FLORIDA'S SUFFOCATING SPRINGS: PROVIDING A LOCALLY-BASED MANAGEMENT SOLUTION TO NUTRIENT POLLUTION FROM SEPTIC SYSTEMS

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The water we drink, bathe in, fish from, and depend on is being polluted by wastewater high in nitrates and other pollutants carried in the wastewater flows. Nutrient pollution, caused by runoff from agricultural operations, fertilized landscapes, and septic systems is particularly problematic. This pollution triggers algae outbreaks, which are increasingly fouling Florida's waters. If we are to protect our waters, we must take action to control and reduce this pollution.

More than one-third of Floridians rely on septic systems for the disposal of human waste and this number is growing daily. Yet, while efforts are currently underway to reduce nutrients from running off of farms and other fertilized landscapes, there is little being done to contain the nutrients that escape from our septics systems. Of particular concern are septic systems located in the central to the north end of the state, where karst landscapes exist – essentially a "Swiss cheese" of limestone substrates below the ground surface. Also quite vulnerable are lakes and surface waters with slow flows and warm waters. This includes Florida's most extraordinary water resource, its springs.

Florida's northern and central regions are dotted with clear springs that are treasured by residents and tourists alike. As septic systems proliferate in the state without the utilization of best management practices, our springs are suffocating under the weight of nitrogen pollution, transforming them from clear pools that support entire ecosystems to viscous and murky green waters overrun by algae.

This diminishment of water quality in our springs will continue until tools are developed to address this problem. To save our springs and other waters from septics, we should empower local governments to create Responsible Nutrient Management Entities (RNME's). RNME's can offer solutions specific to each springshed, including the developing and maintaining an inventory of septic systems, identifying vulnerable areas, and educating system owners on best management practices.

Here, we provide a blueprint for Florida's legislature to craft legislation authorizing local governments to create RNME's, a description of how RNME's can work in your local government, and a model for funding RNME's.

I. AN INTRODUCTION TO FLORIDA'S SPRINGS

Florida boasts approximately 700 recorded springs, making the state home to one of the largest concentrations of natural freshwater springs in the world.[1] These springs are fed by the Floridan Aquifer and arise when pressure forces water stored in underground cavities in the aquifer upward to natural openings in the surface.[2] Northern Florida has 33 first magnitude springs (defined as having an average flow of 100 ft3/s or more) and 191 second-magnitude springs (defined as having an average flow between 10 and 100 ft3/s).[3]

The springs have been aptly described by an attorney with Florida's Department of Environmental Protection (DEP) as "neither a true end nor beginning" in the water cycle.[4] He goes on to explain how springs play a part in this cycle:

> [T]he springs, aquifer, and their associated rivers and streams are a circle of features interdependent on one another to function as they do. Just as the aquifer supplies the springs with their flows that nourish the rivers, many rivers and streams disappear from the surface to become a part of the aquifer.[5]

Humans in Florida have been attracted to the springs' clear water for thousands of years and the springs currently draw millions of visitors every year.[6] They bring in millions of dollars per year in revenue through tourism, [7] supporting a host of recreation-oriented businesses such as canoe and tube rentals, dive shops, and boat tours.[8] The springs are also critical habitat for "countless species-from tiny invertebrates to one-ton manatees."[9] For example, manatees often congregate at or near springs during the winter months due to warm spring water discharging from the along the Gulf of Mexico.[10]

Unfortunately, the springs are in peril due to unbridled groundwater withdrawals, drought, and a decline in water quality due in large part to nutrient loading.[11]

A. Nutrient Pollution and Florida's Springs

Nutrient pollution, caused by fertilizers and septic systems is a leading cause of the degradation of Florida's springs.[12] According to accumulated scientific evidence, the majority of this pollution is caused by mineral fertilizers.[13] However, as discussed below, septic system leakage is also a significant cause of nitrogen loading in many of our springsheds.

