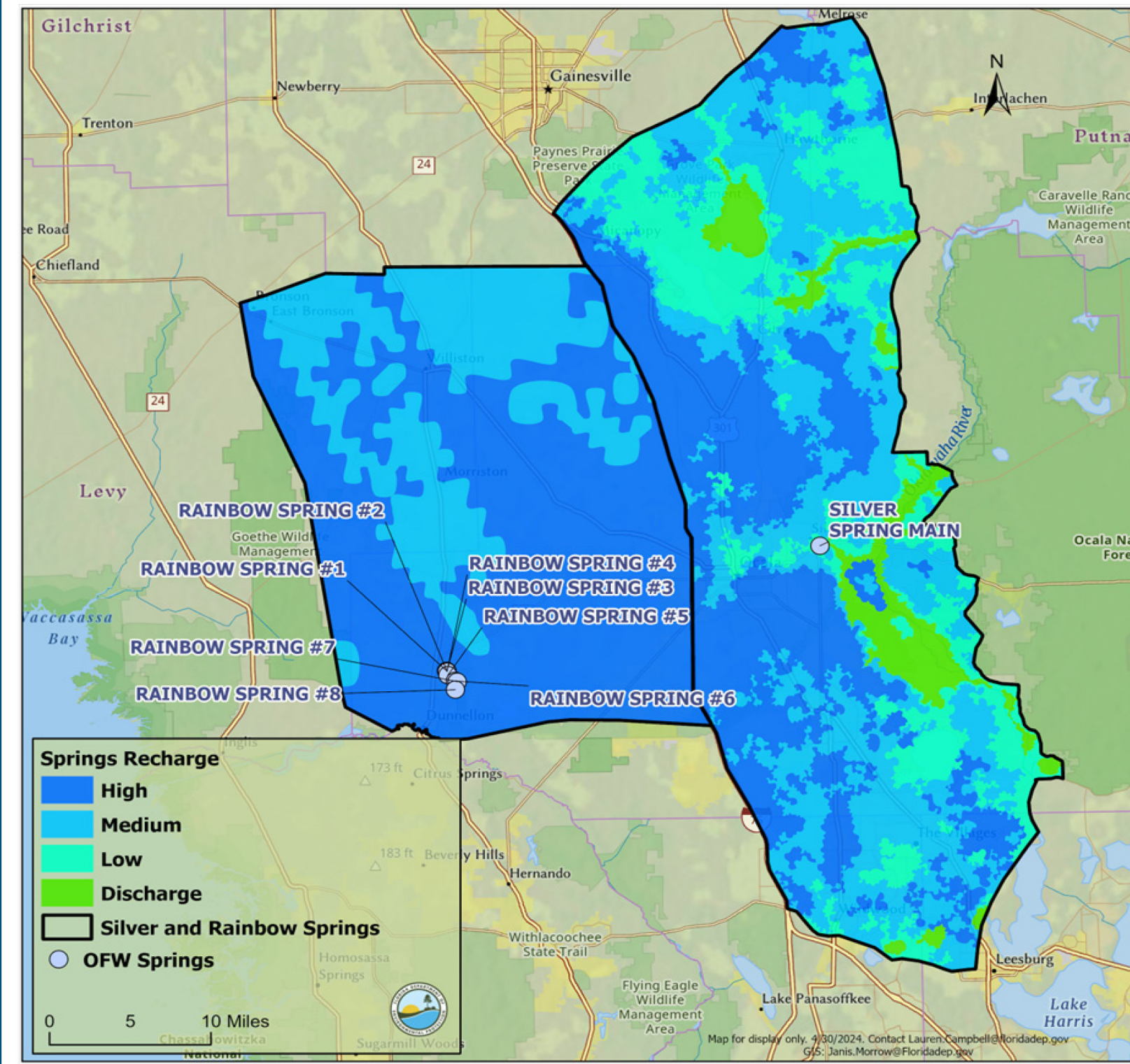




Silver Springs and Upper Silver River and Rainbow Spring Group and Rainbow River Springs Basin Summary

Silver Springs and Rainbow Spring Group Basin Management Action Plan (BMAP)

The first step to address nitrogen impairments in the Rainbow and Silver Springs is to inventory the sources of nitrogen in the basin. This was completed using the **Nitrogen Source Inventory Loading Tool (NSILT)**. The NSILT evaluates the loading from various sources to groundwater after attenuation and considers the recharge potential based on spatial and geologic factors.

