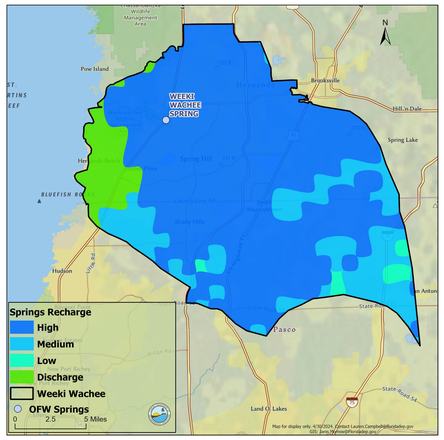
WEEKI WACHEE
Spring Basin Analyses

Weeki Wachee Spring Basin Management Action Plan (BMAP)

The first step to address nitrogen impairment in Weeki Wachee is to inventory the sources of the pollutant in the basin. This was completed through the **Nitrogen Source Inventory Loading Tool (NSILT).** The NSILT evaluates the loading after attenuation from various sources and considered the recharge potential based on spatial and geologic factors.



This figure shows the generalized recharge zones in the basin.

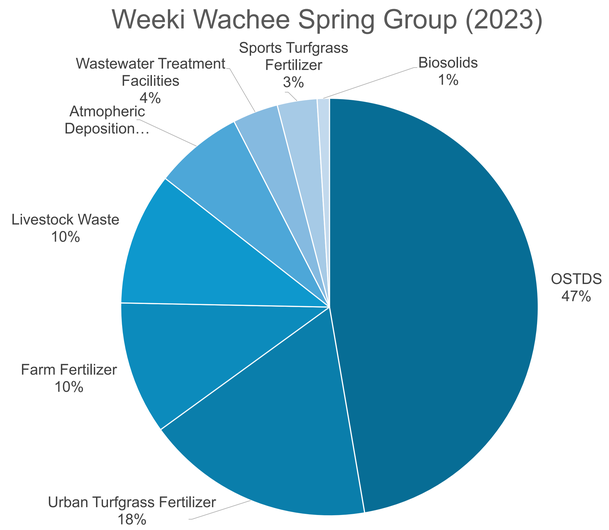
High recharge indicates areas where more water is expected to percolate into the Upper Floridan Aquifer and travel to the spring vent.

Discharge represents areas where water is expected to flow to a surface water body and therefore not impact groundwater.

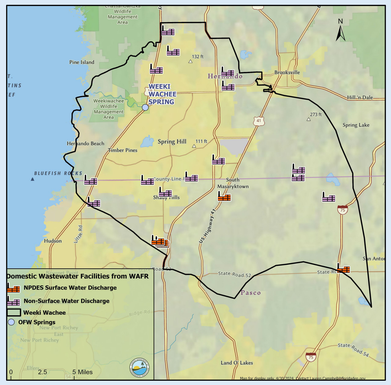
NSILT Summary

Weeki Wachee Spring Group	
Source	**Annual Loading (lb-N/yr)**
Atmospheric Deposition	93,069
Wastewater Treatment Facilities	47,836
OSTDS	641,621
Urban Turfgrass Fertilizer	240,059
Sports Turfgrass Fertilizer	41,825
Farm Fertilizer	139,819
Livestock Waste	139,175
Biosolids	12,878
Total	**1,356,282**

The pie chart below shows the comparative contribution of various nitrogen sources to the Weeki Wachee basin.

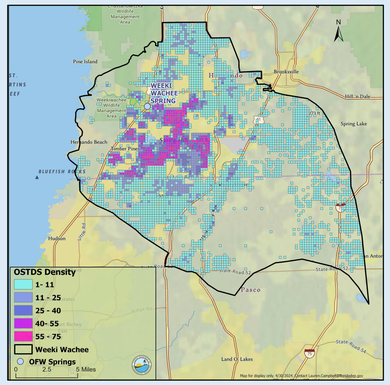


Urban Source Loading



Thirty-one **wastewater treatment facilities** combine to contribute 4% of the total nitrogen load in the basin. The figure to the left shows the location of domestic wastewater facilities in the basin.