Among the hundreds of springs in Florida, Silver Springs is the largest first magnitude spring, discharging over 550 million gallons of water per day.[14] It is also one of the most popular destinations in the state.[15] Like many springs, Silver Springs has suffered serious degradation due to an increase in organic and inorganic nitrates.[16] An overabundance of nutrients in water leads to excessive amounts of macroalgae in the springs, creating a blanket or "mat" at the bottom of the spring. These mats decrease oxygen levels and suffocate plant and animal life in the springs.[17]

"Mats" are increasing in Silver Springs, resulting in a decrease in the clarity of the water and a decline in fish and other species. [18] In fact, nitrates have increased twenty times over in Silver Springs in the past fifty years due to agricultural fertilizers, pesticides, animal wastewater, and human wastewater from septic systems.[19]

Silver Springs is just one example of nitrate pollution in our springs. Overall, Florida springs exhibit a10-fold increase in levels of nitrate compared to historic levels,[20] while some springs have nitrogen loads 350 times historic levels.[21]

B. Federal & State Regulation of Nutrient Pollution

Florida's DEP has determined that nutrient loading from excessive levels of nitrogen and phosphorous is "one of the most severe water quality problems facing the State."[22] These pollutants are currently regulated by both the federal and state government. Through the federal Clean Water Act (CWA), the U.S. Environmental Protection Agency (EPA) requires states to create a list of impaired waters that do not meet water quality standards for activities such as fishing and swimming.[23]

In an effort to combat the nutrient loading problem as well as other water quality issues, DEP has classified all the surface waters in Florida based on use, at levels I (PoBox/Drinking Water Use) through V (Industrial Use), and assigned coordinating water quality standards.[24] Class I waters receive the most stringent water quality criteria.[25] Once DEP determines if a water site is impaired, it will establish a Total Maximum Daily Load (TMDL).[26] This TMDL is a maximum threshold of pollutants permitted to enter the water to avoid further pollution.[27] For example, in 2009 Silver Springs was declared an "impaired water" and put on DEP's impaired water list due to high nitrate readings leading to an imbalance of flora and fauna caused by "algal smothering."[28]

DEP has been working with, and at times against, EPA for several years to establish *numeric* criteria for standards to prevent nutrient pollution in Florida's waterways as required under the CWA.[29] In previous years, DEP used only *narrative* nutrient criterion that states: "[i]n no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna."[30] EPA was dissatisfied with DEP's narrative standards and stepped in under the authority of the CWA in 2010 to require DEP to adopt numeric standards for all inland waters impaired for nutrient pollution.[31] This rule resulted in a legal battle between EPA's numeric standards and DEP's narrative standards,[32] with DEP and others challenging EPA's action to require numeric nutrient standards.[33] In 2013, EPA decided to repeal its federal requirements and agreed to give the state more flexibility in setting numeric standards.[34] However, the battle between the federal government and the state continues as DEP awaits approval from the EPA.[35]

Unfortunately, despite the billions of dollars spent and Florida's acknowledgment of its nutrient pollution problem, there is still state resistance to creating a resolution to this severe water quality problem. This resistance shows a need for help from local governments to restore Florida's springs to safe nitrate levels.

II. Septics Systems and Our Springs

A. How do Onsite Sewage Treatment & Disposal Systems Cause Nutrient Pollution?

Florida's DEP has declared that septic tank systems that are poorly maintained cause a major threat to nutrient pollution in Florida's groundwater leading to the aquifers.[36] Simply put, when human waste is disposed of carelessly, we run the risk of polluting surface waters, groundwater, and soil from which we draws our drinking water and food supply.

More than one-third of Floridians dispose of their waste via Onsite Sewage Treatment and Disposal Systems (OSTDS), better known as septic tanks. In fact, Florida's Department of Health estimated in 2012 that there are approximately 2.6 million OSTDS in the state, the most common of which is a septic tank with a leach field.[37] Furthermore, the proportion of homes served by OSTDS, in comparison to those on central sewer, is much higher in the rapidly growing areas of central and north Florida.[38]

An on-site system collects, treats, and disposes wastewater typically from a single dwelling. A conventional OSTDS consists of three parts, the septic tank, absorption trenches, and surrounding soil.[39] The advantages of a septic tank are that it produces effluent[40] on a very small scale, and require little maintenance.[41] However, several particular chemicals (nitrogen and phosphorus) in effluent can present health dangers, especially dangers to the health of springs.

