



Better-BMAP

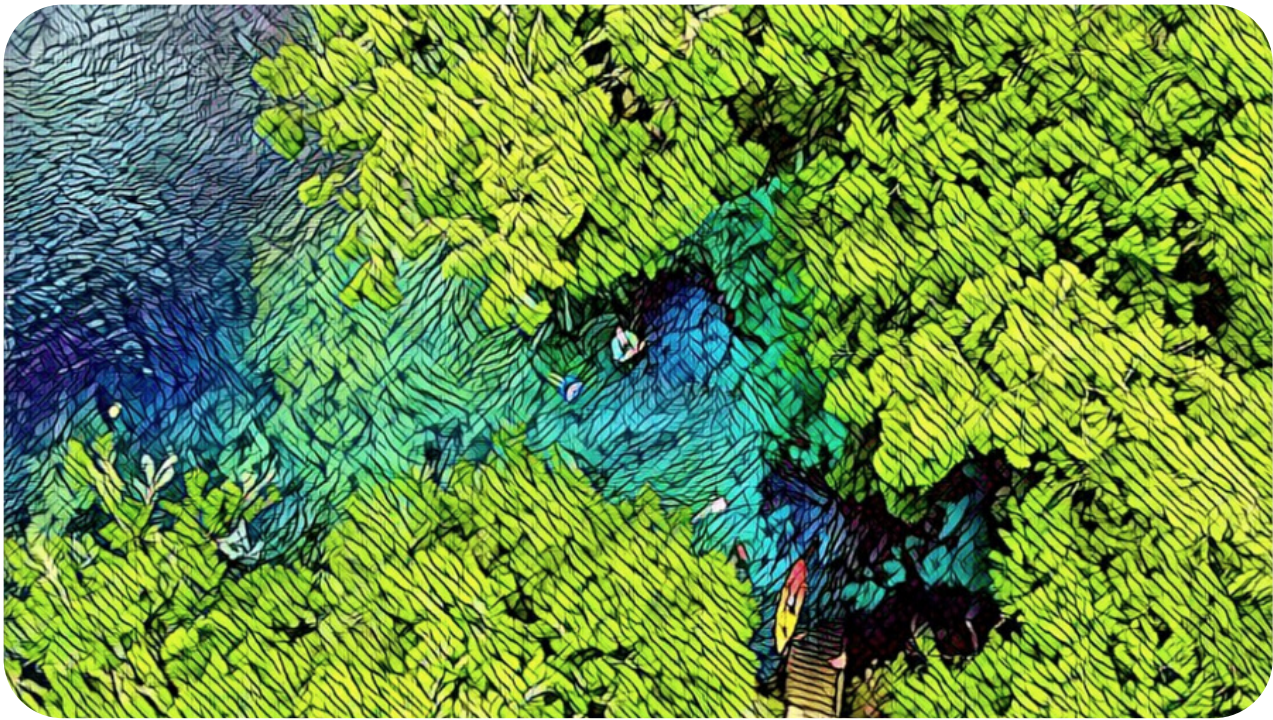
for the Santa Fe River Springs

June 2022

A Report from the Florida Springs Council



Jonathan Spring on the Santa Fe River



Poe Spring on the Santa Fe River



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For more information, please visit www.wildlifeoflouisiana.org or call 813-358-8058.



Funding for this project was also provided by Three Rivers Trust Foundation.

For more information on Three Rivers Trust's work to protect the Santa Fe, Ichetucknee, and Suwannee Rivers, contact 3RiversTrust@gmail.com.

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Better-BMAP for the Santa Fe River Springs

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Executive Summary

Why do we call this a “Better-BMAP” for the Santa Fe River and its springs? Is it brazen of us to believe that a fledgling non-profit, with a small staff and a few volunteers, can write a better BMAP than the State agency endowed with a \$2 billion annual budget and a legislative charge to protect our waters? Actually, no; we don’t think we are being presumptuous. We have the great advantage of caring not a whit about political considerations but only about the health of the springs.

Florida law requires that all BMAPs for Outstanding Florida Springs must demonstrate a credible path for meeting TMDLs within 20 years – i.e. for restoring water quality to acceptable levels.¹ As detailed below and throughout this document, we don’t believe that the State’s BMAP for the Santa Fe River will come close to meeting this fundamental requirement.

The most obvious failing in the State’s BMAP is that it only proposes one-quarter of the nitrate reductions that DEP itself admits will be necessary to clean up the springs. In addition, DEP completely ignores the increased pollution that will inevitably occur in the next twenty years from population growth and greater agricultural intensity

Even if one accepts all the questionable assumptions regarding the impacts of various projects cited by DEP (for example the alleged benefits of agricultural BMPs), the State’s plan is at best a prescription for treading water, for making no meaningful reductions for the next 20 years in the nitrate pollution that is choking the springs of the Santa Fe River.

Because DEP’s plan for restoration of the Santa Fe springs isn’t credible, it was administratively challenged in 2018² by two citizens’ groups and two individual citizens – a challenge that has yet to be resolved in the courts. The Florida Springs Council supported this challenge, along with challenges to four other springs BMAPs.³

However these legal challenges ultimately play out, we believe that there is great value to be derived from demonstrating, as we attempt to do in this document, that it is possible to create a credible plan for cleaning up nitrate pollution in the Santa Fe springs over the next twenty years. This “Better-BMAP” is intended to show the citizens of Florida, as well as its elected leaders, that springs restoration, though difficult, is achievable. Unlike the State’s approach, which requires no significant changes in current policies and practices, our Better-BMAP provides a clear blueprint for the changes needed to make a real difference for the springs.

¹ Section 373.807(1)(b)(8), Florida Statutes

² DEP’s BMAP was produced during the Scott administration, but the DeSantis administration vigorously defended it in subsequent legal proceedings.

³ The petitioners’ arguments regarding the inadequacy of these five springs BMAPs may be found here:

[tinyurl.com/BBMAP01](https://www.doah.state.fl.us/DocDoc/2019/000644/19000644_239_01272020_13395723_e.pdf)

(https://www.doah.state.fl.us/DocDoc/2019/000644/19000644_239_01272020_13395723_e.pdf)



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For the following reasons, we stand by our claim that this document is a far superior Santa Fe River BMAP than DEP's version.

