

FSC BMAP DATA SUMMARY



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Photo by John Moran

Introduction

In 2018, thirteen Basin Management Action Plans (BMAPS), covering over 24 impaired Florida springs, were implemented to reduce nitrogen loading.

Methods

Linear regressions were run to determine if nitrate-nitrite (mg/L) significantly changed between the period of record after BMAPs were implemented (Table 1) by utilizing DEP data from 26 springs. Springs in which nitrate-nitrite (mg/L) significantly changed between 2018 and 2022 were visualized into graphs with historical data from the Florida Springs Institute's database (Figures 2 & 3). This analysis was made using averages of all 26 analyzed springs (Figure 3) and separately for the averages of the 7 springs that significantly changed after BMAP implementation (Figure 4).

Results & Discussion

Of the twenty-six analyzed springs, seven had significant changes in nitrate-nitrite nitrogen after implementation of their BMAPs (Table 1). Six of these seven springs (Figure 1) significantly increased in nitrate-nitrite (Fanning Springs, Homosassa Springs Group, Jackson Blue Spring, Madison Blue Spring, Peacock Springs, and Poe Spring). Nitrate-nitrite concentrations significantly decreased at Wekiwa Spring (Figure 2).

Figure 3 provides period-of-record annual nitrate + nitrite nitrogen averages for all of the 26 impaired OFS. It is evident from these data that the majority of these springs have continuing concentration increases in spite of the 2018 BMAP implementation. Since 2018 nitrate concentrations in these springs have increased from about 1.5 to 1.8 mg/L, an average increase of about 20%.

Figure 4 shows similar averages for the seven Outstanding Florida Springs that had significant positive or negative trends as indicated in Table 1. Since 2018 nitrate concentrations in these springs have increased from about 2.3 to 3.4 mg/L, and additional increase of about 48%.

Table 1. Summary of linear regressions used to determine if nitrate-nitrite nitrogen significantly changed at 26 Outstanding Florida Springs in period-of-record after BMAP implementation in 2018. ** denotes significant result. Min Date denotes the date of the first sample collected in the selected time period. Max Date denotes the date of the last sample collected in the selected time period.

Spring Name	Min Date	Max Date	N	Slope	Between groups degrees of Freedom	Within group degrees of Freedom	F stat	Rsquared	p value
Chassahowitzka Spring Group	2/22/2018	10/9/2020	16	-1.1E-05	1	15	0.093	0.007	0.7654
Columbia Spring	1/23/2018	1/19/2022	18	2.7E-05	1	17	0.095	0.006	0.7619
Crystal River/Kings Bay Complex	3/27/2018	11/15/2021	30	4.2E-06	1	29	0.018	0.001	0.8943
Devil's Ear Spring	1/23/2018	2/22/2022	69	-5.3E-05	1	68	0.557	0.008	0.4579
Falmouth Spring	2/14/2018	2/3/2022	34	0.00029	1	33	3.938	0.110	0.0558
Fanning Springs	2/12/2018	3/1/2022	34	0.00043	1	33	9.078	0.221	0.005**
Homosassa Spring Group	1/4/2018	2/2/2022	112	2.8E-05	1	111	4.245	0.037	0.0417**
Hornsby Spring	1/23/2018	1/19/2022	32	9.7E-05	1	31	1.738	0.055	0.1974
Ichetucknee Spring Group	4/17/2018	3/29/2022	57	4.5E-05	1	56	1.844	0.032	0.18
Jackson Blue Spring	1/25/2018	2/28/2022	32	0.00018	1	31	12.271	0.290	0.0015**
Lafayette Blue Spring	2/7/2018	2/9/2022	30	0.00038	1	29	3.456	0.110	0.0736
Madison Blue Spring	2/6/2018	2/8/2022	32	0.00031	1	31	7.716	0.205	0.0093**
Manatee Spring	2/15/2018	4/12/2022	46	-2E-05	1	45	0.111	0.003	0.7411
Peacock Springs	2/20/2018	1/20/2022	29	0.00144	1	28	15.893	0.371	0.0005**
Poe Spring	1/23/2018	12/7/2021	47	0.00016	1	46	8.760	0.163	0.0049**
Rainbow Spring	1/29/2018	2/1/2022	60	9.5E-05	1	59	1.419	0.024	0.2384
Rainbow Spring #6	1/31/2018	2/1/2022	15	0.00014	1	14	3.619	0.218	0.0795
Rock Springs	1/10/2018	4/20/2022	85	2.3E-05	1	84	0.076	0.001	0.7839
Silver Springs Group	1/10/2018	4/5/2022	26	-3.4E-05	1	25	0.008	0.000	0.9313
Treehouse Spring	1/23/2018	1/19/2022	17	-1.8E-05	1	16	0.043	0.003	0.8391
Troy Spring	2/12/2018	2/2/2022	28	-0.00029	1	27	1.898	0.068	0.18
Volusia Blue Spring	6/30/2021	4/11/2022	6	-4.6E-06	1	5	0.000	0.000	0.9926
Wacissa Spring Group	2/19/2020	4/14/2022	12	-5.5E-05	1	11	0.887	0.082	0.3684
Wakulla Springs	1/7/2018	5/25/2022	206	2.7E-05	1	205	2.376	0.012	0.1248
Weeki Wachee Spring	4/19/2018	1/20/2022	16	1.5E-05	1	15	0.860	0.058	0.3695
Wekiwa Spring	1/10/2018	4/15/2022	54	-0.00014	1	53	6.072	0.105	0.0171**