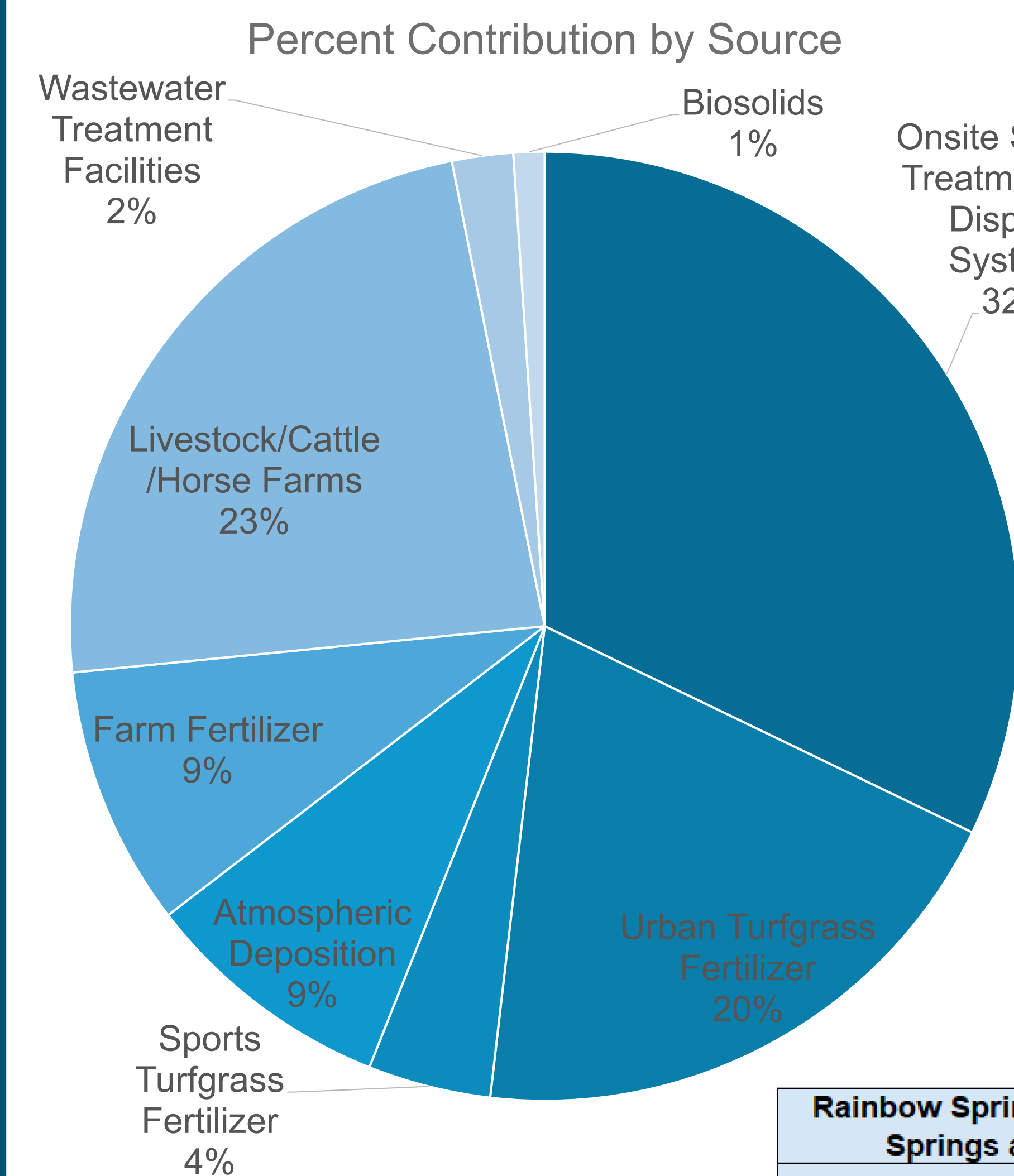


This figure shows the generalized recharge zones in the basin.

High recharge indicates areas where more water is expected to percolate into the Upper Floridan aquifer and travel to the spring vent.

Discharge represents areas where water is expected to flow to a surface waterbody and, therefore, not impact groundwater (GW).