First, we are honest and transparent about the scope of the problem. Our springs are polluted with nitrate because too much nitrogen is being applied to the land surface. How much is in fact being applied to the land surface? DEP's BMAP never says, in part because the agency never insisted that one of its sister agencies (FDACS) provide it with the relevant data. We have no more access to these data than DEP, but at least in our Better-BMAP we don't revert to fanciful speculation about "fate and transport" of pollutants to hide from the scope of the problem. Our BMAP is superior because it is honest.

Second, we are honest and transparent about the size of the nitrogen reductions that will be required before the Santa Fe springs can reach their target nitrate concentrations. Because of their legal obligation to develop TMDLs for the springs, DEP couldn't avoid stating the percentage reductions in nitrate required at the spring vents. Nitrate concentrations in the Santa Fe springs are roughly three to four times the target level of 0.35 mg-N/l, so roughly two-thirds to three-quarters of these nitrates must be eliminated. That's simple math. But rather than compiling a credible list of policies and projects that will reach that reduction, DEP chose to hide behind what it deems to be scientific uncertainties to avoid complying with the law. In their BMAP, DEP only proposes about one-quarter of the needed nitrate reductions to achieve the TMDL. Their expert witnesses even claimed that these totally inadequate reductions might work because, after all, who really knows what happens to nitrogen underground? Is DEP counting on chaos theory, where the flap of a butterfly's wings in Brazil can set off a tornado in Texas, and where piddling nitrate reductions in the ground can produce massive reductions at the springs? Can this blatant disingenuousness possibly be what the legislature had in mind in 2016 when it approved a law mandating springs clean-up within 20 years? Our BMAP is superior because it deals with reality and doesn't rely on "scientific" obfuscation.

Third, we account for growth that is projected over the next 20 years in reports by two of DEP's sister agencies⁴ – reports that DEP chose to ignore. DEP's nitrate reduction goals for the Santa Fe are based on the farcical assumption that Florida will experience no growth in population or agricultural intensity over the next twenty years. Projections of population and agricultural growth are consistently relied upon in economic development,

⁴ See Footnote 5 below.

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transportation, and land use planning; yet when it comes to protecting Florida's springs they are intentionally ignored. Tellingly, DEP included future projections of agricultural growth in drafts of the BMAP but removed the projections before adoption for unknown reasons. Our BMAP is superior because it addresses the reality that Florida will continue to grow, and that future growth must be accounted for and offset to achieve water quality goals.

Fourth, we acknowledge rather than ignore some excellent analyses produced by DEP itself in the recent past. These include both the 2014 Santa Fe River Basin TMDL and a 2017 DEP study showing the ineffectiveness of current agricultural best management practices in the Santa Fe basin. DEP chose to ignore these careful analyses because they both point to the difficulty of achieving compliance with the law. Instead of citing and trusting its own work, DEP chose in the Santa Fe BMAP to propound a number of theories designed strictly to obscure, distract, and mislead. Our BMAP is superior because it is based on observation, not speculation.

Fifth, unlike DEP, we recognize that the law requires specific levels of nitrate reduction for specific categories of nonpoint sources like dairies, field crops, and lawn fertilizer. DEP argued in court that it didn't need to make these allocations in the Santa Fe basin, despite the clear language of the law and despite the fact that the agency has made similar allocations in other BMAPs around the State. Our BMAP is superior because it allocates pollution reductions to categories of non-point sources as required by law.

Sixth, we don't buy into DEP's excuse that it would really like to clean up the springs but its hands are tied by the legislature. We will lay out several actions that DEP could have taken under Florida law to make their BMAP much more effective. In addition, in areas where DEP's authority is in fact limited, we detail several legislative recommendations⁵ that DEP should have made to provide the legislature with a plan (which is, in fact, all a BMAP is) for ensuring that the Aquifer Springs and Protection Act will be implemented faithfully. Our BMAP is superior because it proposes solutions, instead of just accepting the status quo.

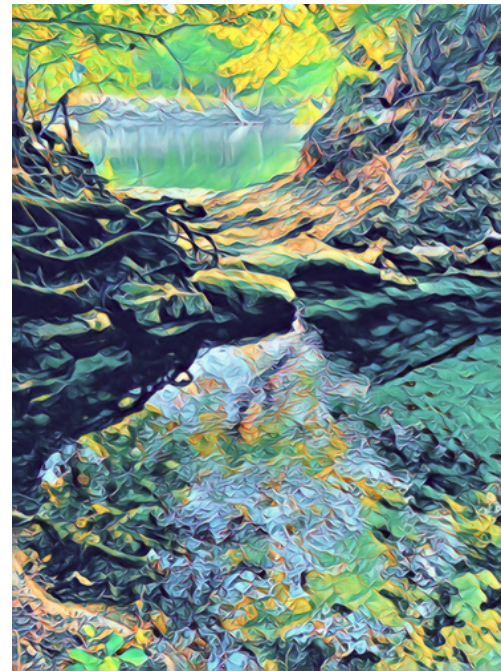
⁵ See section IX(g) below.

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We understand why DEP chose to write a toothless and impotent BMAP. Had they released a Better-BMAP like this one, screams from the development and agricultural communities would have been deafening. But that's no excuse. The law is the law and DEP has chosen to take the easy way out, no doubt hoping to hoodwink the legislature and the courts into believing that it is faithfully executing the Aquifer and Springs Protection Act. Unfortunately, that strategy is clearly working. The legislature has not expressed any misgivings about DEP's failure to produce a legally compliant plan for the Santa Fe springs, or for that matter, for many other Outstanding Florida Springs. And, to date at least, the courts have declined to blow the whistle on DEP's inadequate BMAPs.

While it would no doubt have been politically unpopular for DEP to produce such a legally compliant BMAP, that should not have deterred them. John Jopling, President of the non-profit Ichetucknee Alliance, said it best in his appearance during the administrative hearing challenging the Santa Fe BMAP:⁶

"The statute doesn't say you gotta come up with this plan unless it's hard. They don't say you gotta come up with a plan unless the plan would include stepping on somebody's toes. They say come up with a plan to reduce these. You must. You shall. And this plan manifestly on its face, if we take the DEP at a hundred percent face value, simply doesn't do that."



