continuously to continue to be counted. The crediting procedures DEP uses are conservative and use a long-term average estimate to avoid overestimating project reductions when tracking progress towards meeting the TMDLs.

Q: Is silviculture included in the fertilizer estimates?
A: No, because it is considered to be a low intensity land cover in terms of a nitrate source.

Q: Spring Creek reversed flow several times last year and when it reverses flow, it goes into Wakulla springshed. When Spring Creek flows the other way, the loads flow to the ocean. There are several septic systems around Spring Creek. Can DEP change the NSILT when the flows change to account for the changes in loads?
A: No, the NSILT is an overall estimate of loading based on a variety of conditions and is a snapshot in time. The Spring Creek area is within the Wakulla BMAP, springshed, and Priority Focus Area 2 and is therefore being captured in the NSILT. All loading within the springshed boundary applies to the load to groundwater going to the spring vent.

Q: Is there a comparison of how the loading percentages have changed from the previous NSILT?
A: A direct comparison of the two results can be confusing because not just the sources changed in the analysis. There were a number of methodological changes as well as updated data that makes the direct comparison more difficult. DEP feels that the latest estimate is an improvement and should be used as a snapshot in time of the nitrogen loads. Due to the changes in the methodology, a comparison is not "apples-to-apples" of the changes in sources over time.

Q: Are the assumptions of the NSILT loading calibrated via collection of sample data from various sources?
A: No, the NSILT is not currently calibrated with sampling data. However, the required reductions will be based on the measured spring vent loads, so there will be a direct relationship

between the measured data and the required reductions. DEP will use measurements to calculate the percent reduction needed to meet the TMDL and use the NSILT loading for the loading estimates.

BMAP Allocations

Q: Are there plans to better constrain the loading contributions to the system via a calibrated approach going forward?
A: At this time, the NSILT is not currently calibrated with sampling data. DEP does have a groundwater monitoring network that is used to track groundwater quality throughout the spring BMAPs. DEP is receptive to suggestions on how to better estimate the loading from the springshed in future NSILTs. Comments can be submitted via email to BMAPProgram@FloridaDEP.gov.

Q: Are the NSILT spreadsheets and report available online?
A: Additional details about the NSILT are available upon request. Requests can be sent to BMAPProgram@FloridaDEP.gov. DEP will also publish a technical support document for the NSILT.

Q: Is the TMDL parameter nitrogen or nitrate? Can the constituent be clarified in the future presentations?
A: The TMDL is a monthly average of nitrate concentration in units of mg/L, but the allocations and project reductions are represented in terms of total nitrogen loads in pounds per year. Thank you for the suggestion for future presentations.

Q: Will DEP be giving one allocation to each entity, regardless of source? If so, does that mean that a lead entity can use reductions from one source, like septic systems, to achieve their entire allocation? When does DEP anticipate sharing the allocations?
A: Yes, one allocation number will be given to each responsible entity in the BMAP. The source information can inform each entity from where loading is generated, but entities can use reductions from any source to meet their allocations. DEP and stakeholders may work to explore ways to address sources and to have tools and mechanisms to address them. However, how to meet the allocation will be up to the entity. DEP will be reaching out in the next few months to review the allocations and will meet with each entity to discuss allocations, milestones, and project plans.

Q: Is anyone at DEP reviewing if the in-ground nitrogen-reducing biofilter (INRBs) being permitted have the same characteristics as the INRBs that were studied by Florida Department of Health?
A: We can check on the status of the INRB permitting process and performance reviews. You can also direct specific questions on INRBs to the DEP Onsite Sewage Program (https://floridadep.gov/water/onsite-sewage).

Q: If the milestones will be based on required reductions, will a 30% reduction be realized by 2028?
A: Based on the project information provided by the lead entities, DEP will estimate the expected reductions and assess if we are expected to meet milestones or not. Concurrently, DEP will continue to conduct water quality and biological monitoring. The final goal is based on the TMDL and if the reductions are not met or the biological response is not met, the BMAP will be adjusted using the iterative process. Entities will be required to submit projects to demonstrate that they can meet their entity allocation, as defined by 2023 House Bill (HB) 1379.

Q: Would DEP consider lowering the TMDL nitrate concentration because Wakulla is a clear spring and not tannic? Some springs have lower TMDL concentrations.
A: DEP had more specific data on the three springs BMAPs where the TMDL target is lower, but DEP did not have information to support that approach for Wakulla Springs. Currently, we are seeing some improvements in biology, and that appears to be related to the recent load reductions, which is a good sign. If ultimately the biology does not recover when we are meeting the Wakulla TMDL target concentration consistently, that situation would be a reason to revisit whether the TMDL concentration is protective.

Q: Why did DEP not use 2012 to 2014 data for concentration but did for flow?
A: The period of record being used statewide for the springs analysis was 2012 to 2022, so that period of record was used for flow for Wakulla. A long timeframe was desirable to represent a wide variety of rainfall conditions. For Wakulla, the concentration data for 2012 to 2014 was excluded because there was a large wastewater treatment facility upgrade project in that period. The changes in water quality were observed starting in 2014, so the years of higher concentrations prior to the upgrade were removed specifically for Wakulla, because the 2012 to 2014 data are no longer representative of the Wakulla Springs loads.

Q: Can the allocations and project reduction estimates be made public so that they can be reviewed? Also, can the information on biological impairments be simply summarized for the public--in non-scientific terms--and accessible?
A: Yes, the public are welcome at the BMAP meetings. There will also be a BMAP document that will explain these items in detail. Also, the Statewide Annual Report (STAR) will contain annual updates on projects and will be posted by July 1 each year.

Q: How can materials from the meeting be accessed?
A: An email will be sent to participants via the GovDelivery system once the materials are posted online. To manage your DEP GovDelivery notifications, please visit https://floridadep.gov/dear/dear/content/subscribe.

Q: Will the BMAP require limitations to fertilizer, land use, or accounting of nitrogen loading in the land use comprehensive plan change process to address future growth and land use change?
A: Those entities with BMAP allocations will be required to provide project lists and management actions to meet their own BMAP milestones. Local governments may determine

that amendments to their local comprehensive plans are part of the approach that is necessary to implement their projects and to meet their load reductions. The nitrogen loading reductions from these projects and management actions in the BMAPs will be calculated. The BMAP updates will also include a future growth component to address this future loading. Further, HB1379 has a Capital Improvement Element that amended section 163.3177, F.S., to require any county or municipality within a basin management action plan (BMAP) within its jurisdiction to include in its comprehensive plan a list of projects necessary to achieve the pollutant load reductions attributable to the local government as established in the BMAP.