

Silver and Rainbow Springs BMAP



Department of Health Onsite Sewage Efforts

March 30, 2016

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Onsite Sewage Research and Engineering

Division of Disease Control and Health Protection

To protect, promote and improve the health of all people in Florida through integrated state, county, and community efforts.

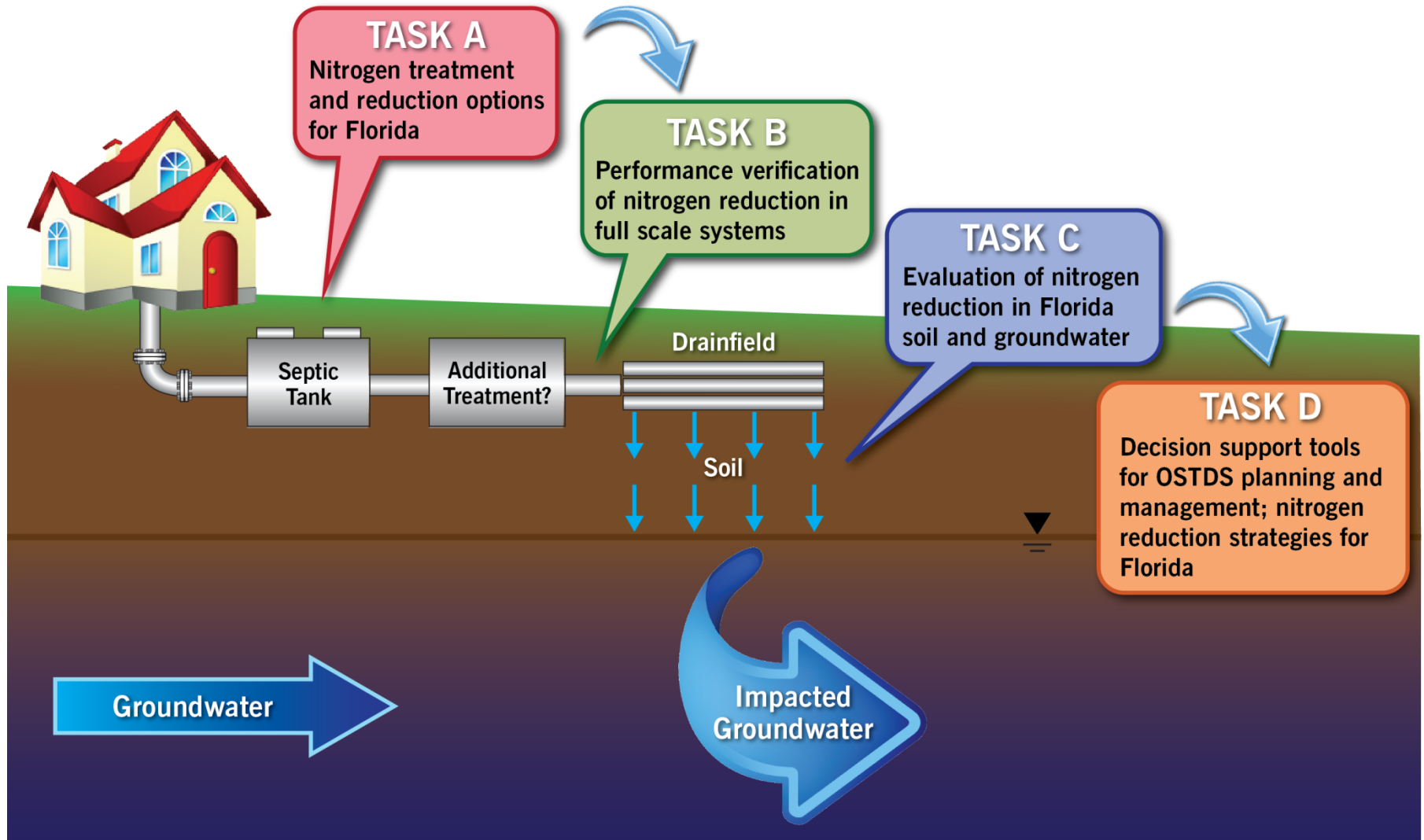
Nitrogen Reduction Options for Septic Systems

History

Nitrogen levels in springs have increased, harming our environment and economy. Septic systems are one of several sources of nitrogen. We have conducted research looking at how much nitrogen comes from septic systems and ways to reduce that contribution. The results of our research provides options that can be used at the local level to address nitrogen from septic systems.



Primary Study Areas



“Passive” Nitrogen Reduction Systems

Reduce effluent N using reactive media for denitrification and a single liquid pump, if necessary.

Wastewater from home



Stage 1
(nitrification)



Dispersal



Stage 2
(denitrification)