Most septic systems will result in "nitrogen loading," even when operating in good condition.[42] Beginning in the septic tank, organic nitrogen compounds are broken down and inorganic ammonium is released.[43] Nitrogen enters the drain field soil from a septic tank largely as ammonia but is quickly oxidized to nitrate when it encounters unsaturated, aerobic conditions.[44] From aerobic devices, most of the nitrogen will enter the drain field already converted to nitrate.[45] Nitrates are very soluble in soil solution and therefore move with the water as it passes out of the drain field and mixes with the groundwater.[46]

Phosphates on the other hand are normally tightly bound to the soil clays and hydrous oxides and therefore do not migrate far from the drain field area, even under saturated flow conditions, until all the binding sites are utilized (a very long-term process). Phosphates are only a problem where septic systems are located in coarse-textured soils surrounding a lake. In these cases the phosphate will eventually exceed the soil's binding capacity and leach into the lake, where it will cause excess growth of algae and aquatic plants.

In the northern and central areas of Florida, where most of the state's springs are located, Karst landscapes exist. These landscapes are sandy and porous and our groundwater is at or near the lands surface where it interacts freely with surface areas. This means that septic system nutrient leakage makes its way easily into groundwater, which in turn feeds into our springs. For example, in the Wekiva springshed, north of Orlando, studies show that about 25% of total nutrient loading to groundwater is caused by septic systems.[47] A study of Rainbow Springs, located approximately 20 miles east of the Gulf of Mexico, revealed similar results.[48] Septic systems installed in these vulnerable areas in the northern and central portions of the state will continue to suffocate our springs until proper action is taken to regulate the placement and operation of these systems.

B. Florida's Regulation of Septic Systems

Fl. Stat. §381.0065 states that, "management of onsite sewage treatment and disposal systems is paramount to the health and safety, and welfare of the public. The installation and use of onsite sewage treatment and disposal systems shall not adversely affect the public health or significantly degrade the groundwater or surface water."[49] Florida's Department of Health (DOH) is charged with this directive and regulating septic tanks generally.[50] As part of its duties, DOH is responsible for adopting rules for septic tank design and construction, determining permitting requirements for those who build or repair systems, conducting inspections of such systems, and developing a comprehensive program to protect the public health from harmful effects of septic tank use.[51]

While DOH is responsible for septic permitting, DEP has the authority to control and prohibit air and water pollution by developing current and long-range management plans and establishing water quality standards.[52] Under this authority programs within DEP were developed to identify water bodies impaired by excessive nitrogen, establish targets for maximum nutrient loads, and develop management actions plans to restore the water bodies.[53] In 1983, in response to concerns about pollution from septic systems, DEP entered into an interagency agreement with DOH to coordinate the regulation of onsite sewage systems, septage and residuals, and marina pump-out facilities.[54]

However, little has been done since the agencies entered into this interagency agreement to meaningfully address pollution problems from septic systems. Currently, DOH grants permits to install or repair OSTDS, but it is not in the field of regulating the degradation of Florida's waters. At the same time, each springshed varies and has distinct water quality problems and DEP as a statewide agency is unable to properly develop best management practices or to regulate permitting on a localized level. Thus, there is a missing link between DEP's implementation of nutrient pollution prevention and DOH's permitting process.

C. State and Local Efforts at Regulating Septic Pollution

Recently, the state and a few local governments have responded to this missing link in regulation. In 2010, the Florida Legislature passed SB 550, requiring that all septic systems in the state be inspected every five years. However, this law was repealed in 2012, before taking effect, in response to public outcry regarding the cost of the required inspections. The repeal was part of a new law, SB 820, which required each county with a first magnitude spring to adopt a septic tank evaluation program unless it chose to opt out with a 60% majority vote of its county council/commission. Unfortunately, this legislation required that the counties decide within a short time frame whether to implement these requirements.[55] As a result, all 19 counties in the state with first magnitude springs opted out of the required inspections.[56]

County governments have also made efforts to limit the effects of nutrient pollution from OSTDS on water resources. For example, a Wakulla County ordinance requires new homes and replacement systems to install Performance Based Treatment Systems (PBTS) rather than the conventional septic system.[57] When properly maintained the PBTSs reported a 50-60% reduction of total nitrogen input into Wakulla County's watershed compared to a conventional septic system.[58]

This is a certainly step in the right direction but most local governments have not developed any regulation to prevent nutrient pollution from leaking into our springs. Only through scientifically sound and openly discussed vetting of this problem will we progress beyond the current health-based septic system and very occasional inspections. Local governments can and should adopt more complete tools for the maintenance, performance, and construction of OSTDS.

