



Onsite Systems, Nutrients, and the Wakulla Springshed

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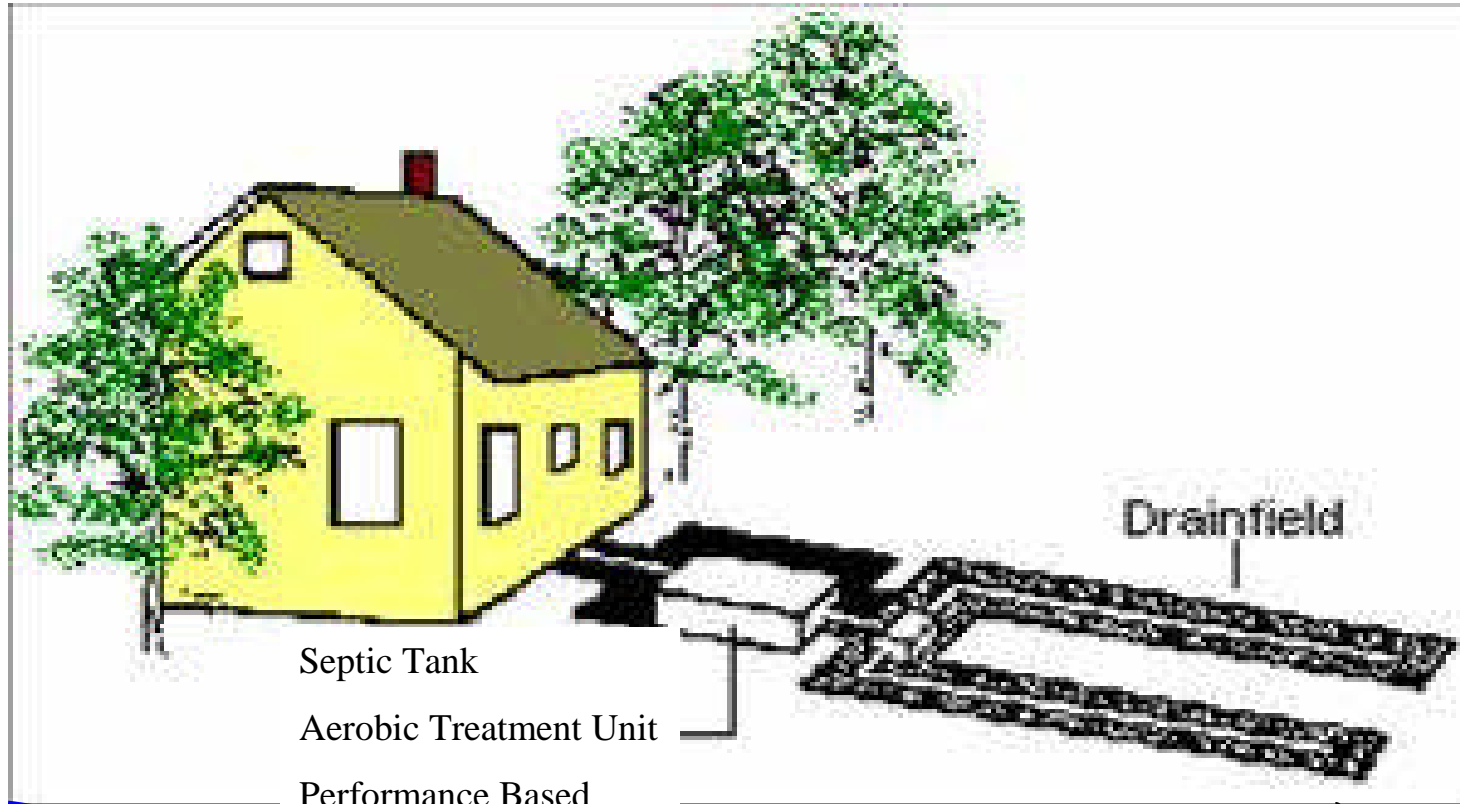
Outline of the Presentation

- How do septic/onsite systems work?
- What can be done about nutrients?
- What are best management practices?
- What are suggestions for the Wakulla Springshed?