⁶ See page 21 of [tinyurl.com/BBMAP01](https://www.doah.state.fl.us/DocDoc/2019/000644/19000644_239_01272020_13395723_e.pdf)
(https://www.doah.state.fl.us/DocDoc/2019/000644/19000644_239_01272020_13395723_e.pdf)





I. Introduction

In 2018, pursuant to the requirements of Section 373.807, F.S., Florida's Department of Environmental Protection (DEP) proposed thirteen Basin Management Action Plans (BMAP) encompassing twenty-four nitrogen-impaired Outstanding Florida Springs. The statute required DEP to propose policies and programs sufficient to reduce nitrate to acceptable levels in these impaired springs within 20 years. Since several of these BMAPs fell woefully short of achieving that basic statutory goal, seven citizens' groups and three individuals filed administrative challenges to five of these BMAPs. One of those five challenged BMAPs – the Santa Fe River BMAP – had four petitioners: two local citizens' groups (Ichetucknee Alliance, Our Santa Fe River) and two individuals (Jim Tatum, Paul Still). As of June 2022, this challenge to the Santa Fe BMAP remains in active litigation: <https://tinyurl.com/BBMAP02>



During this long legal process, the Board of the Florida Springs Council concluded that, since the State was shirking its responsibility to produce credible plans to clean up impaired springs, FSC itself would demonstrate that a plan for springs recovery can in fact be achieved. The result is this report, made possible by support from the Three Rivers Trust Foundation and the Fish and Wildlife Foundation of Florida. The authors are Ryan Smart, Executive Director of FSC, and Bob Palmer, FSC Board Treasurer.

II. Background and Format of the Better-BMAP Report

DEP's BMAP for the Santa Fe River has some excellent background and technical analyses, but very few useful recommendations for policy or programs to achieve the TMDL. Here is a link to that BMAP: <https://tinyurl.com/BBMAP03>



In 2019, the five challenged springs BMAPs were the subject of a seven-day hearing held before the Division of Administration Hearings (DoAH). The petitioners filed a "proposed recommended order" in early 2020: <https://tinyurl.com/BBMAP05>



The petitioners cited a number of legal deficiencies in these BMAPs, nearly all of which apply to the Santa Fe BMAP. Four of the most important were:

- (1) The nitrate reductions claimed by DEP, even if legitimate, fell far short of the reductions necessary to clean up the springs within 20 years;
- (2) growth in nitrate pollution over the next 20 years due to population growth and agricultural expansion was ignored;
- (3) DEP did not assign specific reduction targets to categories of non-point sources (e.g. farm fertilizer, livestock waste, lawn fertilizer), as required by law and as it has done in many other BMAPs across the State; and
- (4) the efficacy of agricultural best management practices (BMPs) has never been verified, as required by law, and claims about their effectiveness are unsubstantiated and likely overstated.

Interested readers can refer to the links provide to get an understanding of all the twists and turns of this saga. This report will not attempt to grade each section of the BMAP with a thumbs-up or a thumbs-down. Rather, we will focus on deficiencies in DEP’s implementation plan and highlight recommendations that DEP could and should have made to ensure a successful BMAP. Our recommendations cut across several areas – programs, policies, and legislative changes – and are detailed below in Section IX.

III. Necessary Nitrate Reductions – The Big Picture and Some Big Numbers

Table 9 of DEP’s BMAP for the Santa Fe River and its springs (reproduced as Table 1 below) shows that 2,851,342 pounds of nitrogen per year are estimated to exit springs vents in the BMAP area. For whatever reason, unexplained in DEP’s BMAP, this estimate of nitrogen exiting the spring vents greatly exceeds the 2,030,119 pounds of nitrogen calculated to enter the groundwater each year in the relevant springsheds of the Santa Fe BMAP⁷ (see Tables 6, 7, and 8 of DEP’s BMAP).

Table 1 – Loading at Spring Vent, TMDL, and Required Reductions (DEPs Table 9)

Area	Total Load at Spring Vent (lb-N/yr)	TMDL Load (lb-N/yr)	Required Reduction to meet TMDL (lb-N/yr)
Devil’s Complex	1,899,233	664,731	1,234,501
Hornsby	435,385	152,385	283,000
Ichetucknee	308,107	107,837	200,269
West BMAP Area	96,083	33,629	62,454
East BMAP Area	112,535	39,387	73,148
Total	2,851,342	997,970	1,853,372

DEP assumes that no growth in nitrogen loading will occur during the 20-year BMAP period and therefore accepts 2,851,342 pounds per year as the baseline from which reductions in nitrogen loading must occur to achieve the TMDL.⁸ DEP calculates that a nitrogen reduction of 65%, or 1,853,372 lbs/year, will be required to achieve the TMDL of 997,970 pounds per year. This Better-BMAP accepts the target nitrogen level of 997,970 pounds, which is simply a calculation of the largest amount of nitrogen that can exit the springs and still yield concentrations of nitrate at or below the “healthy” target concentration of 0.35 milligrams-Nitrogen/liter (mg-N/l).

⁷ There are many credible explanations for this discrepancy. The calculated figure is based on many assumptions regarding fertilizer applications and attenuation of nitrogen applied to the land surface. Legacy nitrogen in the aquifer and de-nitrification in the aquifer may also play a role in the discrepancy. What is ultimately important, however, is the need to reduce the amount of nitrate exiting the spring vents to the TMDL levels.

⁸ Unfortunately, this assumption of no-growth in nitrogen is faulty. See section IV below for a discussion of how the Better-BMAP accounts for and offsets increases nitrogen pollution.

IV. Accounting for and Offsetting Future Growth

Population projections from Florida's Bureau of Economic and Business Research (BEBR) and agricultural projections from Florida's Department of Agriculture and Consumer Services suggest that there will be substantial growth in nitrogen pollution from both population growth and agricultural growth over the 20-year period of the BMAP.