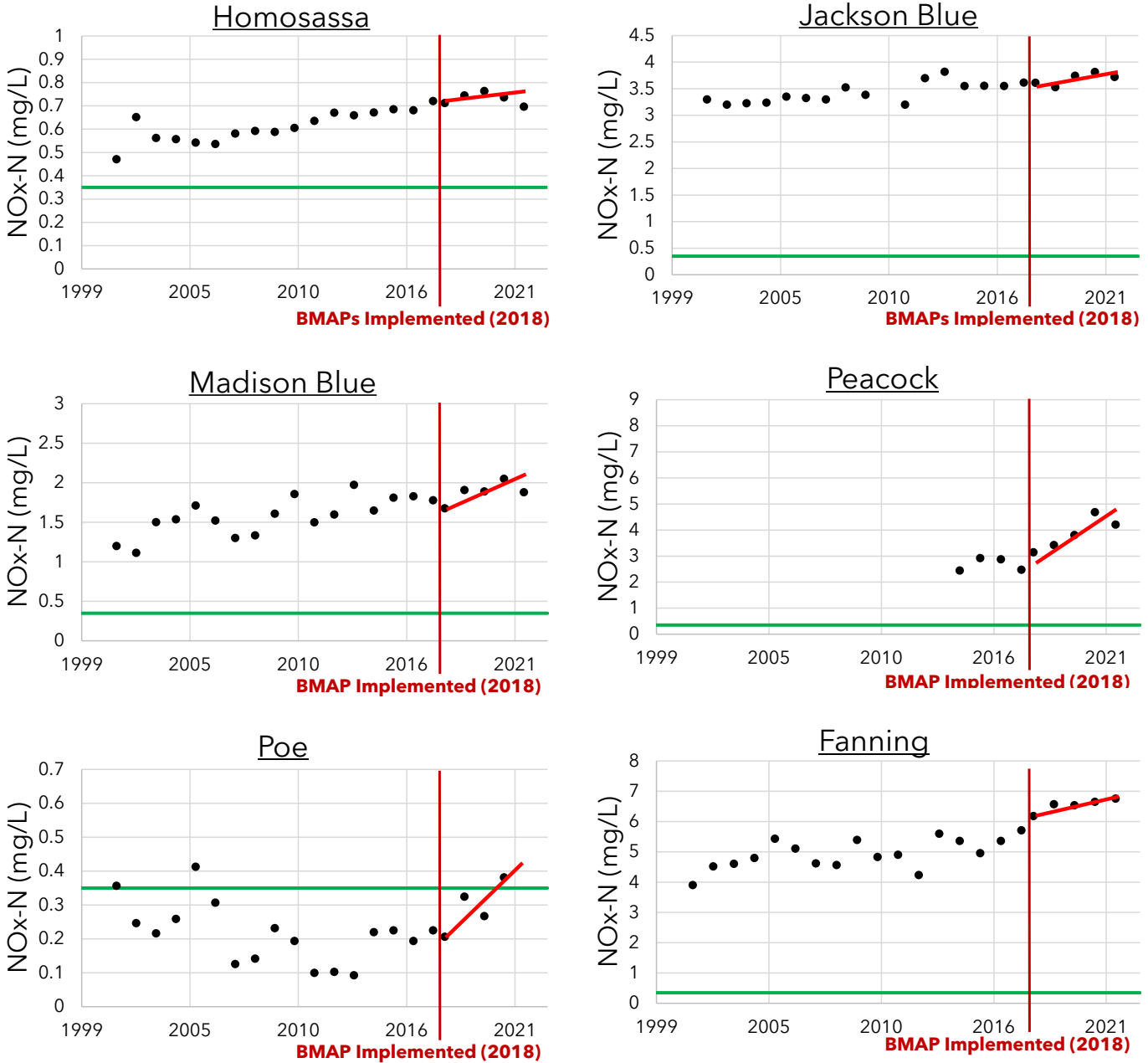


Figure 1. Trends of nitrate-nitrite nitrogen (NO_x-N; mg/L) over time at springs where nitrate-nitrogen significantly increased after BMAP implementation. Green line represents FDEP delimited 0.35 mg/L impairment level.