How do onsite systems work?



Septic Tank

Aerobic Treatment Unit

Performance Based
Treatment System

Drainfield

Groundwater

2 feet between bottom
of drainfield and
seasonal high water
table





(Average) Treatment Expectations

	cBOD5 (mg/L)	TSS (mg/L)	TN (mg/L)	TP (mg/L)	System Type
Standard Septic system below drainfield at groundwater interface	<5	<5	25-40	<5	
Secondary Treatment	<20	<20			ATU
Advanced Secondary Treatment	<10	<10	<20	<10	PBTS
Florida Keys	<10	<10	<10	<1	PBTS
Advanced Wastewater Treatment	<5	<5	<3	<1	





What can be done about nutrients?

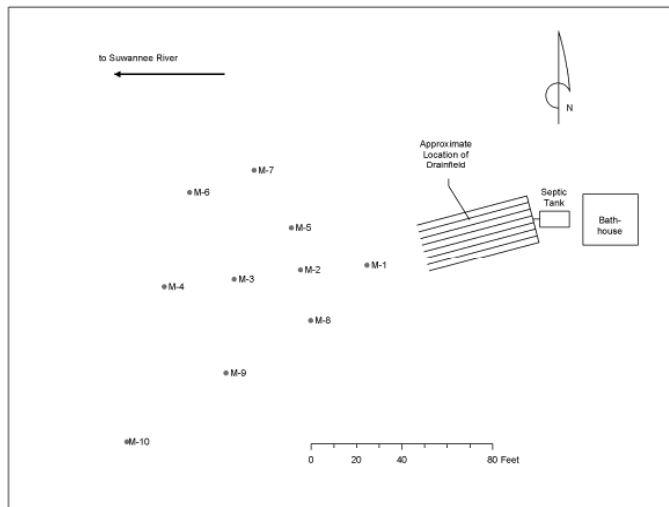
- No sewage
- Limit flow and/or number of OSTDS per acre. This approach has been in Florida OSTDS rules for at least 30 years.
- Increased Treatment:
 - Recycle to plants (drip-irrigation, generally in conjunction with an ATU)
 - High-performance treatment at onsite scale (tested in Keys Demonstration Study, proposed for Wekiva).
- Natural attenuation:
 - In some areas, nitrogen and phosphorus decrease subsequent to the drainfield in the groundwater and don't appear to affect surface water (St George Island Study, Indian River Lagoon Study).
 - In some areas this natural attenuation process appears to be less important (Lake Okeechobee Study, Karst Study)



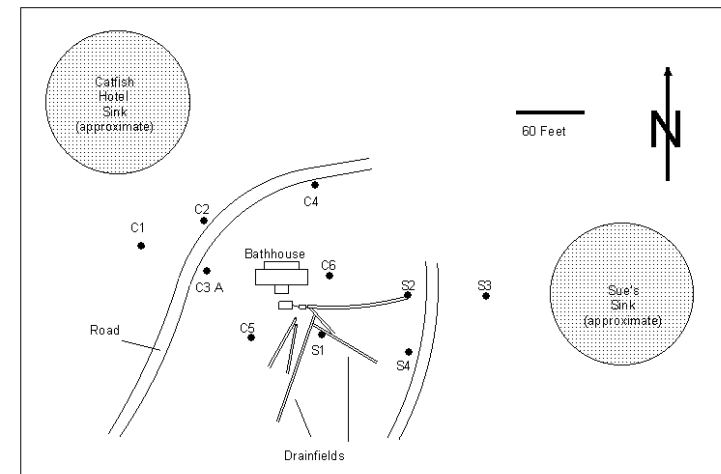


Karst Study

- Manatee Springs State Park Bath Houses
 - Rapid transport of tracers
 - Nitrate concentrations in excess of drinking water standards at many monitoring wells
 - Phosphorus elevated
 - Few fecal coliform observations



River Front



Upland (On top of cave)





Conceptual Flow Model: Upland

~60 feet

Average Nitrate
Concentration (mg/L)