Onsite Wastewater and Disposal Systems (OSTDS), also known as septic systems, contribute 47% of the nitrogen load in the Weeki Wachee BMAP. The figure to the right shows OSTDS density per 300-meter by 300-meter grid cell.

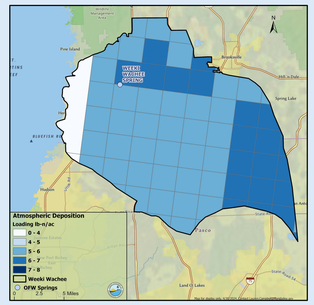


Urban turfgrass from single family residential sources and other urban areas combine to total 18% of the total nitrogen load in the basin.

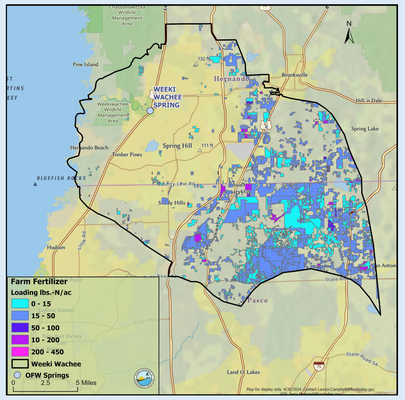
Atmospheric Deposition

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

Atmospheric deposition accounts for 7% of total loading within the Weeki Wachee BMAP area.



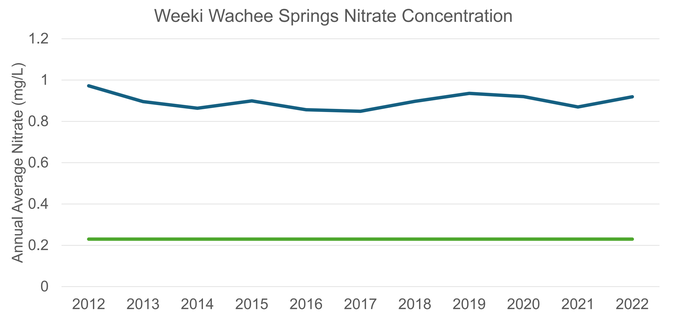
Agricultural Source Loading



Agricultural sources include farm fertilizer (10% contribution) and livestock waste (10% contribution).

The Florida Department of Agriculture and Consumer Services' (DACS) Florida Statewide Agriculture Irrigation Demand (FSAID) database and U.S. Department of Agriculture's (USDA) Census of Agriculture data were used to estimate agricultural loading.

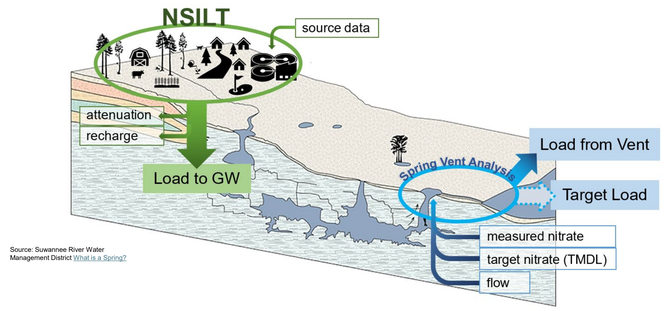
Spring Vent Analysis



	Nitrogen Loads (lbs-TN/yr)	Source
Total Load at Spring Vents	308,909	Upper 95% confidence interval - nitrate data from 2012 - 2022 (0.91 mg/L) and flow data from 2012-2121 (173.04 cfs)
TMDL Load (October 2023)	95,265	TMDL target is 0.28 mg/L and using the same flow data from 2012-2021
Reductions Needed at Spring Vent	**213,644**	
Percent Required Reductions	**69%**	Based on Spring Vent Load and TMDL Load
Required Reductions	**938,016**	Based on NSILT Load and Percent Reduction at Spring Vent

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

Approximately 69% more nitrate is discharged than the waterbody can assimilate without impairment. This represents the reductions needed to achieve the water quality goals.



It is estimated that a proportional decrease in loading is needed to resolve the impairment, so the same reduction percentage (69%) is applied to the NSILT loading estimates to derive the load reductions needed from sources.