Test Facility

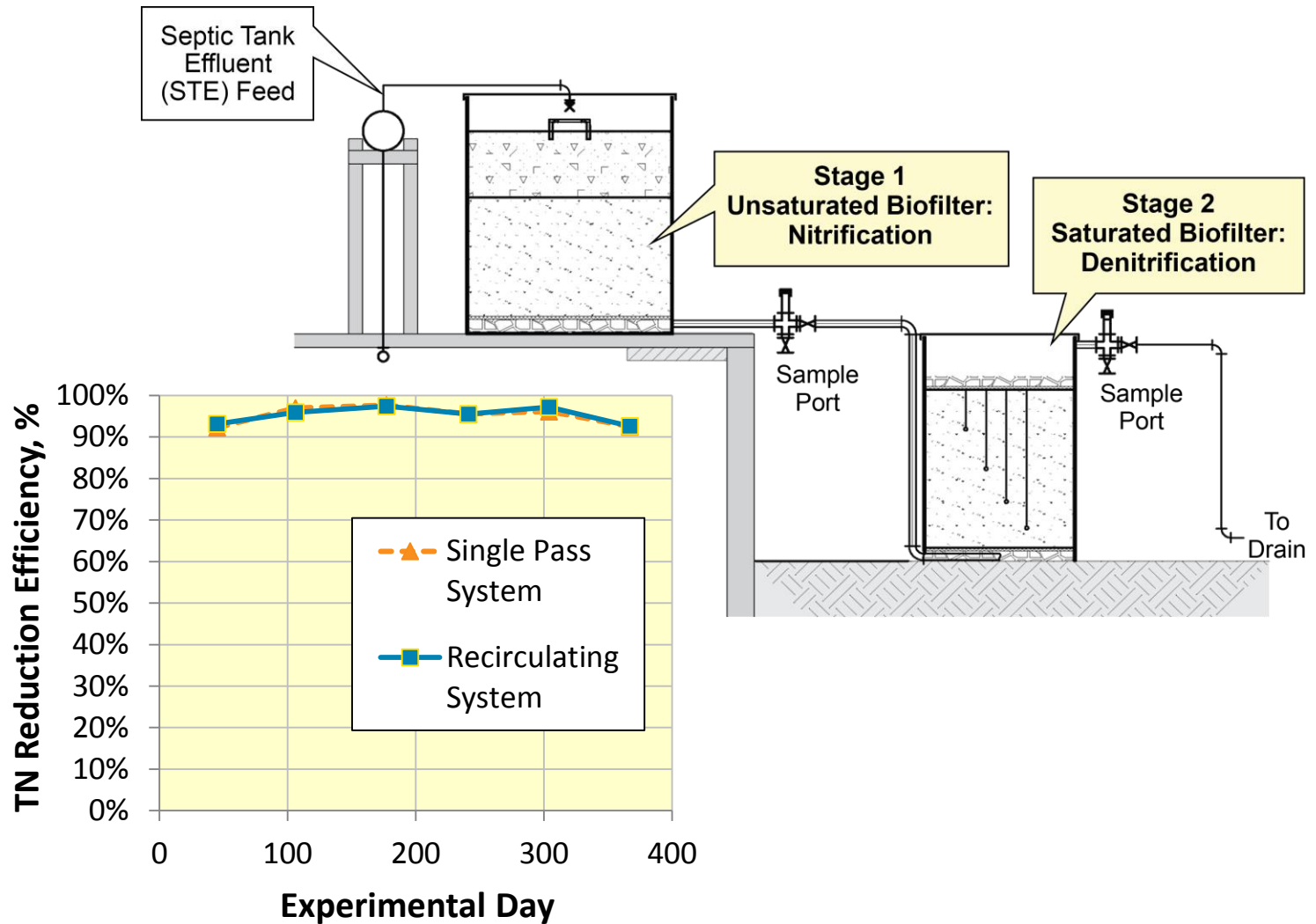
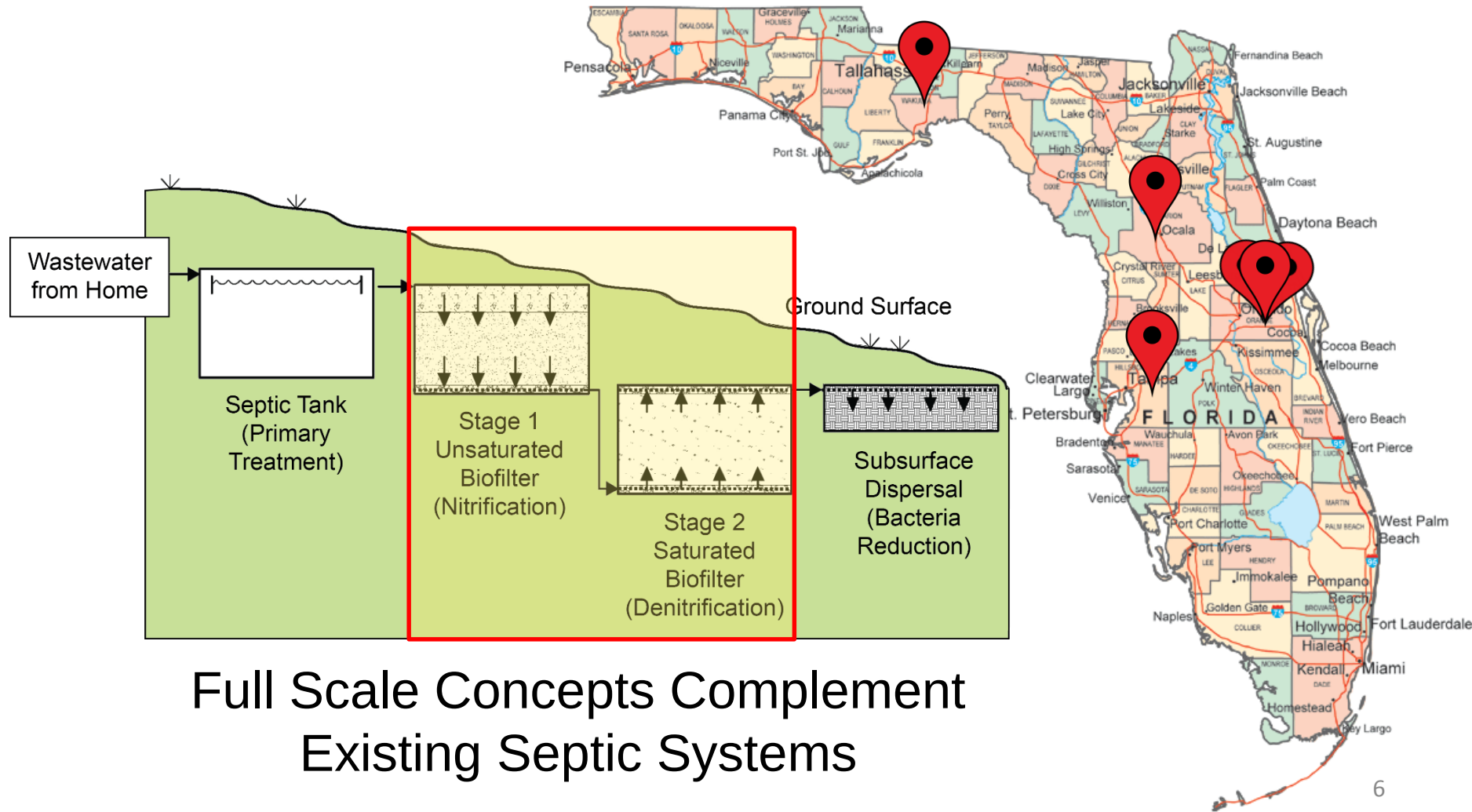