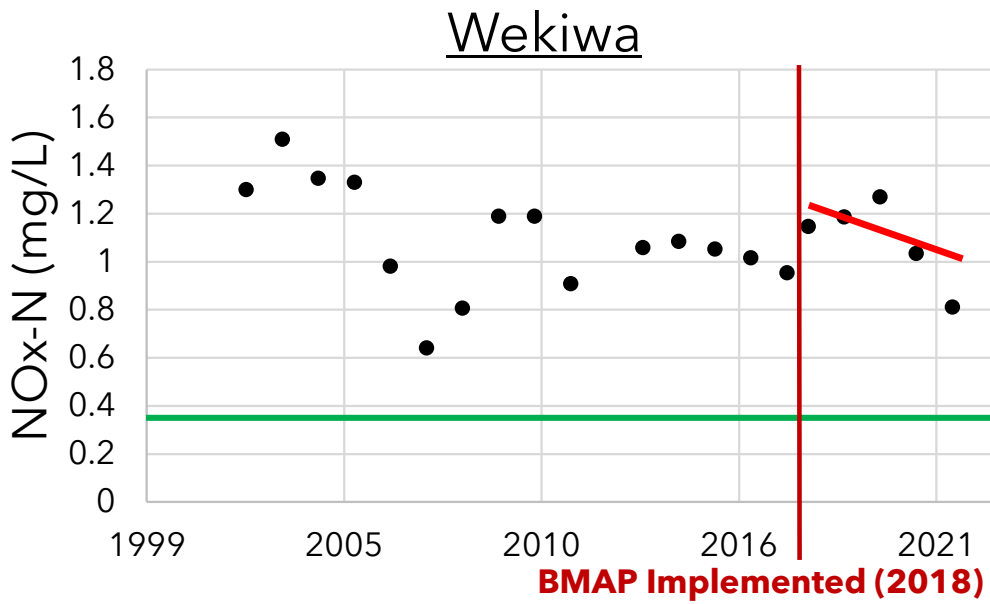


Figure 2. Trends of nitrate-nitrite (NO_x-N; mg/L) over time at a spring where nitrate-nitrogen significantly decreased after BMAP implementation. Green line represents FDEP delimited 0.35 mg/L impairment level.