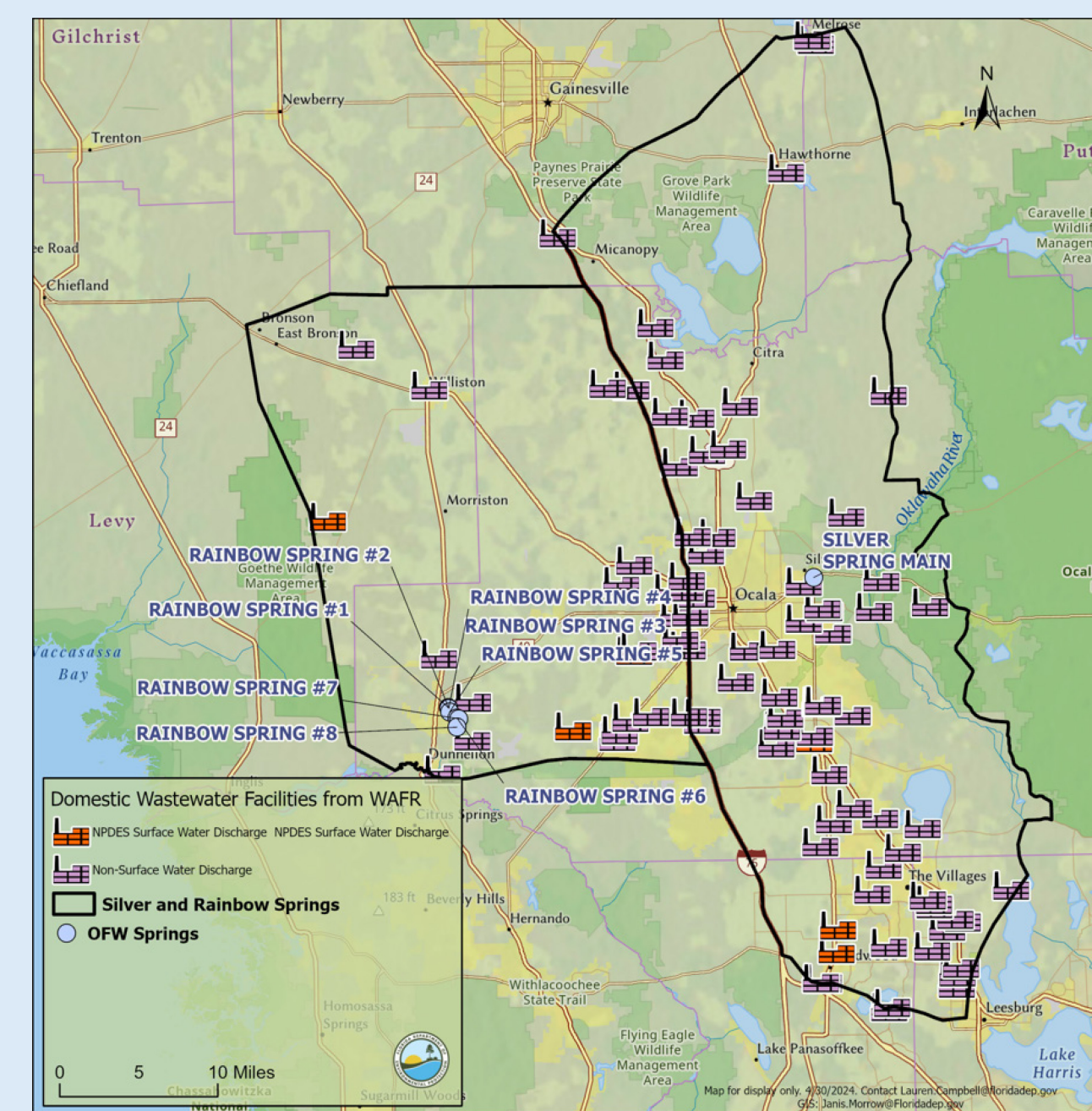
NSILT Summary



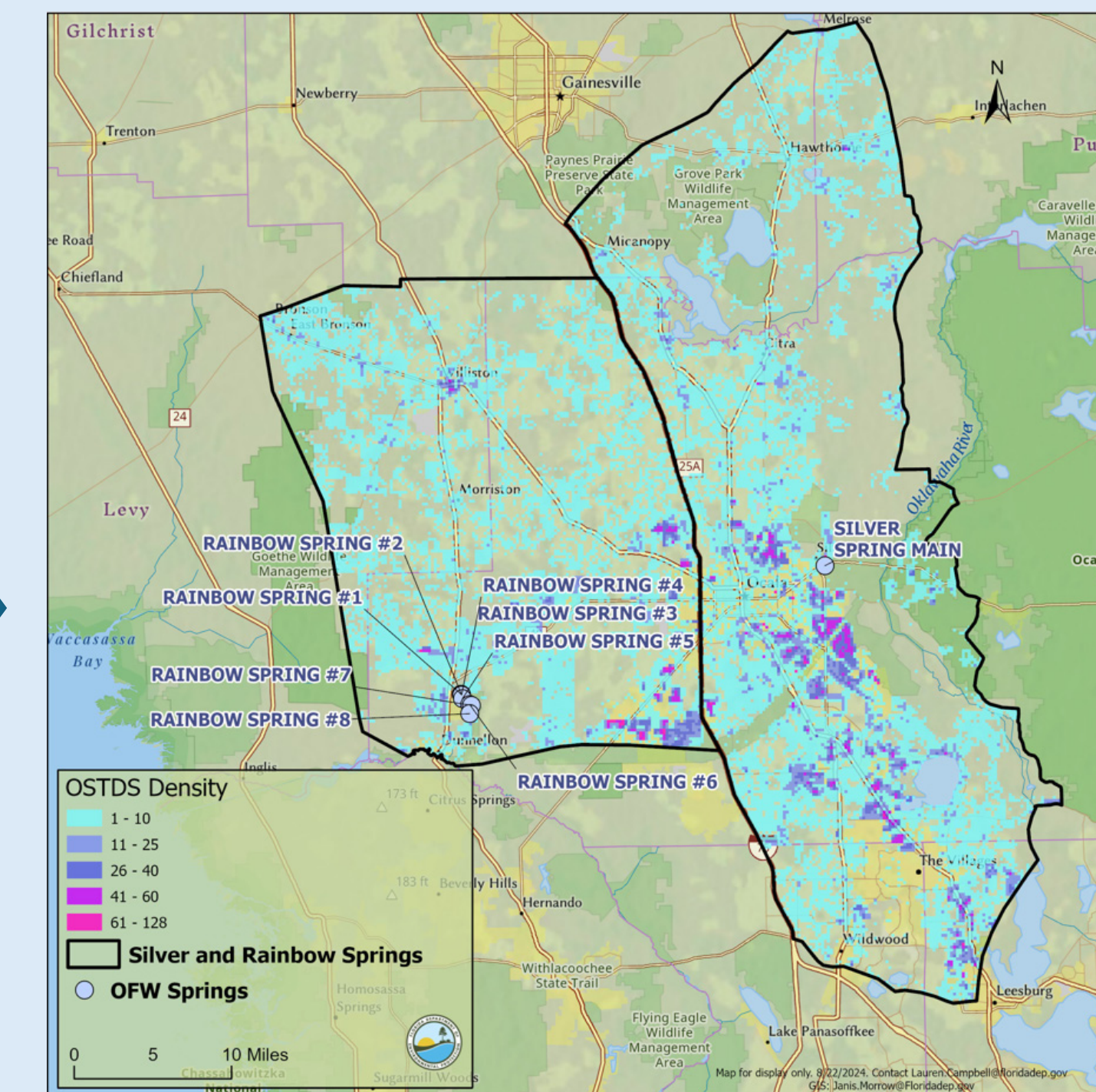
The pie chart shows the comparative contribution of various nitrogen sources in the Rainbow and Silver Springs Basins. The table shows the pounds of loading by source for the entire BMAP.