Image Credit: Hazen and Sawyer

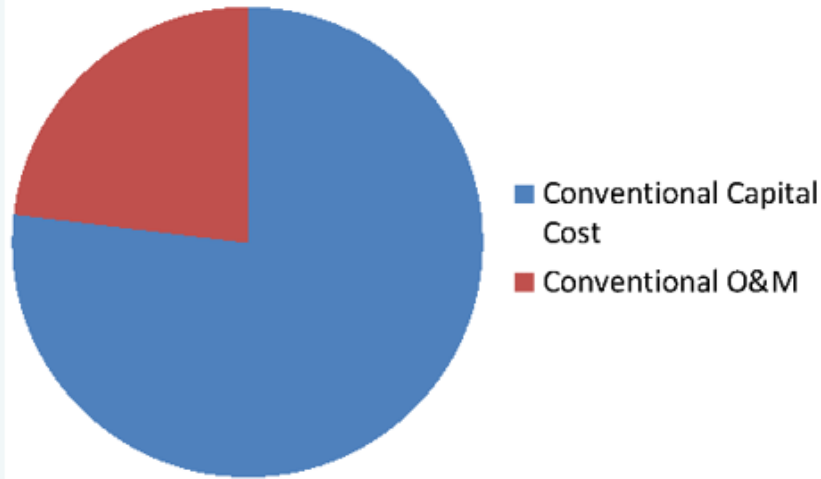
Nitrogen Reduction at Field Sites



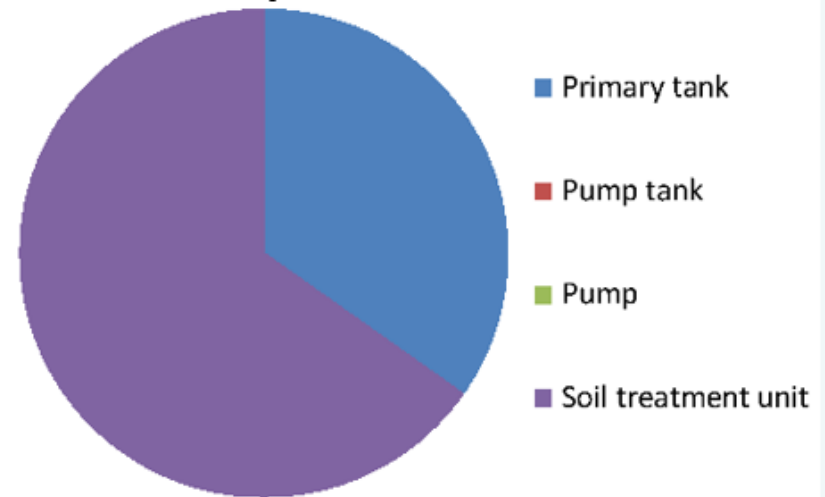
Life Cycle Costs

CONVENTIONAL

Present Worth (2015 dollars)