0.4

0.6

12

21

0.6

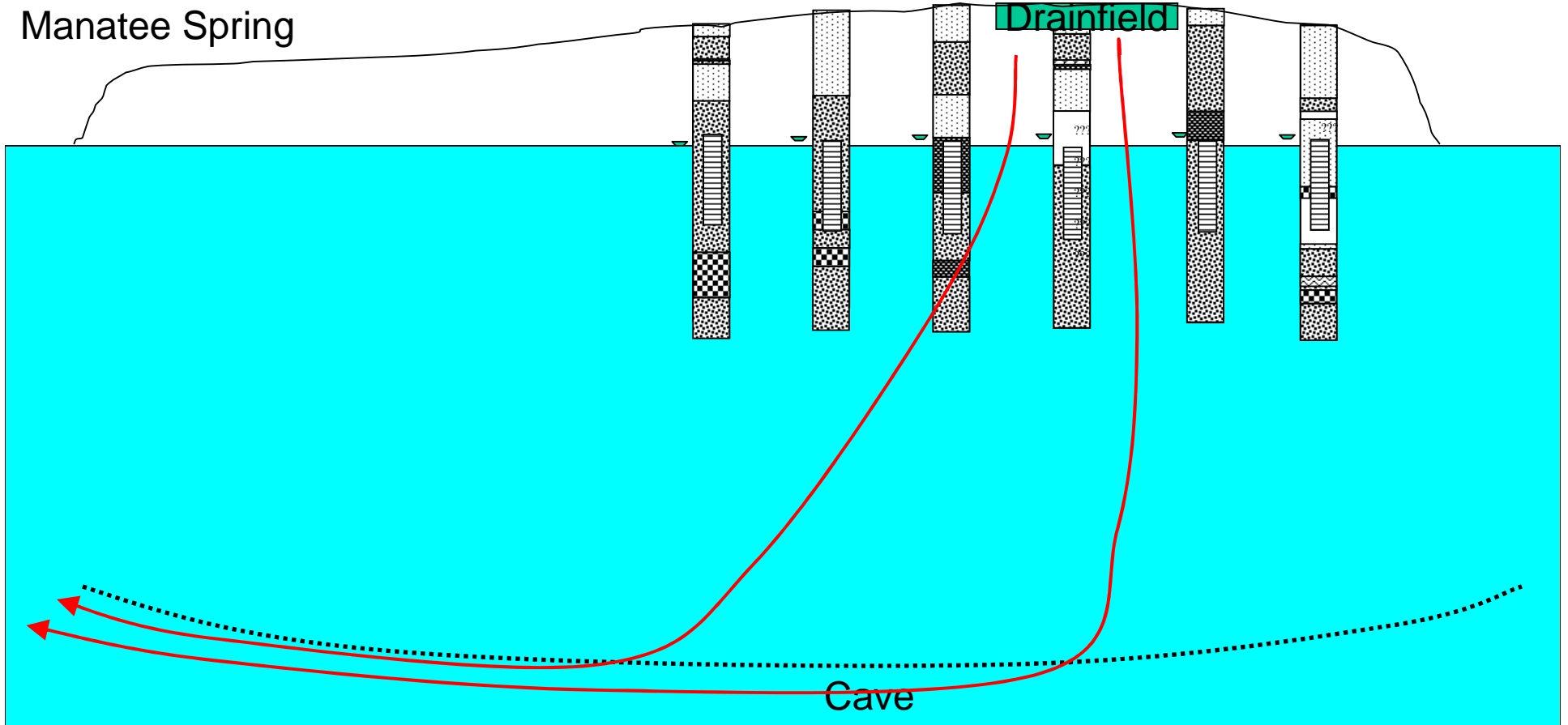
0.1

Sue Sink

Manatee Spring

Drainfield

Cave





Conceptual Flow Model: River Front

~30 feet

Suwannee River

Average Nitrate
Concentration (mg/L)