According to the most recent BEBR "medium" projections, the populations of Bradford, Columbia, Gilchrist, and Union Counties are expected to grow by approximately 10 percent or 14,000 individuals over the next 20 years.

Regarding agriculture, FDACS estimates in the 2020 Florida Statewide Agricultural Irrigation Demand (FSAID) that irrigated acreage in the Suwannee River Water Management District, which includes most of the Santa Fe Basin, is projected to increase by approximately 18% over the next 20 years.

If these projections come to fruition, they will inevitably lead to a significant growth in nitrogen pollution within the Santa Fe Basin over the life of the BMAP. There are two possible ways to address the projected growth in nitrogen loading. First is to accept this growth as inevitable, assign an increase in nitrogen loading to each of the relevant non-point source categories, and propose projects and policies to offset this growth after it has occurred. The second is to propose policies that are capable of essentially eliminating this growth in nitrogen pollution before it occurs. For the purposes of this Better BMAP, we have chosen the latter. However, if the legislature, state agencies, and local governments fail to adopt our recommendations, the amount of nitrogen reductions required to achieve the TMDL will need to be revised upwards to account for future growth, making an already daunting pollution reduction goal that much larger.

V. Allocation of Required Nitrate Reductions – General Discussion

Section 403.067(6)(b), Fla. Statutes, requires that an:

*“Initial allocation of allowable pollutant loads among point and nonpoint sources may be developed as part of the total maximum daily load. However, in such cases, the detailed allocation to specific point sources and specific categories of nonpoint sources **shall be** established in the basin management action plan pursuant to subsection (7).”*

In practice, this means that DEP must determine how many pounds per year of nitrogen must be reduced in each of the major nonpoint categories. Section 373.807(1)(b)(7) lists these categories as: urban turf fertilizer; sports turf fertilizer; agricultural fertilizer; onsite sewage treatment and disposal systems; wastewater treatment facilities; animal wastes; and stormwater facilities. DEP has maintained throughout the legal challenges to this Santa Fe BMAP that it was not required to

allocate nitrate reductions to “categories of nonpoint sources.”⁹ But Florida Statutes clearly indicate otherwise, and this Better-BMAP will identify these nonpoint categories and assign reductions to each.

If an overall nitrate reduction of 65 percent will be required over the next 20 years, does that mean that the nitrogen contribution from each category of nonpoint sources must be reduced by exactly 65 percent? The answer to that question is a qualified “no.” Section 403.067(6)(b) lists ten factors that may be utilized by DEP in designing the actual allocations to nonpoint categories.

This list gives DEP significant flexibility to design a BMAP in a way that is both fair and cost-effective, by adjusting the relative reductions from the various nonpoint categories. It is implicit in the law that each category should assume a fair proportion of the reductions – i.e. that the polluter should pay – but that modest adjustments to strict proportionality may be appropriate. One method of making these adjustments is trading of pollutant reduction credits, which is specifically authorized in Section 403.067(7)(a)(7.), Fl. Statutes.

What do these considerations mean in practice? Here is a simple example. If calculations indicated that categories A and B were each responsible for 50 percent of the total nitrate loading to groundwater, it would be legally acceptable to require category A to provide 55 percent of the required reduction, with category B providing the remaining 45 percent. These reduction allocations could simply be determined by DEP as part of a BMAP or the two categories could engage in the trading authorized by paragraph (a) (7). We recognize that trading of this sort is more difficult to orchestrate with nonpoint sources than with discrete point sources like outfalls or smokestacks, but the concept remains sound.

VI. NSILT and the Calculation of Nitrate Reductions in the Santa Fe BMAP

DEP used the Nitrogen Source Inventory Loading Tool (NSILT) to estimate the contribution of each nonpoint category to the overall nitrogen loading in the BMAP area. For each category, NSILT begins with an estimate of the pounds of nitrogen applied to the ground and reduces that number with various attenuation factors (uptake by plants, biogeochemical processes) to arrive at a figure for pounds of nitrate reaching the groundwater from sources in that category. In light of FDAC’s refusal to provide DEP with comprehensive data on fertilizer applications, petitioners challenging this BMAP stipulated that, even if its estimates are only rough approximations of reality, NSILT is the best tool at present for assessing the sources of nitrate to groundwater.¹⁰

⁹ Despite DEP’s adamant refusal to assign nitrogen reductions to categories of nonpoint sources, in fact it does so regularly in other BMAPs across the State – e.g. Orange Creek, BMAP, five-Year Review of the St. Lucie BMAP in 2018.

¹⁰ Although its use of NSILT is generally sound, we believe that DEP systematically over-estimated the loading from livestock waste. DEP’s methodology is simple – multiply the number of animals by published estimates of daily excretion per animal. What DEP doesn’t take into account is that most if not nearly all of the nitrogen consumed by these livestock comes from nitrogen-containing plant material growing on unfertilized pastureland. In the absence of livestock, a significant amount of this plant material would eventually break down and some of these breakdown products will include nitrogen-containing compounds that will leach to groundwater. Pastured livestock are in effect excreting the same nitrogen that in their absence would be naturally recycled in the environment.

After expending considerable time, money, and effort in developing these NSILT estimates, DEP then largely abandons them.¹¹ DEP should have used NSILT output to assign required nitrate reductions to categories of nonpoint sources, as required by Section 403.067(6) (b), Fla. Statutes

For example, in the Santa Fe BMAP, DEP could have noted that septic systems are the source of roughly 256,000 pounds of N/year reaching groundwater; therefore, if pollution must be reduced by 65 percent overall, then pollution from septic systems should, after factoring in future growth, be reduced by something approximating $[256,000 \times 0.65]$, or 166,400 pounds of N/year. A similar calculation could be performed for each of the other nonpoint categories. We will use this simple mathematical approach later in this Better-BMAP to allocate nitrogen reductions to nonpoint categories of pollution.