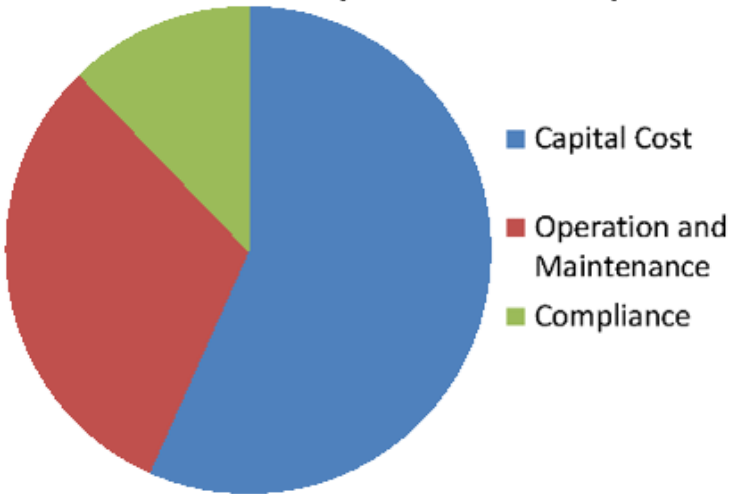


Capital Cost

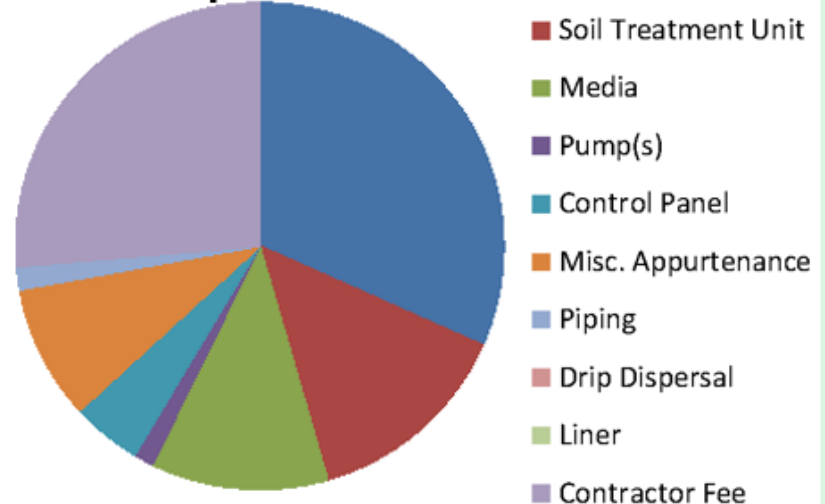


PASSIVE NITROGEN

Present Worth (2015 dollars)