Lb-N/yr: Pounds of nitrogen per year

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WEEKI WACHEE
Allocated Reductions, Milestones and Progress

Basin Required Reductions

Nitrogen Source	Allocations by Source (lb-N/yr)	Percent of Total Reduction
Atmospheric Deposition*	64,367	6.86%
Onsite Sewage Treatment and Disposal System	443,758	47.31%
Wastewater Treatment Facility	25,093	2.68%
Farm Fertilizer (BMP Enrollment)	20,973	2.24%
Livestock Waste-NonCAFO (BMP Enrollment)	13,917	1.48%
Other Agriculture	166,971	17.80%
Urban Turfgrass Fertilizer	166,027	17.70%
Sports Turf-Golf	28,207	3.01%
Sports Turf-Other	719	0.08%
Regional Projects*	7,983	0.85%
Total	938,016	100.00%

*Not allocated to entities.
CAFO = confined animal feeding operation.

Management Strategies

General Approach for Entity Allocations and Reductions
While the loading evaluation and entity allocations were determined by source, nutrient reduction credits can be earned through projects addressing any source. Reduction milestones must be met to ensure sufficient progress towards meeting the total maximum daily load (TMDL) restoration target.

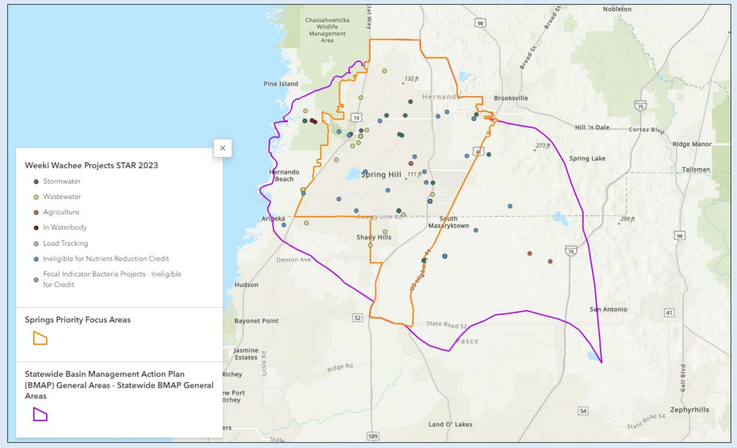
Source-Specific Management Strategies:

- **Atmospheric Deposition:** Due to continuing air regulations, atmospheric nitrogen emissions in Florida has been trending downwards since 2005 (Himes & Dawson, 2017).
- **Onsite Sewage Treatment and Disposal Systems (OSTDS):** No new installation for conventional septic systems on lots of 1 acre or less. All OSTDS within the priority focus area (PFA) will need to be upgraded or sewered.
- **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 assumed 15% reduction in nitrogen leaving the site when a producer enrolls in the Florida Department of Agriculture and Consumer Services (DACS) BMP program and implements BMPs.
- **Livestock Waste BMP Implementation:** An assumed 10% reduction in nitrogen leaving the site when a livestock 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 will help to reduce loading from urban turfgrass fertilization.
- **Sports Turfgrass Fertilizer – Golf:** Operators will be required to develop a nutrient management plan to ensure that fertilizers are managed responsibly.
- **Sports Turfgrass Fertilizer – Other:** Operators must follow the upcoming Sports Turfgrass BMP manual to ensure fertilizers are managed responsibly.

Projects

Project collecting and reporting are crucial to the successful execution and management of basin management action plans (BMAPs). Projects are reported to DEP annually through the Statewide Annual Report (STAR) process. As of Dec. 30, 2023, 36 projects have been completed in the basin.

The benefits of some completed projects were captured in the updated loading estimates. Total reductions achieved by each entity and the basin totals have been updated to reflect these changes.



Stakeholders are required to report projects that are being implemented or planned that will be necessary to achieve the reduction targets, along with an estimate of expected nutrient loading benefits and financial costs.

