

Florida Department of Environmental Protection



Bureau of Watershed Restoration

Summary of Nutrient TMDL for Silver Springs, Silver Springs Group, and Upper Silver River (WBIDs 2772A, 2772C, and 2772E)

January 23, 2013





What is the TMDL?

- It is the formal target for achieving the water quality component of restoration, to address the impairment of these waters by nitrate, which causes overgrowth of algae.
- The TMDL is based on the nitrate concentration, not a load.



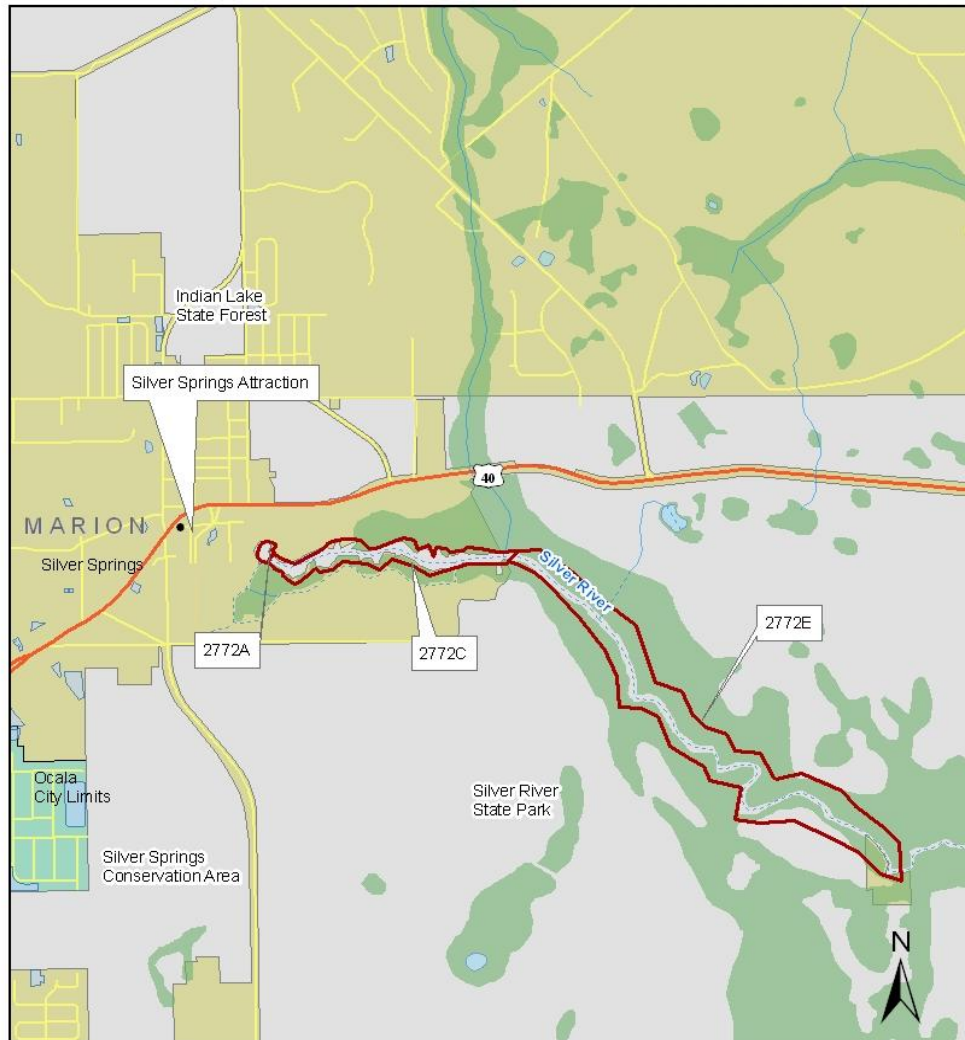
Developing the TMDL

The impaired waters, using FDEP terminology:

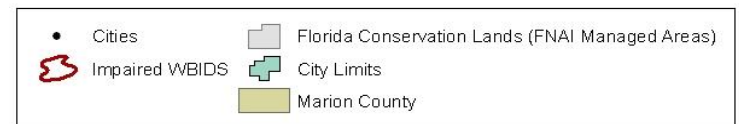
- **WBID 2772A – Silver Springs** (the uppermost segment of Silver River that includes Silver Main, aka: Mammoth Spring).
- **WBID 2772C –Silver Springs Group** (the adjacent segment of the Silver River that includes the cluster of springs downstream from Silver Main).
- **WBID 2772E-Upper Silver River** (the segment of Silver River downstream from the spring group that had documentation indicating ecological imbalance due to algae).



Location of Impaired Waterbody Segments



0 0.2 0.4 0.8 1.2 1.6 Miles





TMDL for Silver Springs, Silver Springs Group and Upper Silver River

How the TMDL was developed:

- Established the algal-growth-based threshold for nitrate.
- Calculated the reductions needed in the nitrate concentrations to reach the target.



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Establishing the threshold

- Within the past 10 years or so, researchers have studied the relationship between nitrate and growth of algae in Florida spring systems.
- Several of these lines of evidence have been used in development of FDEP's and EPA's proposed nitrate standard
- **0.35 mg/L is the nitrate threshold for this TMDL**



TMDL Nitrate Reductions

Maximum monthly average nitrate concentration (2000-2011)

Month	Silver Springs (WBID 2772A) Average (mg/L)	Silver Springs Group (WBID 2772C) Average (mg/L)	Upper Silver River (WBID 2772E) Average ¹ (mg/L)	30-Year Rainfall (1981– 2010) (inches)
January	1.18	1.69	0.98 (n=1)	3.550
February	1.16	1.60	ND	3.110
March	1.05	1.41	ND	4.020
April	1.1	1.41	1.01 (n=2)	2.780
May	0.91	1.43	ND	3.550
June	0.98	1.30	ND	7.200
July	1.09	1.45	ND	6.200
August	1.09	1.58	ND	5.840
September	1.07	1.39	1.30 (n=1)	5.600
October	1.14	1.46	ND	2.710
November	1.13	1.54	0.99 (n=1)	2.470
December	0.98	1.30	1.00 (n=1)	2.650
Maximum Monthly Average	1.18	1.69 	Not calculated	-



TMDL Nitrate Reductions

The percent concentration reduction required to achieve the 0.35 mg/L nitrate target was calculated using the following formula:

$$[(\text{existing mean concentration} - \text{target concentration}) / \text{existing mean concentration}] \times 100$$

$$[(1.69 - 0.35) / 1.69] * 100 = \mathbf{79\% \text{ reduction}}$$



Source categories

Point sources-sources that deliver pollutants directly to the impaired water (like a pipeline); these have NPDES permits

Nonpoint sources-the vast majority of the sources in this area; nitrate delivered to springs via ground water transport



Nitrate TMDL

WBID	Parameter	TMDL (mg/L)	TMDL percent reduction	WLA		LA percent reduction	MOS
				Waste water	NPDES Stormwater percent reduction		
WBIDs 2772A, 2772C, 2772E	Nitrate as monthly average	0.35	79%	N/A*	79%	79%	Implicit

WLA=wasteload allocation

LA=load allocation

MOS=margin of safety



Chronology in adoption of TMDL

- Listing of impaired waters- 2009
- Draft TMDL released- July 2012
- Secretarial approval and TMDL proposed for adoption as a rule- December 2012
- TMDL adoption as a rule- February 2013
- EPA approval- pending