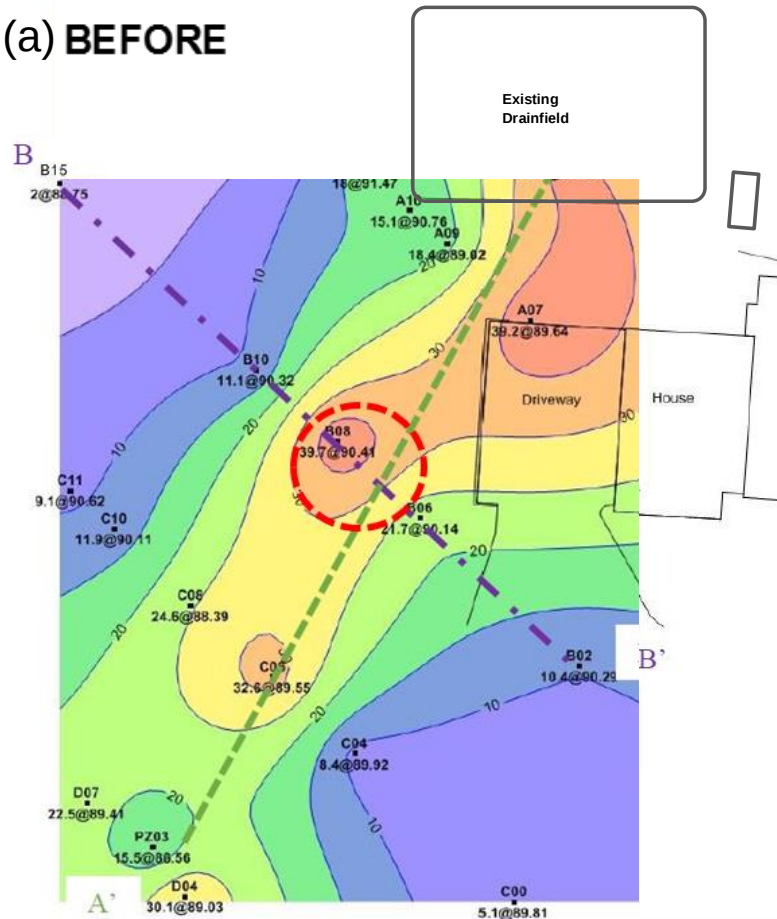


Capital Cost

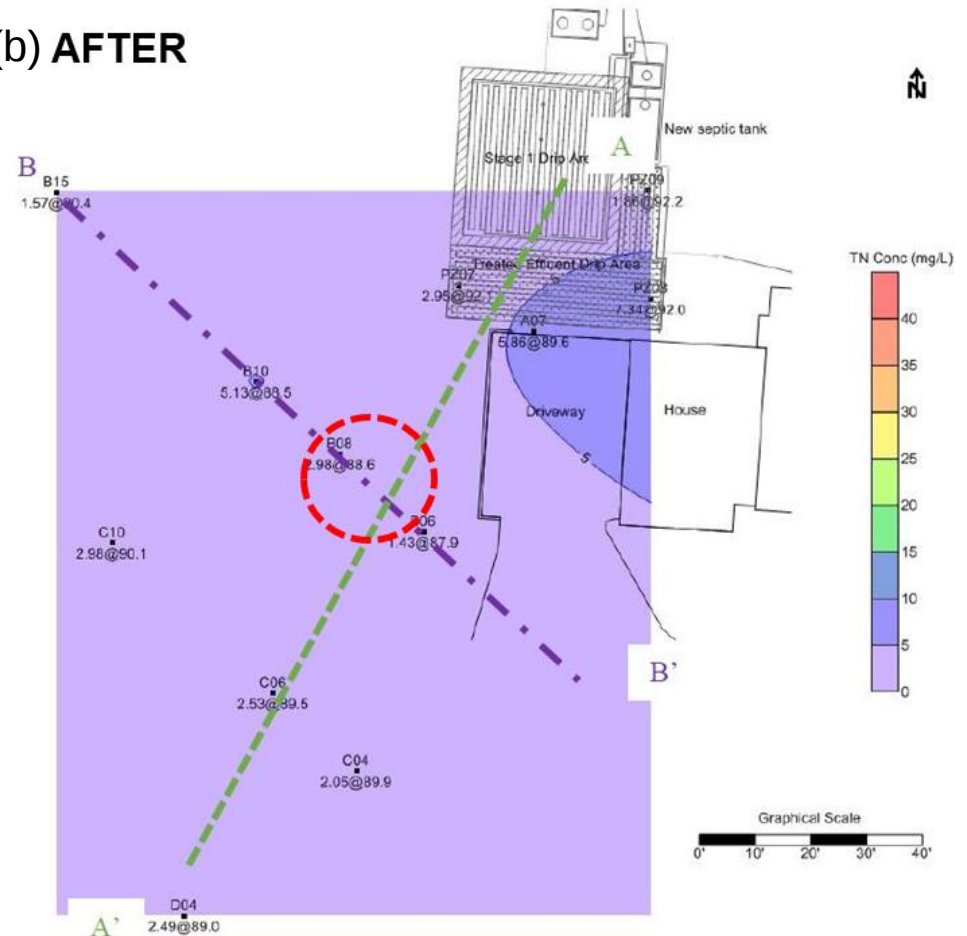


Case Study: Groundwater Monitoring

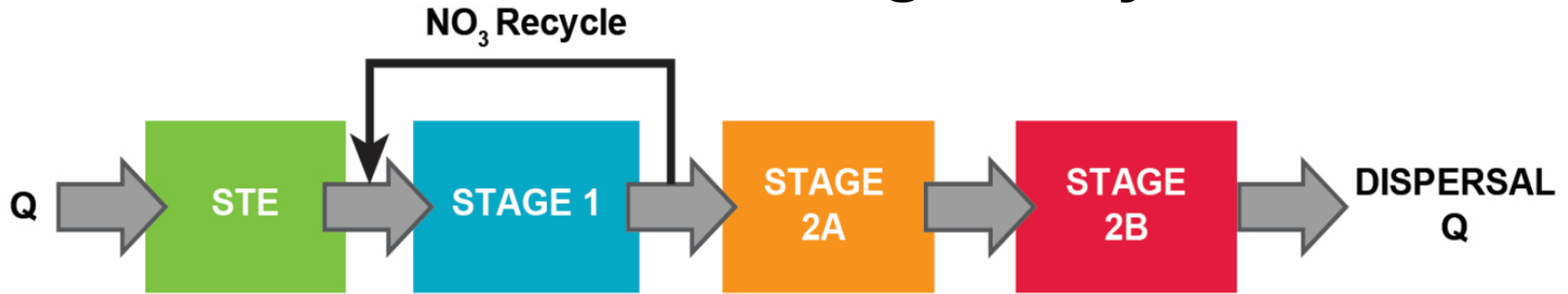
(a) BEFORE



(b) AFTER



In-Tank Passive Nitrogen System



In-tank two stage biofilter with recirculation stage 1, dual media stage 2 lignocellulosic (2a) followed by elemental sulfur (2b)

Media longevity: 10-149 years

System performance: 85-95% reduction of nitrogen

Energy costs: \$3 monthly / \$36 annually

Standardized costs*: \$13,000 new / \$15,500 retrofit existing

* 300 gallon per day system with \$4,000 estimated conventional system cost (tank and drainfield)

In-Ground Passive Nitrogen System



In-ground stacked biofilter, single pass stage 1 over stage 2
lignocellulosic

Media longevity: 10-135 years

System performance: 40-70% reduction of nitrogen

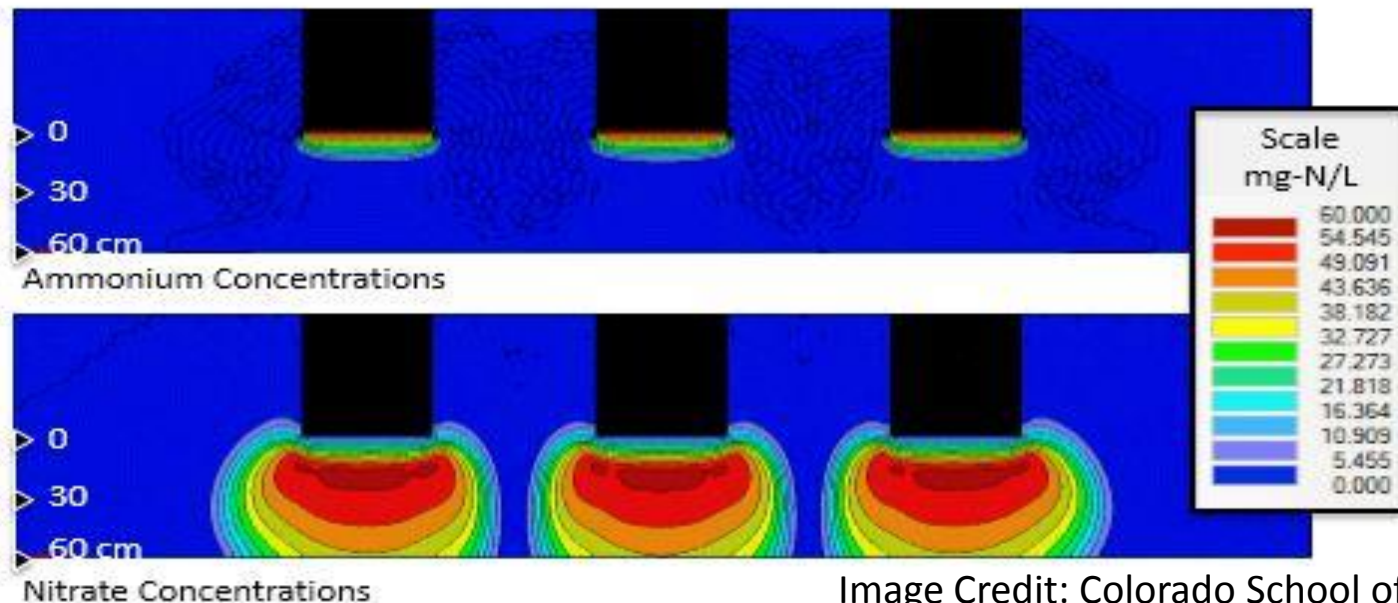
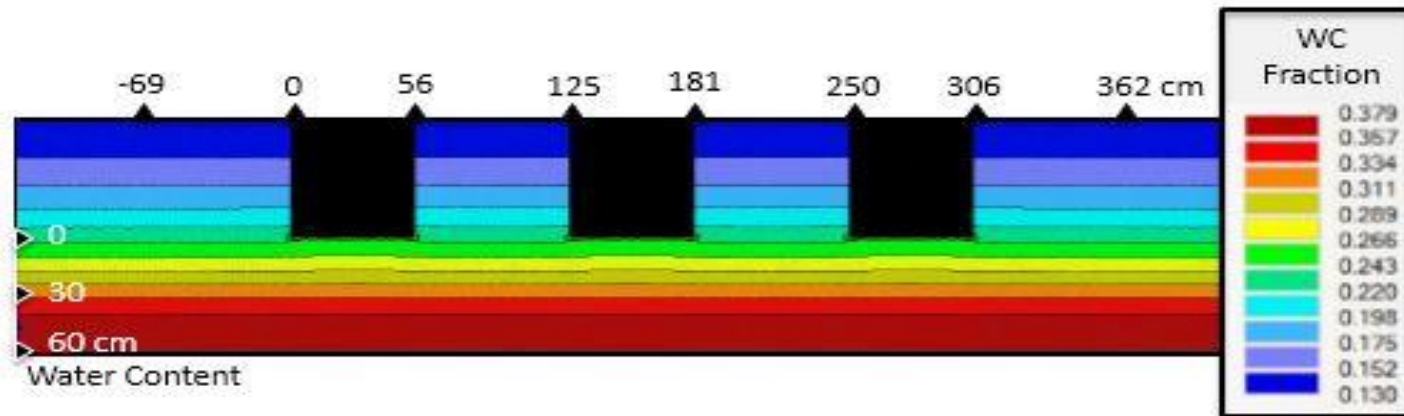
Energy costs: \$0.75 monthly / \$9 annually