DEP, however, chose in this BMAP to obfuscate the problem, the solution, and ultimately the law by claiming that the NSILT output describing current loading was an “allocation” of the required load reductions in the context of section 403.067, F.S. This is an absurd assertion. NSILT descriptions of current loading may be used to “determine” or “approximate” the sources of pollution but in no way do they “allocate” the reductions required by Section 403.067(6)(b), Fla. Statutes. Unfortunately, and incorrectly, the DoAH judge overseeing the hearing where five springs BMAPs were challenged did not appear to understand this distinction, at times calling NSILTs “allocations” and at other times denying that they were allocations.¹² In short, DEP’s obfuscation worked, which allowed the agency to avoid the protests from polluters that would inevitably follow production of a BMAP that followed the law.

VII. Allocating Sources of Pollution to Nonpoint Categories

DEP’s Table 9 shows required nitrate reductions needed to meet the TMDL for each of five springshed areas – Devil’s Complex, Hornsby, Ichetucknee, West BMAP area, and East BMAP area. This information, however interesting, is not what is called for in the law, which requires an allocation not to springsheds within a BMAP but rather to categories of nonpoint sources within a BMAP.

Estimating these categorical allocations for a Better-BMAP requires a multi-step process because DEP’s BMAP lacks certain key information. The first step in our allocation was to sum up, based on Tables 6, 7, and 8 of DEP’s BMAP, the amount of loading within each springshed attributable to each category of nonpoint source.

¹¹ NSILT analyses are only utilized in one specific way in all the springs BMAPs. Any NSILT analysis showing that loading from septic tanks exceeds 20 percent of overall loading in a springs BMAP area triggers a remediation plan for septic systems that DEP must develop within five years. In fact, this single calculation seems to be the only reason that DEP performed NSILT analyses at all.

¹² To read the ALJ’s confusion firsthand, see paragraph 56 of her recommended order: <https://tinyurl.com/BBMAP06> (<https://www.doah.state.fl.us/ROS/2019/19000644.pdf>)



The resulting figures, shown in column B of Table 2 below, are estimates because they do not include loading data from the West and East BMAP areas. Column C shows the percentage of total loading attributable to each category.

Table 2 – Percent of Nonpoint Loading by Each Nonpoint Category

A – Nonpoint Category	B – Current N Loading (lbs./year) ¹³	C -% of Total Nonpoint Loading
Agriculture – Dairy	24,203	1.19
Agriculture – Farm Fertilizer	1,056,798	52.06
Agriculture – Livestock Waste	346,613	17.07
Septic Systems	182,554	8.99
Urban/Sports Fertilizer	161,537	7.96
Wastewater Treatment	20,504	1.01
Atmospheric Deposition	237,920	11.72
TOTAL	2,030,129	100.00

The second step in our allocation is to apply the percentages in column C to the total nitrogen loading at the spring vents (2,851,342 lb/year) found in Table 9 of DEP’s BMAP. The results of this calculation are found in Table 3 below.

Table 3 – Estimated N Loading by Nonpoint Source Category for Santa Fe BMAP Area

A – Nonpoint Category	B -% of Total Nonpoint Loading	C – Estimated N Loading for BMAP area (lbs./year)
Agriculture – Dairy	1.19	33,931
Agriculture – Farm Fertilizer	52.06	1,484,409
Agriculture – Livestock Waste	17.07	486,724
Septic Systems	8.99	256,336
Urban/Sports Fertilizer	7.96	226,967
Wastewater Treatment	1.01	28,799
Atmospheric Deposition	11.72	334,177
TOTAL	100.00	2,851,342

In Table 4 below, Column C indicates the required allocation of categorical reductions to meet the TMDL. Figures in Column C are derived by multiplying the required reduction to achieve the TMDL (65%) by the estimated total loading per non-point source category found in Column C of Table 3.

¹³ Each figure in column B comes from DEP’s BMAP and is the sum of data shown in the “ Springshed” columns of Tables 6, 7, and 8.

Column C assumes that the reduction targets for each category should be allocated evenly based on each category's contribution to the problem¹⁴ – that is, after 20 years, each source's loading should be reduced by 65 percent, as discussed above in Section III.

Table 4 – Allocation of the Required Pollution Reduction for Each Nonpoint Category

A – Nonpoint Category	B -% of Total Nonpoint Loading	C – Allocation N of Required Reductions (lbs./year)
Agriculture – Dairy	1.35	24,983
Agriculture – Farm Fertilizer	58.97	1,092,961
Agriculture – Livestock Waste	19.34	358,372
Septic Systems	10.18	188,738
Urban/Sports Fertilizer	9.02	167,114
Wastewater Treatment	1.14	21,204
TOTAL	100.00	1,853,372

VIII. DEP's Proposed Reductions

Table 11 of DEP's BMAP (reproduced in a simplified form as Table 5 below) is a list of projects and policies (nitrogen-reducing "credits") aimed at meeting the TMDL. The reductions shown total 473,889 lbs.-N/year reaching groundwater – a total that is inadequate to meet the TMDL or to satisfy the 20-year clean-up target established in Florida law. In addition, DEP lists additional "credits" of 154,849 – 774,244 lbs.-N/year from "Advanced Agricultural Practices and Procedures" (AAPP), despite the fact that DEP has made no effort either to initiate rulemaking or support legislation to require or fund these AAPP.

Table 5 - DEP's Credits to Groundwater Loading from Projects and Practices

A -Nitrogen Source	B - N Credits to Load to Groundwater (lbs./year)
OSTDS	11,959
Urban Turf Fertilizer	19,173
Farm Fertilizer Projects	98,100
Farm Fertilizer BMPs	232,273
Dairy Projects	200
Dairy BMPs	7,189
Livestock Waste	51,541
Sports Turf Fertilizer	2,267
Wastewater Treatment Facilities	21,309
Wastewater Projects	29,877
Total Credits	473,889
Advanced Agricultural Practices and Procedures	154,849-774,244

¹⁴ Because there are no projects or policies that can directly reduce loading from atmospheric deposition, there is no allocation to that source. Some reduction in atmospheric deposition should occur as other sources are reduced, but the extent of that reduction is unknown. Columns B and C in Table 3 are proportionally adjusted to account for loading from atmospheric deposition.