It is important that all projects necessary to achieve milestone targets are included in the report, even if a funding mechanism is not currently identified. It provides information on the funding needed to implement projects and assists with the prioritization of projects.

Entity Required Reductions

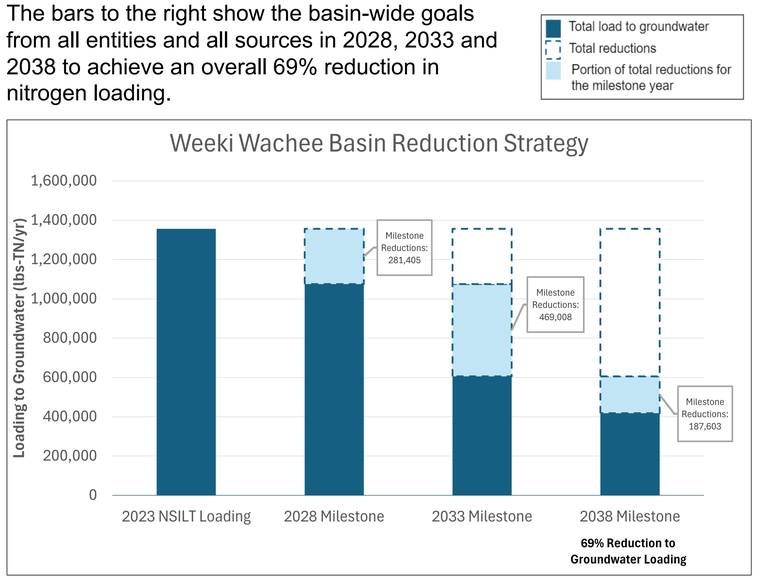
Entity	2028 Milestone (30%)	2033 Milestone (80%)	2038 Milestone (100%)
Hernando County	155,894	415,718	519,648
City of Brooksville	960	2,559	3,199
Pasco County	33,361	88,962	111,202
Agriculture	60,558	161,489	201,861
Private Wastewater Facilities*	466	1,238	1,549
Private Golf Courses*	8,460	22,565	28,207

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

Entity 2028 Milestones

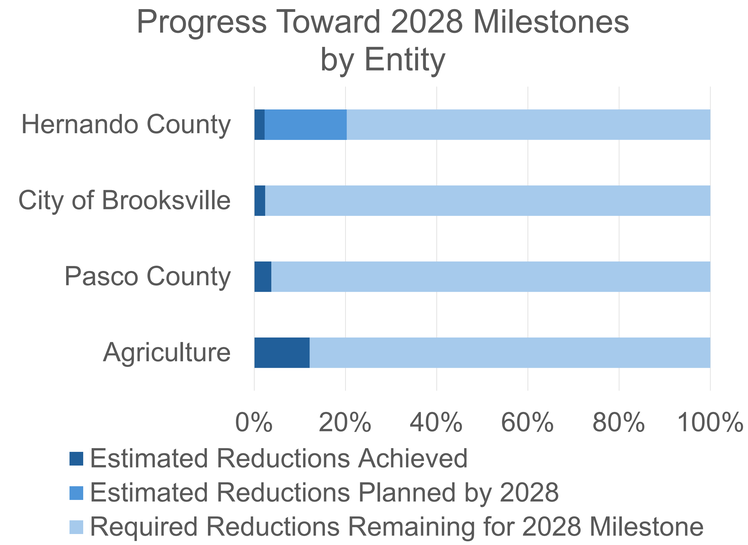
The overall reduction strategy for Weeki Wachee is illustrated by the bar chart below. The results of the NSILT are summarized in the first bar to the left, with different sources contributing to the total estimated load to groundwater.

The bars to the right show the basin-wide goals from all entities and all sources in 2028, 2033 and 2038 to achieve an overall 69% reduction in nitrogen loading.



The basin-wide reduction goal for 2028 is 281,405 lbs-TN/yr.

Below is a progress chart for responsible entities in the basin showing achieved reductions and reductions from projects planned through the 2028 milestone. Estimated reductions reflect projects entered through December 2023.



Lbs-N/yr: Pounds of nitrogen per year
NSILT: Nitrogen Source Inventory Loading Tool

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