Rainbow Spring Group and Rainbow River and Silver Springs and Upper Silver River BMAP Area	
Source	Estimated Annual Loading (lbs-N/yr)
Atmospheric Deposition	336,808
Wastewater Treatment Facilities	81,898
Onsite Sewage Treatment and Disposal Systems	1,265,209
Urban Turfgrass Fertilizer	774,333
Sports Turfgrass Fertilizer	164,784
Farm Fertilizer	348,742
Livestock/Cattle/Horse	921,420
Biosolids	41,561
Total	3,934,755

Urban Source Loading



Approximately 115 **wastewater treatment facilities (WWTFs)** combine to contribute two percent of the total nitrogen load in the BMAP. The figure to the left shows the location of domestic WWTFs in the basins.



Onsite Sewage Treatment and Disposal Systems (OSTDS), also known as septic systems, contribute 32% of the nitrogen load in the BMAP. The figure to the right shows OSTDS density per 300-meter by 300-meter grid cell.

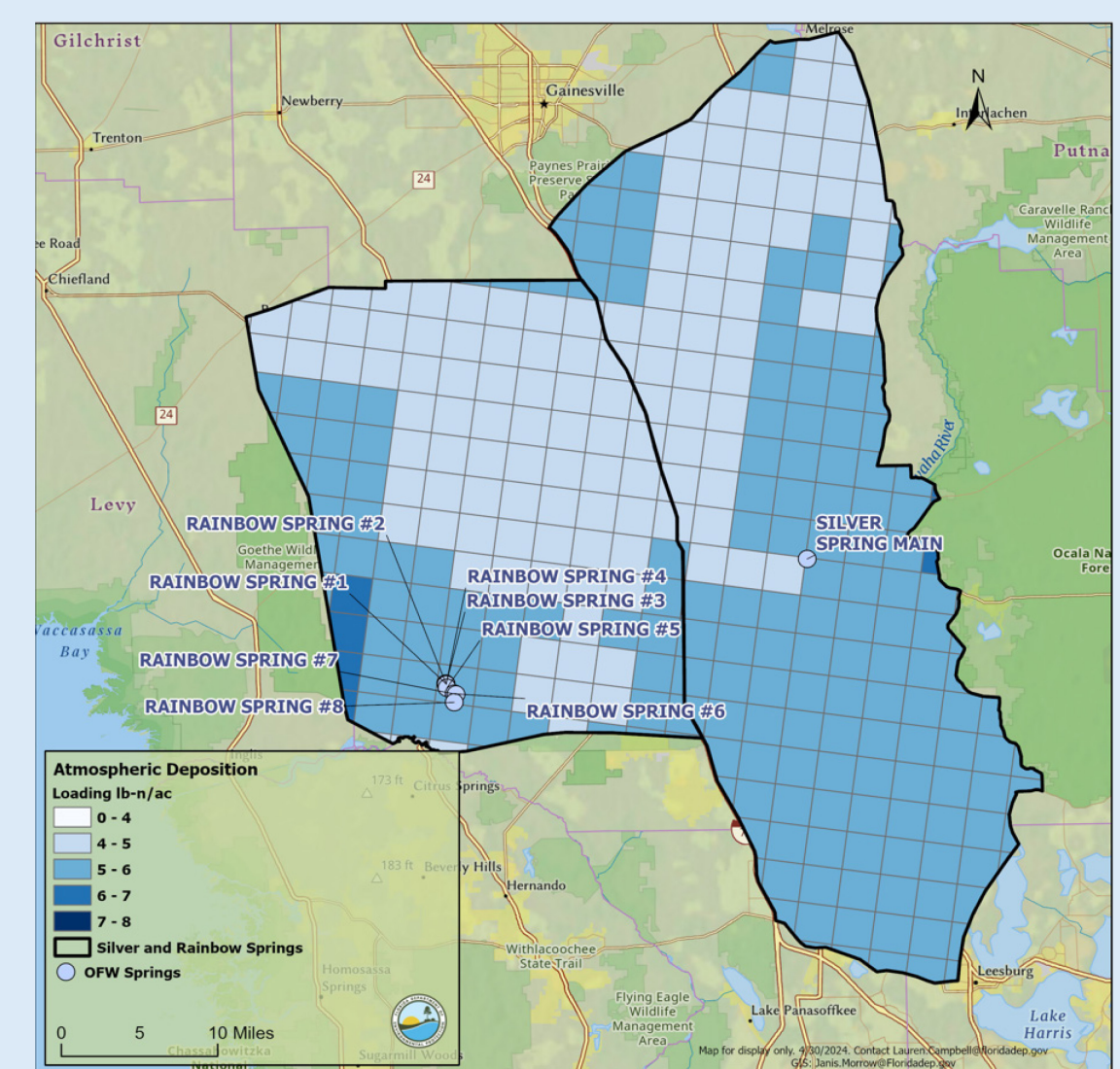
Urban turfgrass fertilizer (UTF) from single family residential sources, and other urban areas combine to total 20% of the total nitrogen load in the basins.