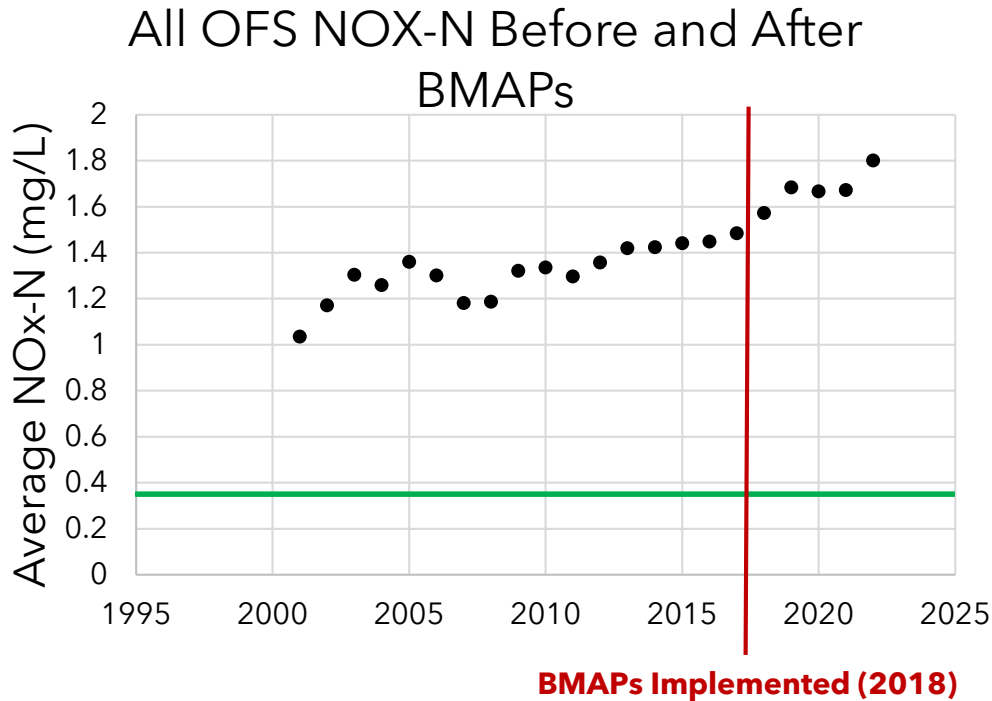


Figure 3. Annual average nitrate-nitrite nitrogen (NOx-N; mg/L) trends averaged from all twenty-six analyzed outstanding Florida springs (OFS) before and after BMAP implementation. Green line represents FDEP delimited 0.35 mg/L impairment level.

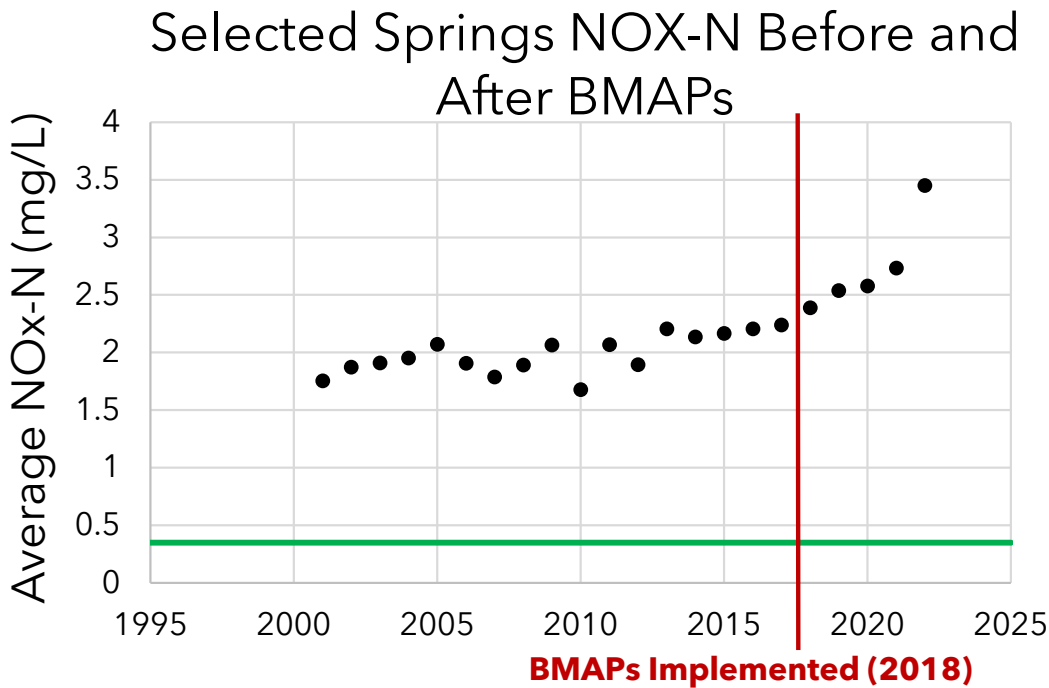


Figure 4. Annual average nitrate-nitrite nitrogen (NOx-N; mg/L) trends averaged from the seven springs that significantly changed after BMAP implementation. Green line represents FDEP delimited 0.35 mg/L impairment level.