Column B of Table 6 below assigns nitrogen-reducing “credits” from Table 5 to their relevant nonpoint category. The “TOTAL” line shows that, overall, DEP’s credits are barely 25 percent of the nitrogen reductions required to meet the TMDL (Column C divided by Column B). In general, as shown in column D, DEP’s “credits” are woefully short of meeting the proportional reduction target of 65 percent for each category. For example, farm fertilizer “credits” and livestock waste “credits” total only 34 percent and 16 percent of their respective targets. Even these lowly percentages are likely inflated since DEP assumes 10-15 percent reductions in nitrogen loading from best management practices that are unverified¹⁵ and have been shown to be ineffective¹⁶ in the Santa Fe basin.

One figure in Column D is an outlier. DEP’s “credits” for wastewater treatment facilities (WWT) appear to exceed not only the target reduction but also the actual amount of nitrogen reaching groundwater from these sources. The likely explanation for this anomaly is that the WWT loading shown in Table 2 above is a sum of loadings from DEP’s tables 6, 7, and 8 – tables which omit loading from the so-called East and West BMAP areas.

Table 6 – Shortfall of DEP’s List of “Potential Credits” to Meet the TMDL, By Category

A – Nonpoint Category	B – Allocated Proportional N Reduction (lbs./year)	C – DEP’s “Potential N Credits” (lbs./year)	D – Shortfall in DEP “Credits” (lbs./year)
Agriculture – Dairy	24,983	7,389	17,594
Agriculture – Farm Fertilizer	1,092,961	330,373	762,588
Agriculture – Livestock Waste	358,372	51,541	306,831
Septic Systems	188,738	11,959	176,779
Urban/Sports Fertilizer	167,114	21,440	145,674
Wastewater Treatment	21,204	51,186	[29,982]
TOTAL	1,853,372	473,888	1,379,484

Several inferences may be drawn from Table 6 above:

1. The vast majority of the pollution reaching groundwater – about 70 percent –comes from agriculture.
2. To be compliant with the law, a Better-BMAP must identify at least four times as many credits as DEP’s BMAP.
3. The “required proportional reductions” shown in column B above do not have to be precisely met, but the total reduction of 1,853,372 lbs-N/yr does have to be met to achieve the TMDL.
4. This Better-BMAP must account not only for current pollution levels but also increases in pollution due to population and agricultural growth.

¹⁵ Verifications of BMP effectiveness are required by Section 403.067(7)(c)(3), Fl. Statutes, but these verifications have never been performed for the agricultural practices utilized in the Santa Fe BMAP area.

¹⁶ See “Four-Year Progress Report, January 2013 – December 2016, Implementation of Best Management Practices in the Santa Fe Restoration Focus Area”, jointly prepared by DEP and DACS.

IX. Building a Better BMAP

The goal of building this Better-BMAP is to identify the policies and programs sufficient to reduce loading to groundwater by 1,853,372 lbs-N/year.

(a) *Combating Future Growth*

Growth in population and in agriculture is expected to increase nitrogen loading in the BMAP area over the next 20 years. For discussion of these trends, see Section IV above. We believe that virtually all new potential additional loading can be prevented or offset by policy changes. The current condition of the Santa Fe springs demonstrates that it is not acceptable to simply allow future growth in nitrogen loading to occur and then attempt to deal with it using the same failed policies. The policies recommended below address that reality.

In regards to population growth, all new developments must be connected to an advanced wastewater treatment system achieving a nitrogen level of 3 mg/L or better and must include treatment wetlands which provide additional water quality benefits before the discharges enter the aquifer. Further, all new development must prohibit in-ground irrigation systems, require Florida Friendly Landscaping, and ban the use of fertilizers containing nitrogen.

Regarding agricultural growth, no new water use permits should be issued to agricultural operations in the BMAP area. All existing permits should be capped at the average annual water use over the past three years and excessive permitted capacity should be removed. This is only common sense, since the State currently classifies both the Santa Fe and Ichetucknee Rivers as “in recovery”, meaning that groundwater pumping is already causing significant harm to these rivers. Additionally, each new agricultural fertilized acre within the Santa Fe Basin should be offset by removing an existing fertilized acre.

CONCLUSION: Virtually all new increases in nitrate pollution over the next 20 years can be avoided if the aforementioned policy changes are adopted and enforced.

(b) *Urban Turf Fertilizer*

DEP’s BMAP assumes that enhanced education will yield a six percent reduction in urban turf fertilizer usage within 20 years. Education can no doubt be helpful but regulatory tools are also available and should be used. A fertilizer ordinance like the one enacted in Alachua County¹⁷ should be adopted and vigorously enforced in all counties. Such ordinances would include a strict

¹⁷ <https://tinyurl.com/BBMAP07>
(<https://alachuacounty.us/depts/epd/waterresources/codesandcompliance/pages/fertilizer-code.aspxn>)



rainy season ban, require more than 50% of the nitrogen to be in slow-release, and prohibit application when soils are saturated or before a predicted rain event. Exemptions for commercial and institutional applicators should be removed from the Alachua County ordinance and prohibited in all other ordinance within the Santa Fe BMAP.

CONCLUSION: When springs are impaired, there is no better target for controlling nitrate pollution than lawn fertilizer. Were county and state governments to accept this obvious reality and enact the measures listed above, lawn fertilizer use could be reduced the required 65% to achieve the nutrient reduction allocation required in this Better BMAP.

(c) Agricultural Best Management Practices & Cost-Share Programs

The State should pursue much more aggressive cost-share programs with producers to promote nitrogen-saving changes in agricultural practices. Although expensive, these could be financed with State appropriations, augmented by receipts from two sources discussed below – water-use fees and fertilizer taxes.

We envision four types of cost-share programs:

- (1) advanced BMPs;
- (2) altered crop rotations;
- (3) dairy conversions; and
- (4) reduced livestock intensity.

(1) Advanced Agricultural Best Management Practices (BMPs).

FDACS has shown a total lack of urgency in investigating and approving advanced BMPs. During the BMAP challenge hearings, DEP claimed that existing BMPs provide nitrogen-reduction benefits of 10-15 percent, but the petitioners' expert witnesses made it clear that even those very modest projections were unproven and likely significantly overstated. Current BMPs are designed to maximize crop yield, not to protect water resources, even though producers are granted a presumption of compliance with all water quality laws and rules for implementing BMPs.