Sports turfgrass fertilizer (STF) estimated from educational institutions, athletic/sports facilities, and recreational areas contribute 4% of the total nitrogen load in the basins.

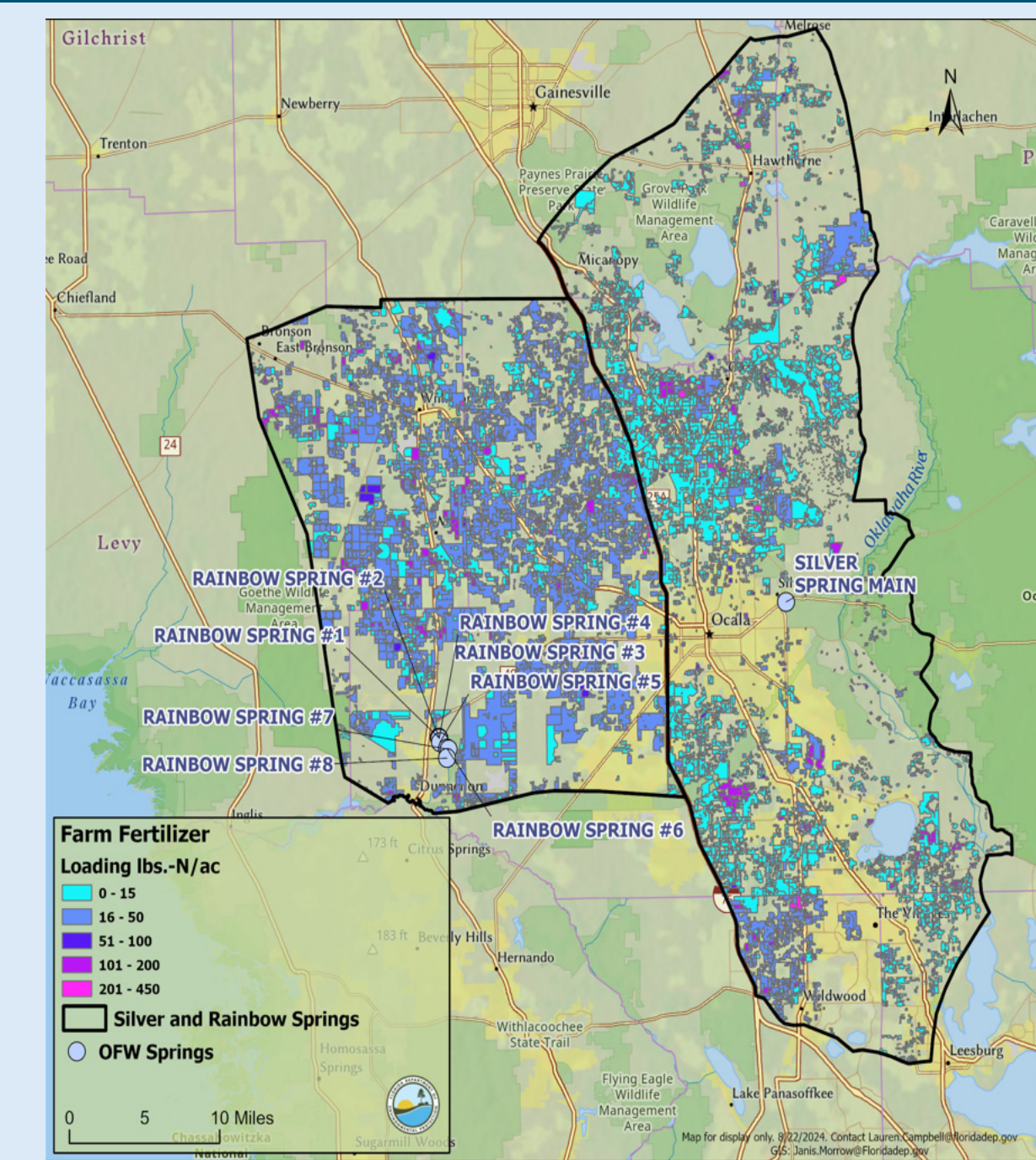
Atmospheric Deposition

Atmospheric deposition (AD) was estimated using data from the Total Deposition Science Committee (TDep) Model. TDep estimates annual deposition on 4-kilometer (km) by 4-km grid squares.

AD accounts for 9% of total loading within the Rainbow and Silver Springs BMAP area.