Standardized costs*: \$8,700 new / \$12,000 retrofit existing

* 300 gallon per day system with \$2,250 estimated conventional tank cost

** Performance may have been significantly improved with design and construction revisions based on lessons learned in this study.

Vadose Zone Model Example



Vadose zone inputs | Vadose zone outputs | Sat. zone inputs | Sat. zone outputs | STUMOD-HPS | Multi-sites I | Multi-sites II | Sensit | CFD I | CFD II

Nitrogen Model



Choose soil type

?

Help

Caution!

Default values

?

Effluent concentration

?

Hydraulic loading rate

?

Treatment depth

?

Soil temperature

?

ET & plant uptake

?

Carbon content functi

?

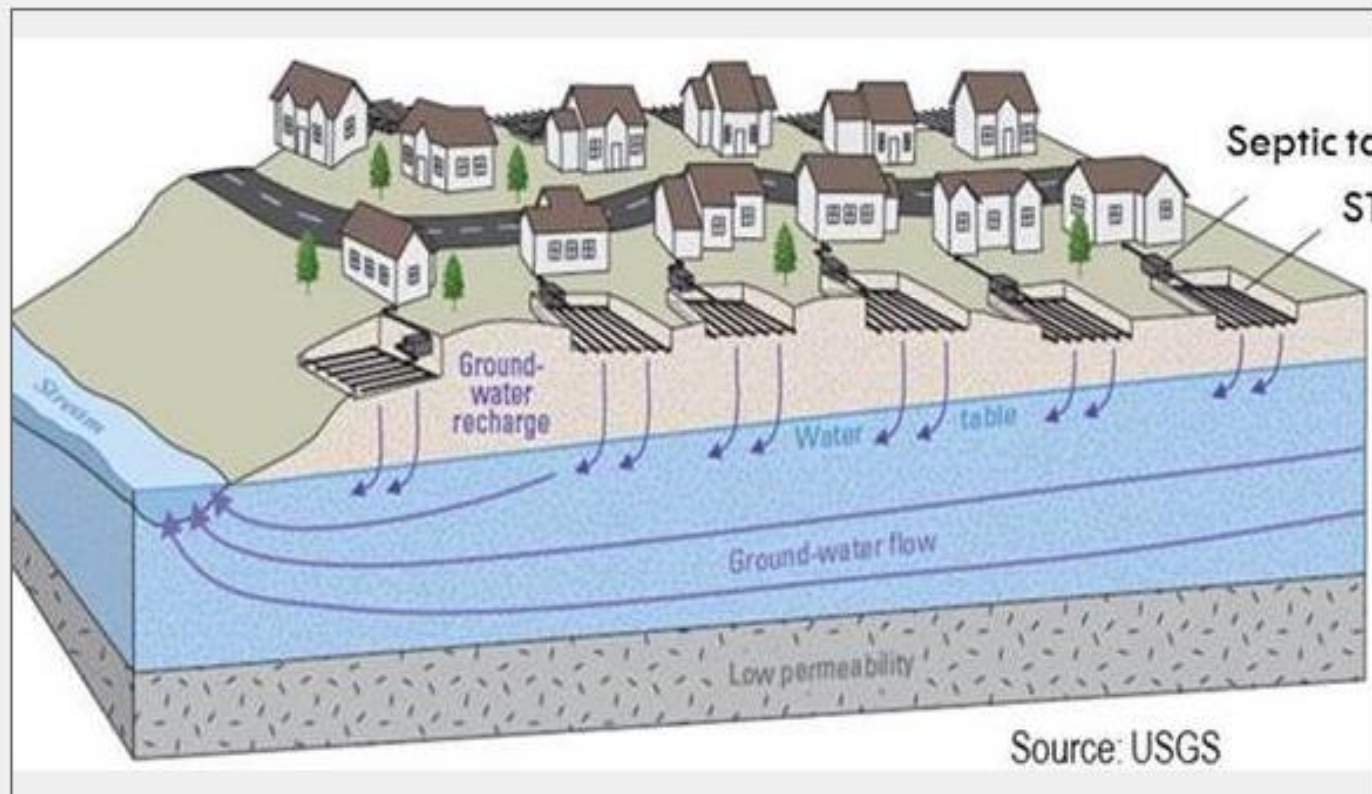
Select # of soil Layers

No. of Layers

?