Much stronger BMPs, designed to reduce nitrogen loading to achieve water quality goals, need to be adopted and enforced as soon as possible. A cornerstone of newly developed BMPs must include a strictly enforced limit on the amount of fertilizer that can be applied per acre each year within the Basin of impaired springsheds, like the Santa Fe River. Cost-share projects should then be utilized so that fertilizer is applied as efficiently as possible. There are very promising techniques, already available, to sustain crop yield while significantly reducing fertilizer use.

Researchers at the UF/IFAS research facility in Lake Okeuch report nitrogen savings of 30-50 percent from precision placement of fertilizer for corn and carrot production. Planting of cover crops in the winter to enhance soil health also offers great potential benefits. Implementing appropriate advanced BMPs (e.g. side-dressing) on a broad scale will be expensive and will require significant cost-sharing from the State.

Soil-moisture sensors (SMS) enable producers to adjust irrigation regimes to maintain healthy crops while minimizing over-watering events that lead to nutrient leaching into groundwater and surface waters. SMS are common in North Florida, financed either through cost-share programs or solely by the producer. Nutrient sensors can also help producers reduce costs by avoiding over-fertilization.¹⁸ It is unclear to what extent soil nutrient sensors are utilized in the region.

The potential benefits of these sensors for reducing nutrient leaching are somewhat speculative but potentially very large. In 2017, the Director of FDACS' Office of Water Policy testified to the Florida legislature that 700 SMS could cut 200,000 pounds of nitrogen from the Suwannee Basin each year. IFAS extension agent Patrick Troy has reported that eight out of nine growers using SMS reported fertilizer savings from their use.

For several years, DEP and FDACS have used cost-share programs to increase deployment of SMS by North Florida producers. This has been a valuable initiative, but it needs to be significantly accelerated to the point that all major farming operations in the Santa Fe basin are using SMS. FDACS should also investigate whether a similar program with nutrient sensors could yield substantial nitrogen-reducing benefits. Cost-sharing or outright purchase of these tools would be relatively cheap compared with cleaning up nitrogen pollution once it's in the environment.

(2) Altered Crop Rotations.

In recent years, some water management districts and Florida counties have paid producers to change cropping patterns to less intensive regimes. For example, transitioning from a triple crop rotation of corn/sorghum/rye to a double crop rotation of peanuts/rye could save hundreds of pounds of fertilizer per acre each year. So could a change from dairy or livestock operation to pine plantation. Unfortunately, the implementation of these efforts has been spotty. The price requested by landowners (generally \$175-200/acre/year) is not significantly less than the leasing price for an acre of irrigated lands in most areas. It would seem that the State could derive equal or greater benefits by simply leasing intensive farmed land and letting it remain fallow.

¹⁸ IFAS's expert witness for the BMAP challenge (DoAH 19-0644) testified in his deposition that North Florida producers commonly over-fertilize, sometimes at rates 50 percent higher than IFAS recommendations. Nutrient sensors would greatly reduce or eliminate this practice.

(3) Dairy Conversions

Existing grazing dairies within the Santa Fe Basin should be converted to free stall barn operations which allow for 100% of cattle waste to be collected and treated to nearly eliminate loading from cattle waste. After treatment, manure should be applied to cropped forage production fields at agronomical rates consistent with advanced best management practices. By collecting, treating, and utilizing dairy cattle waste as crop fertilizer, nearly 100% of the current loading from dairy operations can be eliminated within the basin, opening up the opportunity for water quality credit trading which would provide a financial benefit for agricultural producers willing to share in the cost of such conversions.

(4) Reducing Livestock Intensity

Livestock waste is estimated to contribute approximately 17% of nitrogen loading to the Santa Fe Basin. There appear to be few, if any, cost effective ways to capture and treat waste from pastured livestock in the medium and high recharge areas of the Santa Fe Basin. The state should implement an aggressive cost share program to compensate producers for reducing livestock head per acre on lands within the Santa Fe Basin. The State used this strategy in the 1980s to protect Lake Okeechobee, buying out over 30 of that region's dairies.

CONCLUSION: Cost-share programs can be expensive but utilizing them must be an important part of any effective strategy to recover springs from nitrate pollution.

(d) Agricultural land purchases and easements

The most direct path to reducing nitrate pollution from agriculture would be State purchase of intensively fertilized properties through the Land Acquisition Trust Fund (LATF). In 2014, over 75 percent of Florida's voters approved Amendment 1 to the State Constitution providing that 33 percent of documentary stamp revenues be used for the acquisition and improvement of conservation lands. In August 2021, the State's Office of Economic and Demographic Research calculated that under the 33% formula, LATF should receive \$1.257 billion in 2021-2022, or \$1.121 billion after debt servicing.¹⁹ Since the passage of Amendment 1, the legislature and Governor have starved land purchases under LATF, a policy made easier by a First District Court of Appeal ruling in 2019 that LATF funds are "not restricted to use on land purchased by the state after 2015".

¹⁹ tinyurl.com/BBMAP08
(<http://edr.state.fl.us/content/conferences/docstamp/docstampexecsummary.pdf>)



We would argue, however, that the voters clearly intended that conservation land purchases and improvements should receive something much closer to \$1+ billion annually than the paltry \$50 to \$100 million that has typically been appropriated annually since 2010. The legislature should do what it rarely seems to do – implement the will of Florida voters – and utilize a significant fraction of LATF funds to purchase highly polluting agricultural properties in the Santa Fe BMAP area.

CONCLUSION: Over the 20-year BMAP period, large agricultural land purchases through LATF should be a key component of any plan to restore the Santa Fe springs.

(e) Legislative changes

Earlier sections of this BMAP propose a number of legislative changes that would help ensure compliance with the Santa Fe BMAP. A brief description of each follows.

(1) BMP Verification

DEP is required under Florida law to verify the effectiveness of agricultural BMPs at representative sites. It has never done so for any commercially important crop in the Santa Fe basin. Verification and enforcement of BMPs is a necessary step which must be completed before any nitrogen-reduction credits can be claimed for agricultural BMPs.