Agricultural Source Loading

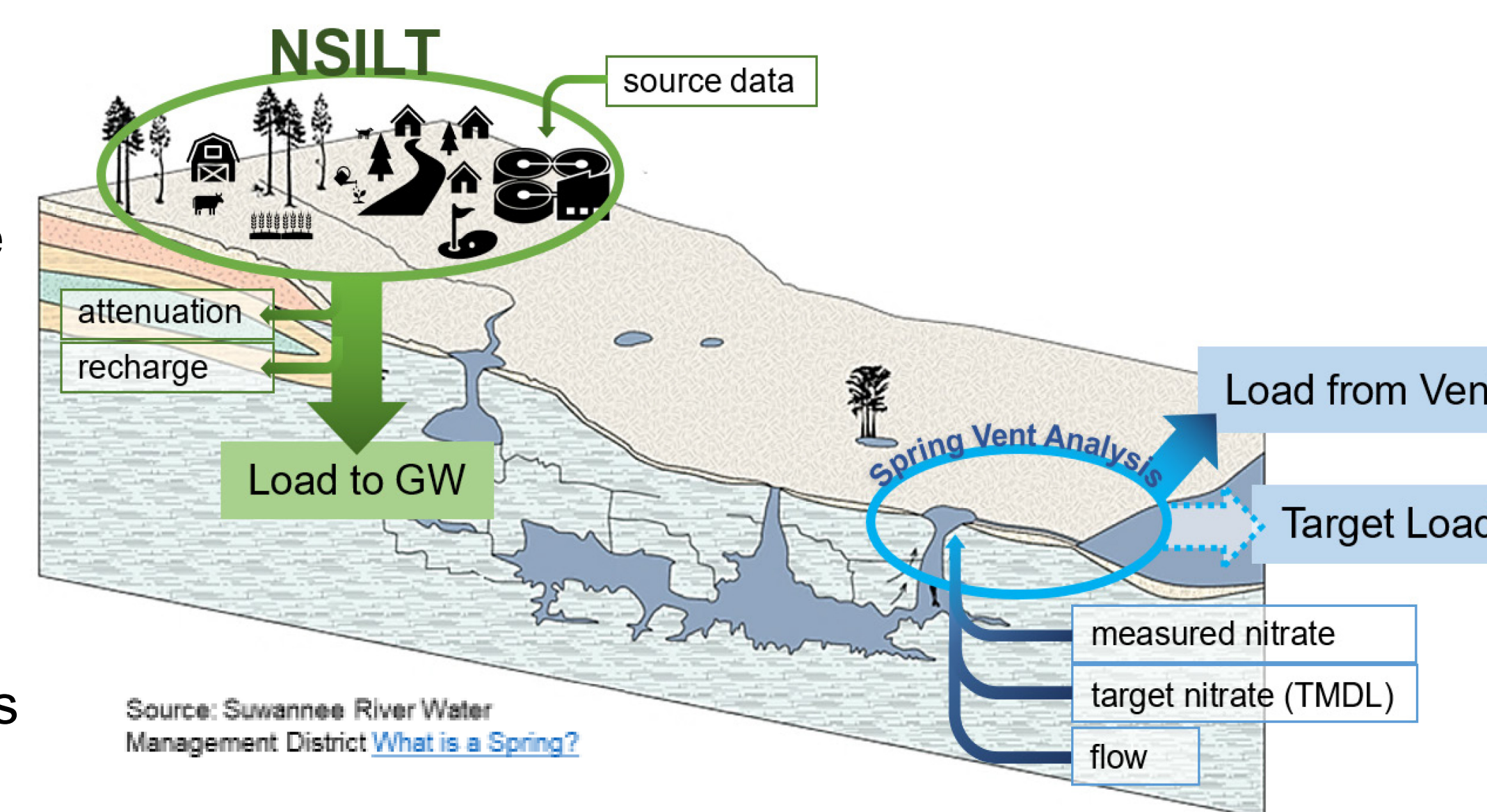


Agricultural sources include farm fertilizer (FF) and livestock waste (LW), which contribute nine and 23%, respectively. The Florida Department of Agriculture and Consumer Services (DACS) Florida Statewide Agriculture Irrigation Demand (FSAID) database and the U.S. Department of Agriculture (USDA) Census of Agriculture data were used to estimate agricultural loading.