Soil type layer 2

Soil type layer 3



Run STUMOD

Close

Image Credit: Colorado School of Mines



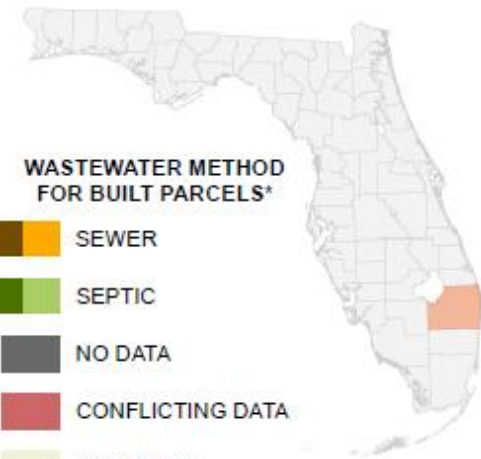
floridahealth.gov/FLWMI

GOAL:

Map the drinking water source and wastewater treatment method for every built property in Florida

Florida Water Management Inventory

Palm Beach County Wastewater 2015

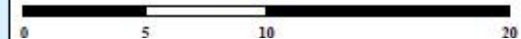


WASTEWATER METHOD FOR BUILT PARCELS*

- SEWER
- SEPTIC
- NO DATA
- CONFLICTING DATA
- NOT BUILT

- Interstate
- US Highway
- State Road

Miles



SEWER PARCELS

315,731 Known (77.7%)
 38,754 Likely (9.5%)

SEPTIC PARCELS

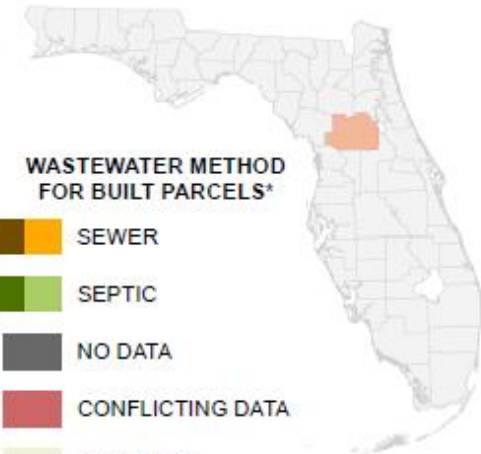
14,996 Known (3.7%)
 29,002 Likely (7.1%)

UNKNOWN PARCELS

3,706 Conflicting Data (0.9%)
 4,359 No Data (1.1%)

Florida Water Management Inventory

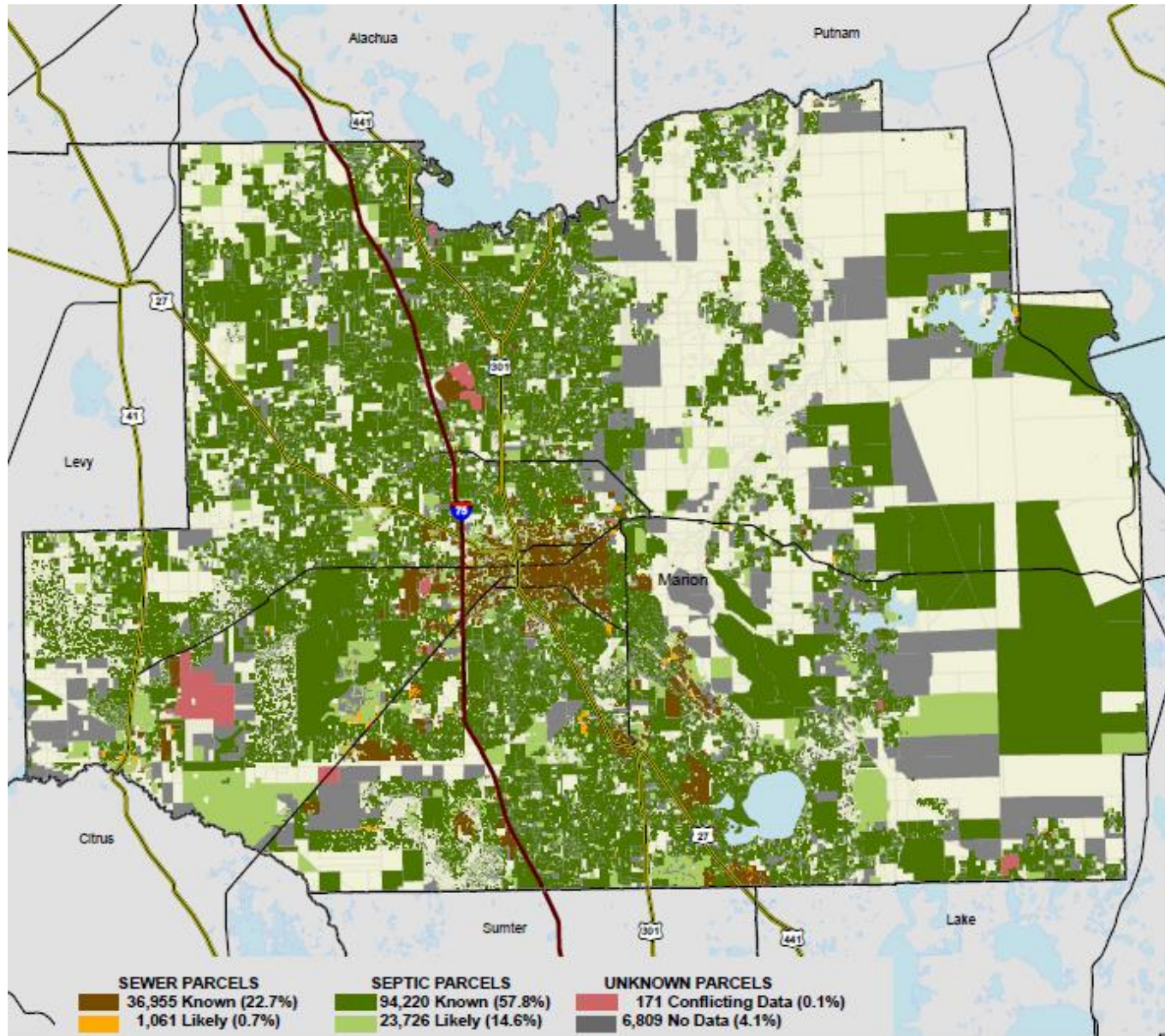
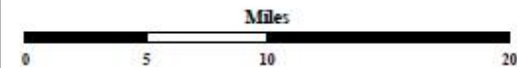
Marion County Wastewater 2015