III. Models for OSTDS Management

Unfortunately, there is no meaningful regulation of nutrient pollution from septics at the state level for the protection of Florida's springs. Therefore local governments should adopt proper management programs allowing them to respond sufficiently to this worsening problem. In order to assist local governments seeking to do just this EPA created its *Voluntary National Guidelines for Onsite and Clustered (Decentralized) Wastewater Treatment Systems* guidance.[59]

EPA's guidance provides decision makers with a resource for the development of a management plan and/or entity to assess septic problems, collect data on water quality, enhance existing management programs or create new ones, and to implement management programs. EPA's management guidance provides five models structured to reflect an increasing need for more complete management as the sensitivity of the environment increases. All five models are briefly described in a chart on the following page (Box 1).

Model 4 of EPA's guidance provides for the creation of a Responsible Management Entity (RME) to conduct permitting and other activities related to septic systems. An RME, as described by EPA, is a legal entity responsible for providing various management services with the requisite managerial, financial, and technical capacity to ensure long-term management of on-site wastewater treatment systems.[60] The RME is recommended in areas of high environmental sensitivity where there are many OSTDS.

An RME could be used as the local government tool to manage and address nutrient problems caused by OSTDS, thereby filling in the missing link that exists between DEP and DOH and ensuring that all established criteria can and will be met. However, EPA's models are only a basis for a local government's program and can be tailored by substituting components of one program into another to accommodate local needs. A hybrid or combination of programs tailed to combat nutrient pollution from septic systems, as described below, is the proper management solution for states such as Florida, where environmental sensitivity and public health risks vary.

Box 1

EPA'S FIVE MANAGEMENT MODELS	MANAGEMENT CASE STUDIES
MODEL 1: HOMEOWNER AWARENESS MODEL This is the simplest model and is directed at systems that are owned and operated by individual property owners in areas of low environmental sensitivity. To ensure that timely maintenance is performed, the regulatory authority mails maintenance reminders to owners at appropriate intervals.	*FAIRFAX, VIRGINA* In response to improperly designed and poorly managed OTSDS. Fairfax County adopted an ordinance requiring routine pumping of septic tanks every five years and alternating drainfields and drainfields reserve areas to ensure system performance.
MODEL 2: MAINTENANCE CONTRACT MODEL As system designs become more complex to enhance the capacity of conventional systems, contracts with qualified technicians are needed to ensure proper and timely maintenance.	*ALBEMARLE REGION, NORTH CAROLINA* In response to individual wastewater system malfunctions, water quality risks, and the explosive growth, local governments authorized an eleven county regional management entity to inventory and monitor individual wastewater systems, improve system management, and develop site-specific design criteria for new and replacement systems incorporating advanced treatment technologies.
MODEL 3: OPERATING PERMIT MODEL When sustained performance of treatment systems is critical to protect public health and water quality, limited-term operating permits are issued to the owner and are renewable only if the owners demonstrate that the system is in compliance. This level includes performance-based designs.	*HAMILTON COUNTY, OHIO* When 34% of local OTSDS were found to be either malfunctioning or substandard the Hamilton County General Health District upgraded its onsite wastewater program to include operating permits and routine inspection requirements to maintain system performance.
MODEL 4: RESPONSIBLE MANGEMENT ENTITY (RME) In cases where frequent and highly reliable operation and maintenance of decentralized systems is required to protect particularly sensitive environments, operation permits are issued to a responsible management entity instead of the property owner to assure that appropriate maintenance is performed.	*PEÑA BLANCA, NEW MEXICO* In response to 86% of the OTSDS needing repair or replacements the community opted to repair or replace all the OTSDS, establishing and designating a sanitation district that served as the operator/manager of the upgraded and new facilities.
MODEL 5: RESPONSIBLE MANAGEMENT ENTITY (RME) "OWNERSHIP MODEL" Providing the greatest assurance of system performance in the most sensitive of environments, this model specifies that the RME owns, operates and maintains the system, removing the property owner from responsibility for the system.	*PHELPS COUNTY, MISSOURI* To comply with more stringent state public health regulations, the county leaders and the local water supply district expanded services to allow the water district to own and operate decentralized systems that provide affordable and sustainable wastewater treatment.