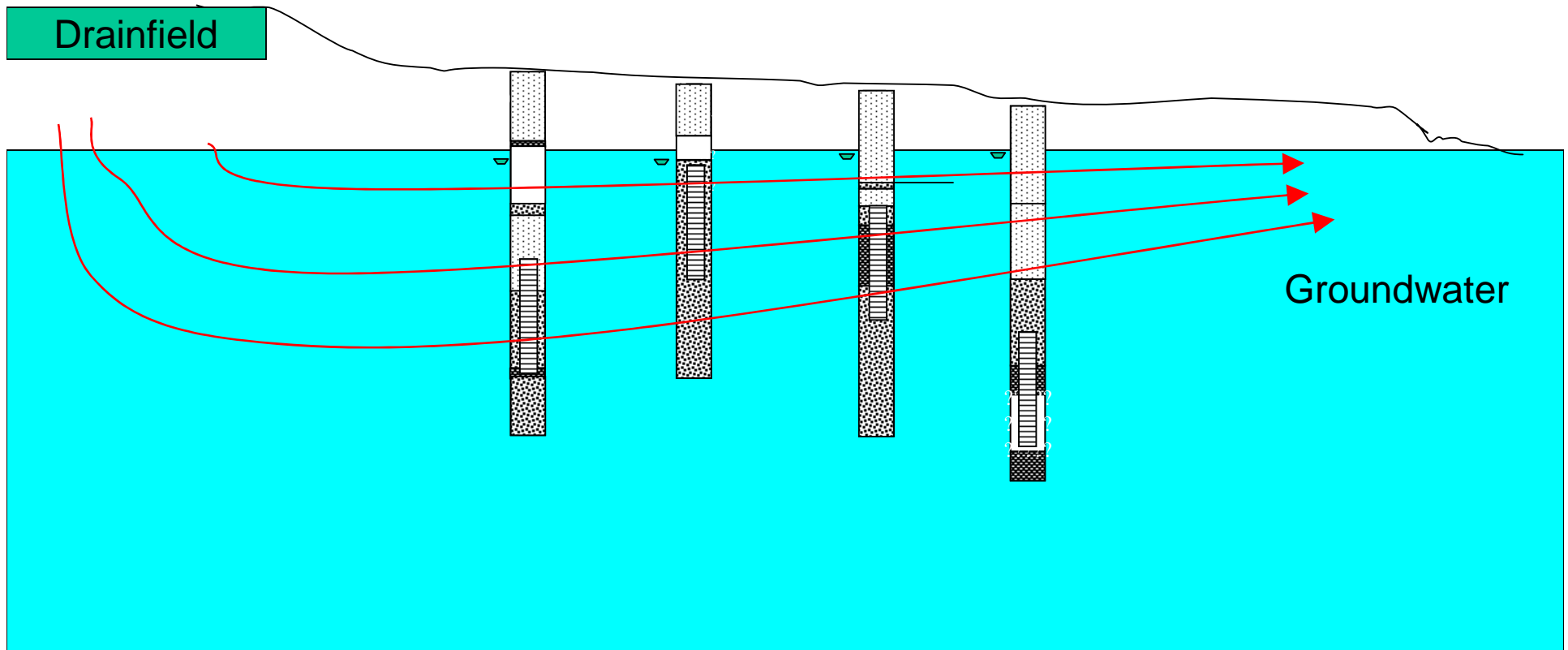
29

23

15

0.3

Drainfield

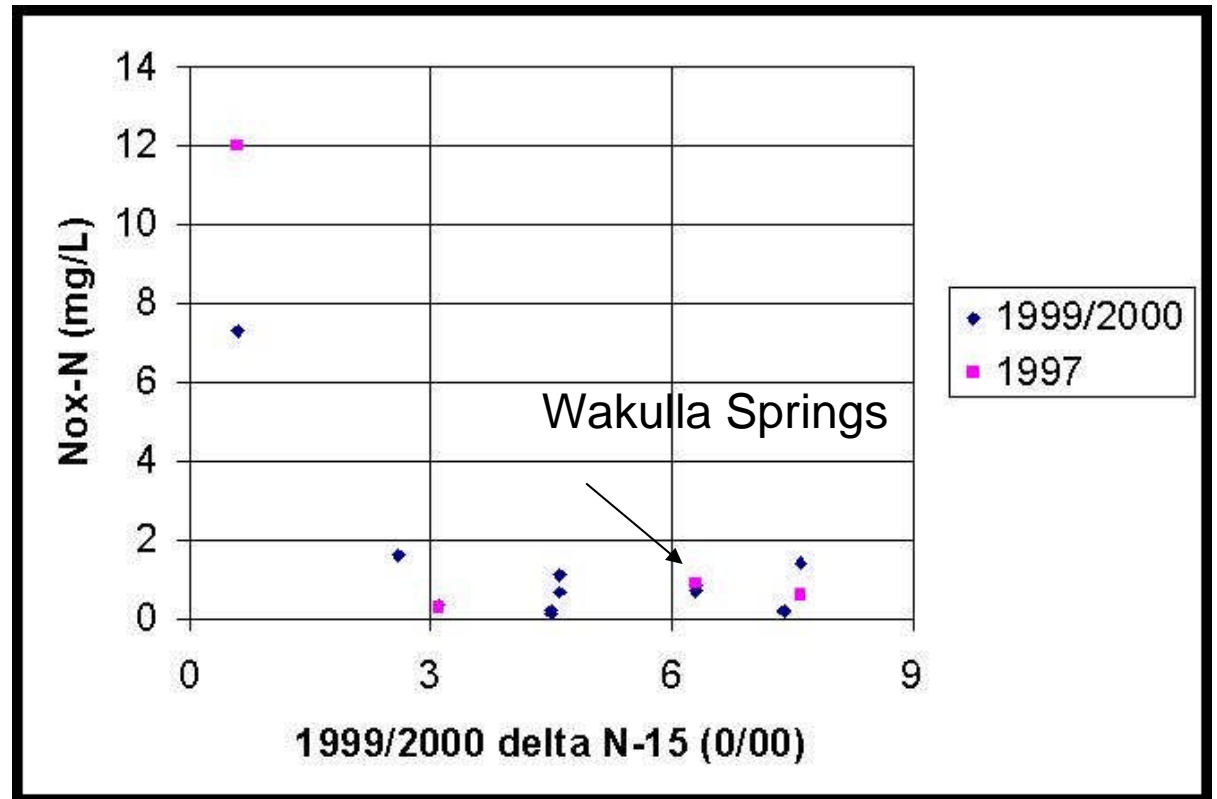




Nitrogen in the Wakulla Springshed

Delta N-15 as indicator of N-source in residential drinking water wells in the Wakulla Springs area

- <3 artificial fertilizer
- >10 animals/sewage



Data from Chellette, Pratt and Katz, 2002





What are Florida's management practices?

- Standard Septic Systems:
 - Homeowner education
 - Design and construction (water table separation, soil textures) standards
 - Missing: regular inspection and maintenance requirement
- Aerobic treatment units:
 - Units third-party tested to meet performance criteria.
 - Operating permit requires homeowner contract with qualified maintenance entity.
 - Regular inspection required
- Performance-based treatment systems:
 - Engineer-designed and in most cases third-party tested
 - Operating permit requires homeowner contract with qualified maintenance entity
 - Regular inspection and sampling required
- Some demonstration/pilot projects have explored sewer districts with authority over onsite systems to achieve reliable maintenance and monitoring. EPA emphasizes this solution.





Some Suggestions for the Wakulla Springshed

- What is the problem?
Nutrient contributions to groundwater (22% for TN) or possible pathogen indicator contributions to stormwater from failing systems
- Where is natural attenuation ineffective?
Spring vulnerability mapping and groundwater monitoring to confirm priority (unconfined) areas for protection
- What is an effective mix of approaches?
 - Nutrient-reducing treatment in vulnerable areas by either onsite systems, DEP package plants or connection to a larger WWTP.
 - A funding and coordinating entity will be necessary, especially to involve onsite systems, which serve mostly populations in the urban fringe and rural areas (counties)
- Further information about onsite research
<http://www.doh.state.fl.us/environment/ostds/research/researchreports.htm>