Spring Vent Analysis

Spring flows and nitrate concentration data were reviewed to evaluate the total mass (lbs-TN/yr) of nitrate discharging from the spring.

Approximately 80% more nitrate is discharged than the waterbodies can assimilate without impairment. This represents the reductions needed to achieve the water quality goals.

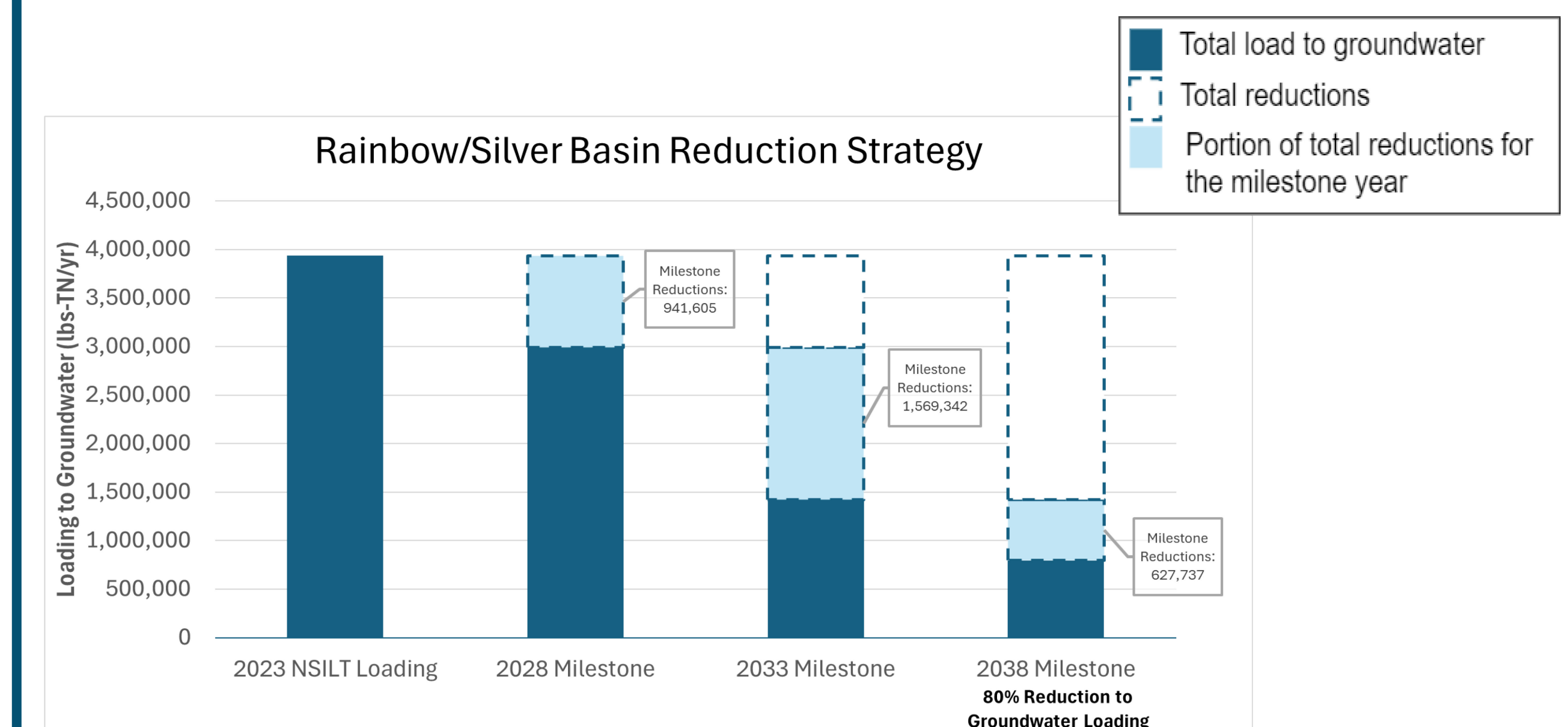


	Nitrogen Loads (lbs-N/yr)	Source
Total Load at Spring Vents (October 2023)	4,313,434	Upper 95 % confidence interval – nitrate and flow data 2012-2022
TMDL Load	872,682	TMDL target is 0.35 mg/L and using the same flow data and proportions
Percent Required	80%	
Total NSILT Load (October 2023)	3,934,755	2023 NSILT
Required Reductions	3,138,686	Proportional decrease in NSILT load

Putting It All Together

The results of the NSILT are summarized in the first bar in the figure below, with different sources contributing to the total estimated load to groundwater. The percent reduction on the far right reflects the outcomes from the spring vent analysis. A proportional reduction in loading is needed from sources. Therefore, the reduction percentage was applied to the total load to groundwater to define the necessary reductions.