IV. Developing Responsible Nutrient Management Entities in Florida

In order to help protect its springs and prevent further nutrient pollution caused by OSTDS, Florida's local governments should be legally empowered to create Responsible Nutrient

Management Entities (RNMEs). RNMEs can act as a one-stop management entity to plan and manage projects and operations for responsible nutrient management.

As shown in Box 2 below, RNMEs could be structured to address nutrient pollution problems through: 1) Planning; 2) Training and Education; and 3) Permitting and Maintenance. Depending on each local area's needs, a local government may choose to adopt some or all of the potential components of an RNME described below.

Box 2

RNME MANAGEMENT PRIORITIES	RNME MANAGEMENT ACTIVITIES
PLANNING	· Develop and maintain an inventory · Identify and map vulnerable areas · Work collaboratively with land use planning authorities
TRAINING & EDUCATION	· Ensure homeowner awareness and training · Educate system owners on Best Management Practices · Manage private operator training · Certify design, installation, and operation · Coordinate with service providers
PERMITTING & MAINTENANCE	· Develop system performance standards · Conduct strategic and restrictive permitting · Replace dated systems in vulnerable areas

A. Planning

First and foremost, RNMEs can be tasked with conducting research and planning for the maintenance, repair, and future siting of OTSDS. As part of this planning component, RNMEs can develop and maintain an inventory of area OTSDS and their age, type, condition, and density of placement. An RNME may also identify and map vulnerable areas where soil composition or other factors make it likely that nutrient pollution will make its way to waters and/or areas where a water body is out of compliance with nutrient criteria. An inventory and mapping system will help identify these red flagged areas and create an organized tracking system to maintain the needs of the local area. Using the impaired water list from DEP can also help identify areas that are vulnerable. An inventory data system may also track useful installation and maintenance information such as permits, inspection, and compliance records and repairs on specific systems. Once an inventory has been created and vulnerable areas have been identified, an RNME should work collaboratively with land use planning and local central sewer system providers to develop procedures for areas that are in major need of restoration. For example, some vulnerable areas may need to be restricted from installing new OSTDS and/or required to hook up to the central system or other appropriate wastewater disposal options.

B. Training and Education

Educating and training the homeowner and private service providers is essential to the success of this hybrid model. RNMEs can serve as the local entity responsible for working closely with state agencies, service providers, planners, homeowners, and other stakeholders to conduct training and education.

There are currently many homeowner- focused septic training programs operating across the country and the most successful programs support homeowners by conducting both education and training. This includes, but is not limited to, educating homeowners on Best Management Practices (BMPs), including education on user awareness of septic system location, the overall function of the system and the importance of care, and supporting the homeowner in conducting maintenance (e.g., checking septic tank sludge levels). Homeowners should be provided with educational materials and be encouraged to serve as monitors of their own systems. Printed reminders can be mailed out to inform owners that inspection and perhaps maintenance is due for their systems. Also, educating homeowners and the household of what goes into the ground (e.g., encouraging individual home composting/mulching instead of garbage disposal use) should be incorporated into OSTDS education.

RNMEs can also be tasked with ensuring that private operators that install and maintain OSTDS are properly educated on the environmental consequences of nutrient pollution. For example, RNMEs may require that private operators attend a nutrient pollution training before being authorized to conduct OTSDS installation in the local management area.

C. Permitting and Maintenance

An RNME may also be responsible for both the permitting of new OTSDS and the development of proper maintenance procedures for existing systems. Importantly, any RNME that conducts OTSDS permitting will need to ensure that its activities are in sync with local DOH procedures.