(2) Fertilizer taxes

In the Everglades Agricultural Area, Florida law imposes an agricultural tax on landowners “for the privilege of conducting an agricultural trade or business on” each acre of real property within the EAA. The legislature should enact a similar tax in the Santa Fe BMAP area based on amount of fertilizer use, as determined during regular site visits to verify BMP compliance. Proceeds should be used for land purchases or cost-share initiatives in the area.

(3) Water Usage

No new permits for agricultural irrigation should be issued in the area, a policy which would largely eliminate potential increases in agricultural pollution over the next 20 years. In addition, the legislature should authorize and require the water management districts to collect water-use fees based on the size of each water-use permit. Again, proceeds from these fees should be used for land purchases or cost-share initiatives in the area.

(4) LATF Appropriations

Targeting significant annual LATF appropriations to the Santa Fe springs will remove a large portion of the most pollution agricultural properties.

(5) Other

The legislature should develop other initiatives which would lessen nitrates in the Santa Fe BMAP area. For example, one can expect that a significant number of solar farms will be sited in North Florida over the next 20 years. The legislature should develop incentives for utilities to site these solar farms on existing, highly polluting agricultural properties.²⁰

(f) Atmospheric Deposition

As indicated in Table 2, atmospheric deposition accounts for almost 12 percent of the nitrate loading to the Santa Fe springs. It might seem pointless to consider how to reduce this diffuse loading. But, in fact, any reduction in nitrogen loading in the Basin may result in a concomitant reduction in atmospheric deposition of nitrogen. Not all nitrogen ends up in plants or the soil or the aquifer. Some is volatilized into the air, and it is that fraction that will be reduced as fertilizer applications are reduced.

²⁰ For a discussion of this topic, see this policy paper: <https://tinyurl.com/BBMAP09>
(<https://floridaspringsinstitute.org/wp-content/uploads/2020/03/Andreas-Solar-Policy-Paper.pdf>)



X. Better BMAP Estimated Pollution Reduction Credits from Projects, Practices, and Policies

Table 7 – Better BMAP List of “Potential Credits” to Meet the TMDL, By Category

Pollution Source	Current Estimated N Loading (lbs/year)	Allocated Proportional N Reduction (lbs/year)	Estimated Credits to Groundwater (lbs/year)	Description of policies and practices
Urban/Sports Fert.	226,967	167,114	161,147	Estimated credits to groundwater assume a 65% reduction in loading from the implementation and enforcement of fertilizer ordinances discussed in 9(b) and a 6% decrease from continuing public education.
Agriculture - Dairy	33,931	24,983	33,931	Converting all existing dairy grazing operations to free stall barn operations allowing for the capture and treatment of all dairy cattle waste.
Agriculture – Farm Fertilizer	1,484,409	1,092,961	1,116,927	100% implementation of advanced best management practices including strictly enforced limits on annual per acre fertilizer application, and cost-share projects such as precision fertilization, cover crops, and soil moisture sensors and nutrient sensors will result in an estimated 30% reduction in N loading from farm fertilizer. The remaining farm fertilizer allocation will be addressed by land acquisition and easement purchases which eliminate, or greatly restrict, the use of fertilizer.
OSTDS	256,336	188,738	149,882	Credits from the connection of all OSTDS parcels within the Devil’s Complex, Hornsby, and Ichetucknee Priority Focus Areas according to Appendix D in DEP’s Santa Fe BMAP.
WWTF	28,798	21,204	21,309	Achieved by BMAP WWTF policy requiring 3 mg/L maximum discharge.
Livestock Waste	486,724	358,372	370,176	Implementation of cost-share programs to reduce the number of livestock within the Santa Fe Basin by 30%. The remaining livestock waste allocation will be addressed by land acquisition and easement purchases which convert pasture lands to pine plantations or natural conditions
Atmospheric Deposition	334,177	N/A	N/A	N/A
Total	2,851,342	1,853,372	1,853,372	



XI. Conclusions

Florida law defines a BMAP as a plan for how a TMDL may be credibly achieved within 20 years. The law doesn't say that DEP can write a partial or insufficient plan in the hope that it can figure out how to write a credible plan five or ten years down the road.

DEP's Santa Fe BMAP, however, is such a partial, insufficient plan. This paper is an effort to produce a legally compliant plan. We've found that doing so is tough – obviously too politically tough a task for DEP to swallow. Writing and implementing a compliant plan will require honest analysis by DEP, significant political will by the Governor and the legislature, and considerable sacrifice from the taxpayers, the agricultural community, homeowners, and others.

But it is possible. In this document, we've outlined the key components of an effective BMAP for the Santa Fe. They include significant changes in fertilization of turf grass and connection of existing and new homes to advanced wastewater treatment. But most importantly, a Santa Fe BMAP that points the way to springs recovery will show how agricultural sources of nitrate can be cut by approximately 65 percent. This will perforce involve more advanced agricultural practices, cost-shared with the State, but more importantly large-scale land purchases and/or conversion of intensive agricultural to non-polluting crops like longleaf pine. It would be nice to pretend that these major changes in agriculture are not necessary, but the TMDL math doesn't lie.

If the prescriptions described here are too unpalatable for the State to implement, either fiscally or politically, the State's policymakers should admit that and simply say that they weren't serious in calling for springs clean-up in the first place. That would be far more honest than the current situation, where the legislature calls for restoration, state agencies run political interference against effective action, and all the state players pretend that they're solving the problem.

We chose not to take that approach. We're honest about the scope of the problem and the seriousness of the measures that will have to be undertaken to reverse decades of manmade degradation.

In the end, we can only hope that the State takes our advice seriously and implements the measures that we've recommended. If not, the State should have the decency to admit that, although recovering our springs is a worthy and achievable goal, they don't have the political will to make it happen.



The Better-BMAP was created by the Florida Springs Council, the only statewide group focused exclusively on advocacy for our world- class springs and rivers. Representatives from springs groups combined their efforts, skills, and expertise for the good of all springs; the result was the Florida Springs Council, a 501 (c)3 non- profit coalition designed for collective advocacy for Florida's springs and spring-fed waterways. Learn more at FloridaSpringsCouncil.org.





Naked Spring at Gilchrist Blue Springs State Park on the Santa Fe River



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