The intermediate bars show the basin-wide reductions for all entities and sources for the 2028, 2033 and 2038 milestones.





Silver Springs and Upper Silver River and Rainbow Spring Group and Rainbow River Allocated Reductions, Milestones and Progress

Basin Reductions

Nitrogen Source	Allocations by Source (lbs-N/yr)	Percent of Total Reduction
Atmospheric Deposition*	268,665.39	8.56%
Onsite Sewage Treatment and Disposal Systems	1,009,235.82	32.15%
Wastewater Treatment Facilities	42,277.73	1.35%
Farm Fertilizer (BMP Implementation)	52,311.37	1.67%
Livestock Waste-NonCAFO (BMP Implementation)	92,142.01	2.94%
Other Agriculture	860,231.29	27.41%
Urban Turf	617,671.96	19.68%
Sports Turf	131,445.15	4.19%
Regional Projects*	64,705.24	2.06%
Total	3,138,686	100.00%

* Not allocated to entities.

CAFO: Confined animal feeding operation.

BMAP Management Strategies

Source-Specific Management Strategies:

- **Atmospheric Deposition:** Due to continuing air regulations, atmospheric nitrogen emissions have been trending downwards in Florida since at least 2005 (Himes & Dawson, 2017).
- **Onsite Sewage Treatment and Disposal Systems (OSTDS):** No new installation of conventional OSTDS. All existing conventional OSTDS within the BMAP must be enhanced or sewerred.
- **Wastewater Treatment Facilities:** Surface water discharges from facilities must meet advanced waste treatment (AWT). Other discharge methods must meet AWT standards, if the Florida Department of Environmental Protection (DEP) determines the treatment is needed.
- **Farm Fertilizer Best Management Practice (BMP) Implementation:** An estimated 15% reduction in nitrogen loading when a producer enrolls in the Department of Agriculture and Consumer Services (DACS) BMP program and implements BMPs.
- **Livestock Waste BMP Implementation:** An estimated 10% reduction in nitrogen loading when a producer enrolls in the DACS BMP program and implements BMPs.
- **Other Agricultural Activities:** The remainder of reductions allocated to agricultural sources will need be addressed through a combination of regional agricultural projects, agricultural cooperative regional elements, innovative technologies and cost-share projects.
- **Urban Turfgrass Fertilizer:** Ordinances, education, street sweeping and structural stormwater improvements to reduce impact from urban turfgrass fertilization.
- **Sports Turfgrass Fertilizer:** Owners/operators must follow the appropriate BMP manual. Additionally, all golf courses will be required to provide a nutrient management plan (NMP).
- **Biosolids:** Land application of Class A or Class B domestic wastewater biosolids must be in accordance with a DEP-approved NMP.

Tracking Progress

Project collection and reporting are crucial to the successful implementation and management of basin management action plans (BMAPs). Projects are reported to the Florida Department of Environmental Protection (DEP) annually through the Statewide Annual Report (STAR) process.

Responsible entities are required to provide lists of projects to achieve their required reductions for each five-year milestone.

It is important that all projects needed to achieve milestones are included in the project portal for the STAR, even if a funding mechanism is not currently identified. This information provides the state information on the funding needs to achieve BMAP goals, and the ability to prioritize projects.

Reduction milestones must be met to ensure sufficient progress towards meeting the total maximum daily load (TMDL) target.

Entity Required Reductions

Entity	2028 Milestone Required Reductions (lbs-N/yr) (30%)	2033 Milestone Required Reductions (lbs-N/yr) (80%)	2038 Milestone Required Reductions (lbs-N/yr) (100%)
Alachua County	4,801	12,803	16,004
Bay Laurel Center CDD	2,555	6,813	8,516
City of Belleview	2,302	6,139	7,674
City of Dunnellon	1,884	5,023	6,279
City of Fruitland Park	5,954	15,878	19,847
City of Hawthorne	646	1,722	2,153
City of Leesburg	307	818	1,023
City of Ocala	31,514	84,036	105,045
City of Wildwood	2,239	5,971	7,464
City of Williston	5,579	14,878	18,598
Lake County	15,749	41,996	52,495
Levy County	24,248	64,660	80,825
On Top of the World	9,201	24,535	30,668
Marion County	356,343	950,249	1,187,811
Putnam County	6,431	17,148	21,435
Sumter County	8,555	22,814	28,518
Town of Bronson	1,042	2,779	3,474
Town of Lady Lake	5,484	14,623	18,279
Town of McIntosh	1,154	3,078	3,848
Town of Micanopy	812	2,165	2,706
Town of Reddick	1,155	3,081	3,851
Villages Center CDD	19,932	53,152	66,440
Agriculture	301,405	835,747	1,004,684
Private Wastewater Facilities*	4,277	11,406	14,257
Private Golf Courses*	27,184	72,490	90,612

*Reductions for these entities will be tracked through permits and compliance actions.

Entity Progress Toward 2028 Milestones

The chart below shows estimated progress toward the 2028 milestones by entity **as of December 2023**.