RNME permitting may include the consideration of established nutrient level standards, best management practices, and the health of nearby water bodies. An RNME may issue permits annually or every five years depending on the condition of the system and/or area. Depending on the type of system that a homeowner has the inspection will determine whether the permit should be renewed or terminated in order to gain compliance.[61] An RNME may require that older systems that cannot meet the standards are upgraded or replaced entirely to meet the best technology available.[62]

Maintenance required by RNMEs may include site inspections and water quality level testing. To ensure proper maintenance of systems, RNMEs also may send regular maintenance and service attention reminders to homeowners encouraging system management.[63] This may be done by monthly newsletters or even sending notices attached to a monthly water bill. In vulnerable areas, more stringent procedures may need to be put into place. For example, an

RNME could require homeowners in vulnerable areas to work with certified licensed inspectors who are approved by the RNME.[64] It may be required that these homeowners submit their inspection records to the RNME so that it is recorded properly in its inventory data system. If any homeowner fails to comply with the maintenance requirements the RNME may be authorized to step in to get the system into compliance. In some cases, an RNME may be allowed to attach a lien to the property of the homeowner that is not in compliance in order to reimburse the entity for the repairs and/or maintenance.[65]

V. Legally Empowering Local Governments to Create RNMEs

Currently, septic regulation is largely in the hands of Florida's DOH and implemented by County DOH offices. DEP as the agency tasked with environmental protection plays a small role in its regulation of pollutants, including nitrogen, emitted by OSTDS. As described above, these agencies are not providing the kind of comprehensive planning, training, and permitting that is necessary to save Florida's springs from the suffocating effects of nitrogen pollution from septic systems. It is time that Florida's legislature amends the law to empower local governments to create RNMEs to conduct these activities. Sample language for such an amendment is provided below in Box 3.

Box 3

Sample Legislative Language to Empower the Creation of RNMEs

State of Florida
Department of Health
Chapter 64E-6, Florida Administrative Code
Standards for Onsite Sewage Treatment and Disposal Systems

Definitions.
Responsible Nutrient Management Entity – a legal entity established to be responsible for providing localized nutrient management services with the requisite managerial, financial, and technical capacity to ensure long term management of onsite sewage treatment and disposal systems.

64E-6.0_
(1) Effective ____, each city, county or appointed regional entity shall have the right to establish a responsible nutrient management entity for the prevention, control, and abatement of nutrient pollution caused by sewage waste and effluent from onsite sewage treatment and disposals systems. Responsible nutrient management entities shall have the authority to implement regulations, maintenance, and planning in coordination with the Department. This authority may include but is not limited to: a) permitting, b) development of system performance inspection standards, c) development of standards for the construction, operation, and maintenance of onsite sewage treatment and disposal systems.
(2) The establishment of responsible nutrient management entity must be approved by the Department. The Department shall ensure that responsible nutrient management entities are at least as restrictive as state law.

Lawmakers should amend Part 1 of Chapter 64E-6 of the Florida Administrative Code, which outlines the duties of DOH in its regulation of OTSDS in the state. This amendment should provide a definition for "Responsible Nutrient Management Entity" and language empowering local government entities to create RNMEs with the power to conduct regulation, maintenance, and planning in coordination with DOH.

VI. Funding RNME Operations

Funds to support the operations of an RNME can be drawn from various sources. Box 4 below provides a case study location and accompanying scheme from EPA's *Voluntary National Guidelines for Onsite and Clustered (Decentralized) Wastewater Treatment Systems* guidance.[66] These case studies show that no matter the size of the budget a proper funding scheme can be developed.

The Florida RNME, depending on the area can choose to follow a billing approach, utility expansion plan, grant funding, or combination thereof to achieve and implement the RNME.

Box 4

MANAGEMENT CASE STUDIES	FUNDING MODELS
FAIRFAX COUNTY, VIRGINIA **"User Fees & State Funds"**	Fairfax County sustains its annual $1.5 million onsite program through user fees and dedicated funds. The fees cover approximately 30% of the program costs. The remainder is financed through dedicated state and local funds.
ALBEMARLE REGION, NORTH CAROLINA **"User Fees & County Funds"**	The annual budget for the wastewater program is $290,000. The program is sustained through its $300 per home permit fees, annual $50 system inspection fees, and county funds.
HAMILTON COUNTY, OHIO **"Inspection Fees & County Funds"**	The county's 2008 decentralized wastewater program budget was $1.24 million, funded by $850,000 in user fees and $390,000 from the Hamilton County Storm Water District. Fees include $40 for inspecting mechanical systems and $85 for inspecting conventional, gravity-flow, individual systems. Legislation authorizing property liens has helped to eliminate delinquent inspection fees.
PEÑA BLANCA, NEW MEXICO **"Federal Grant & Service Fees"**	Received an EPA Clean Water Construction grant, and the water sewer district charges a monthly service fee, ranging from $9 to $20 per month.
PHELPS COUNTY, MISSOURI **"Revenue Bonds & Financing"**	Public Water Supply District issued revenue bonds and borrowed money to finance the start of the decentralized wastewater management program. Public Water Supply District charges a flat rate of $46.50 per month to fund the program. The district has the power to terminate poBox water service for nonpayment of fees.

VII. Conclusion

At our current rate, watershed after watershed in Florida is being cited with problems resulting from too many nutrients, and a significant portion of these nutrients are coming from septic systems. Yet our currently regulatory system is not properly addressing this pollution. There is a yet unmet need to rectify this problem and provide logical, ecologically and economically productive tools for our local governments, communities, and homeowners to address the growing nutrient water quality issues. RNMEs, if properly empowered to do so, can provide these tools.

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[1] Fla. Dep't. of Entl. Prot., *Florida Springs*, (Jan. 26, 2011).
[2] *Id.*
[3] James B. Heffernan et al., *Hydrologic and Biotic Influences on Nitrate Removal in a Subtropical Spring-Fed River*, 250 (2010), available at http://aslo.org/lo/toc/vol_55/issue_1/0249.pdf.
[4] Kelly Samek, *Unknown Quantity: The Bottled Water Industry and Florida's Springs*, 19 J. Land Use & Envtl. L. Rev. 569, 572 (2004).
[5] *Id.*
[6] Fla Springs Task Force, *Florida's Springs: Strategies for Protection & Restoration* 1 (Nov. 2010).
[7] *Id.*
[8] Kelly Samek, *Unknown Quantity: The Bottled Water Industry and Florida's Springs*, 19 J. Land Use & Envtl. L. Rev. 569, 573 (2004).
[9] Id.
[10] Southwest Florida Water Management District, *The Hydrology and Water Quality of Select Springs in the Southwest Florida Water Management District* 1 (March 2010), available at http://www.swfwmd.state.fl.us/documents/reports/springs.pdf.
[11] *See* Fla. Springs Task Force, supra note 7.
[12] Fla. Admin. Code Ann. R. 62-302.300(13) (2012).
[13] Matthew J. Cohen, *Springshed Nutrient Loading, Transport and Transformations*, School of Forest Resources and Conservation University of Florida 54 available at http://waterinstitute.ufl.edu/research/projects/downloads/p001-Ch2_SpringsNutrients2.pdf.
[14] Florida's Springs Protecting Nature's Gems, Silver Springs, (Apr. 3, 2013).
[15] *Id.*
[16] *Id*.
[17] R. Jan Stevenson et al., *Ecological Condition of Algae and Nutrients in Florida Springs: The Synthesis Report*, 8 (Oct. 31, 2007), available at http://publicfiles.dep.state.fl.us/dear/sas/library/docs/springs/synthesisreport.pdf.
[18] *Id*.
[19] *Id*.
[20] See Cohen, supra note 14.
[21] Id.
[22] Fla. Admin. Code Ann. R. 62-302.300(13) (2012).
[23] *Id*.
[24] Fla. Admin. Code Ann. R. 62-302.400 (2012).
[25] *Id*.
[26] Fla. Dep't. of Entl. Prot., *Total Maximum Daily Loads Program*, (Mar. 26, 2013).
[27] *Id*.
[28] Normandeau Associates, Inc., *Restoration Plan for the Silver Springs & River*, 36 (June 16, 2011), available at http://www.floridasprings.org/downloads/florida_142_370s78yf.pdf.
[29] Fla. Dep't. of Entl. Prot., Development of Numeric Nutrient Criteria for Florida's Waters, (Feb. 27, 2013).
[30] Fla. Admin. Code 62-302.530 (2012).
[31] *Id.* at 1146; *See* also 33 U.S.C. § 1313(c)(4) (2006).

[32] Fla. Wildlife Fed'n, Inc. v. Jackson, 853 F. Supp. 2d 1138, 1145 (N.D. Fla. 2012).
[33] SU026 ALI-ABA 387, 393-94.
[34] *Id.*
[35] *Id.*
[36] Fla. Dep't. of Entl. Prot., *Fla. Springs Initiative Achievements*, (Jan. 26, 2011).
[37] Fla. Dep't. of Health, *OSTDS Statistics*, (Aug. 30, 2012). Total is based on 1970 census figures plus the number of systems installed from 1970 to 2012. The figures does not account for systems taken out of service.
[38] Harmon Harden et al., *Wakulla County Septic Tank Study*, Fla. State Univ. Dept. of Earth, Ocean and Atmospheric Science, 8 (Dec. 7, 2010), available http://www.dep.state.fl.us/springs/reports/files/phaseII_report.pdf.
[39] Michael T. Hoover, *Soil Facts: Septic Systems and Their Maintenance*, 1 (2004), *available at* http://www.soil.ncsu.edu/publications/Soilfacts/AG-439-13 (last visited on March 30, 2013). Household wastes flows into the septic tank, where the purification begins. In the septic tank, solid wastes settle to the bottom of the tank as sludge, and grease floats to the top as scum. Bacteria (called anaerobes because they live without oxygen) begin to slowly digest the solid wastes. The remaining wastes flow out of the tank into the trenches as liquid effluent. The absorption trenches distribute the effluent to the soil, where final treatment and disposal occur.
[40] U.S. Envtl. Prot. Agency, *Terminology Services*, (May 7, 2013). Effluent is defined by the United States Environmental Protection Agency as "wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial point source, such as a pipe. Generally refers to wastes discharged into surface waters."
[41] Charles G. Willing, Jr., *Private Ownership of Ground-Discharging Small Sewage Treatment Plants: A Case for Preventive Regulation*, 17 B.C. Envtl. Aff. L. Rev. 585, 595 (1990).
[42] Wash. State Dep't of Health, *Basic Principles of Onsite Sewage*, 8 (1992).
[43] *Id*
[44] *Id*
[45] *Id*.
[46] Craig G. Cogger, *Septic System Waste Treatment in Soil*, Wash. State Univ., College of Agric. and Home Econ. (1992).
[47] *See* Cohen, supra 14, at 104.
[48] *Id.* at 104-5.
[49] Fla. Stat. § 381. 0065(a)-(b) (2012).
[50] § 381.0065. Septic tank has its own chapter in the Florida Statutes. See Fla. Stat. §§ 489.551-558..
[51] § 381.0065(3).
[52] Fla. Stat. § 403.061 (2012).
[53] Fla. Dep't of Health, *2012 Progress Report on Phase II and Phase III of the Florida Onsite Sewage Nitrogen Reduction Strategies Study*, Bureau of Onsite Sewage Programs, 5 (2012).
[54] Fla. Dep't. of Envtl. Prot., *Septic Systems*, (Sept. 21, 2011).
[55] Fla. Dep't. of Health, *Onsite Sewage Programs*, (Dec. 21, 2012).
[56] *Id.*
[57] Wakulla, Fla., Ordinance 2006-58 (Dec. 27, 2007); See also supra 39.
[58] *Id*. at 100.
[59] See Office of Water, U.S. EPA, EPA 832-B03-001, *Voluntary National Guidelines for Management of Onsite and Decentralized (Clustered) Wastewater Treatment Systems*, (2003), available at http://www.epa.gov/owm/septic/pubs/septic_guidelines.pdf.
[60] N.Y. State Dep't. of Health, *Appendix 75-A Wastewater Treatment Standards - Individual Household Systems*, (April 2013).
[61] *Id.* at 18.
[62] *Id.* at 19.
[63] *Id.* at 12.
[64] *Id.* at 17.
[65] *Id.* at 18.
[66] See Office of Water, U.S. EPA, EPA 832-B03-001, *Voluntary National Guidelines for Management of Onsite and Decentralized (Clustered) Wastewater Treatment Systems*, (2003), available at http://www.epa.gov/owm/septic/pubs/septic_guidelines.pdf.