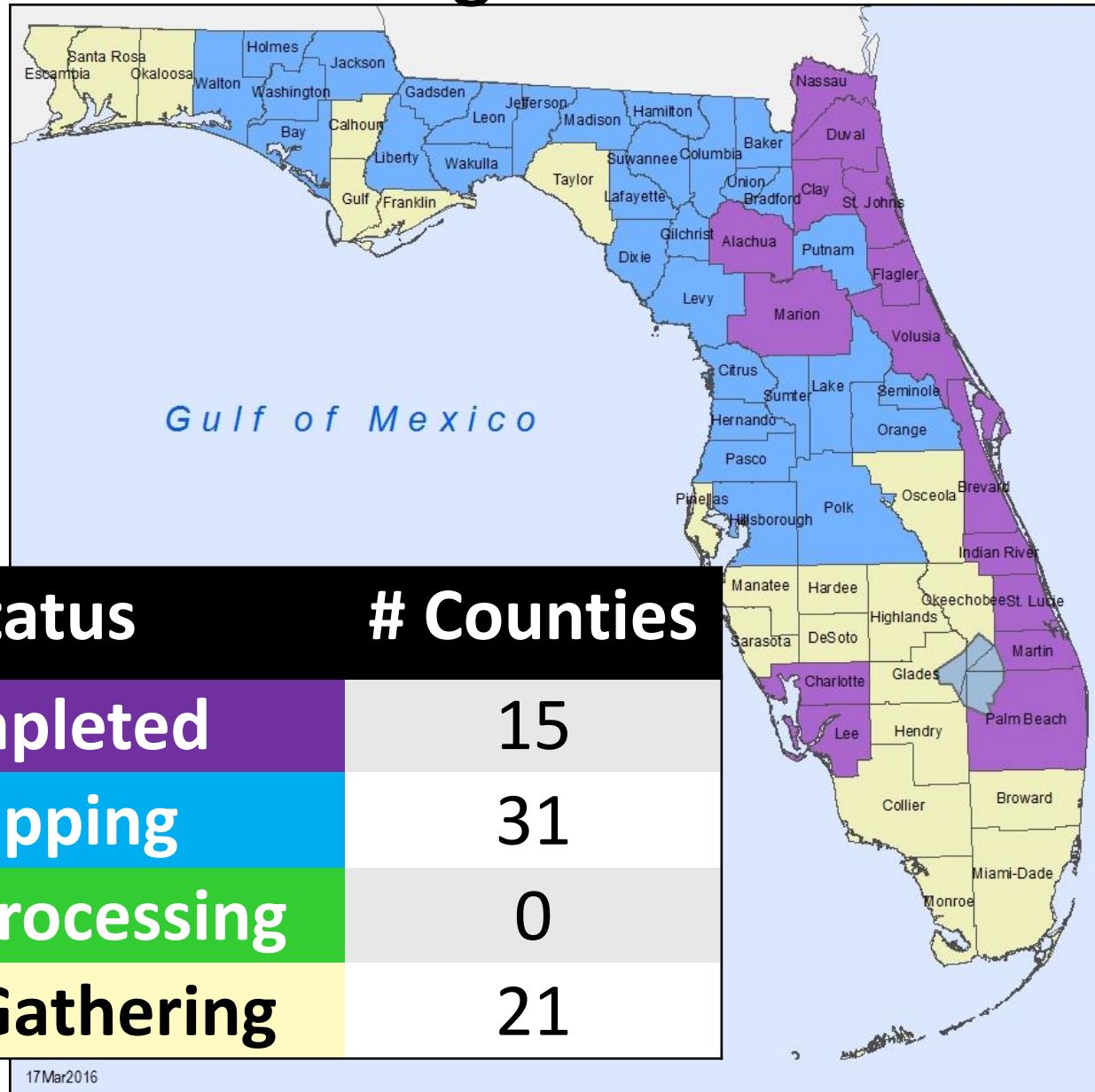
WASTEWATER METHOD FOR BUILT PARCELS*

- SEWER
- SEPTIC
- NO DATA
- CONFLICTING DATA
- NOT BUILT

- Interstate
 - US Highway
 - State Road
- * Includes parcels with unknown Built status. Percentages do not include parcels where wastewater is not applicable.



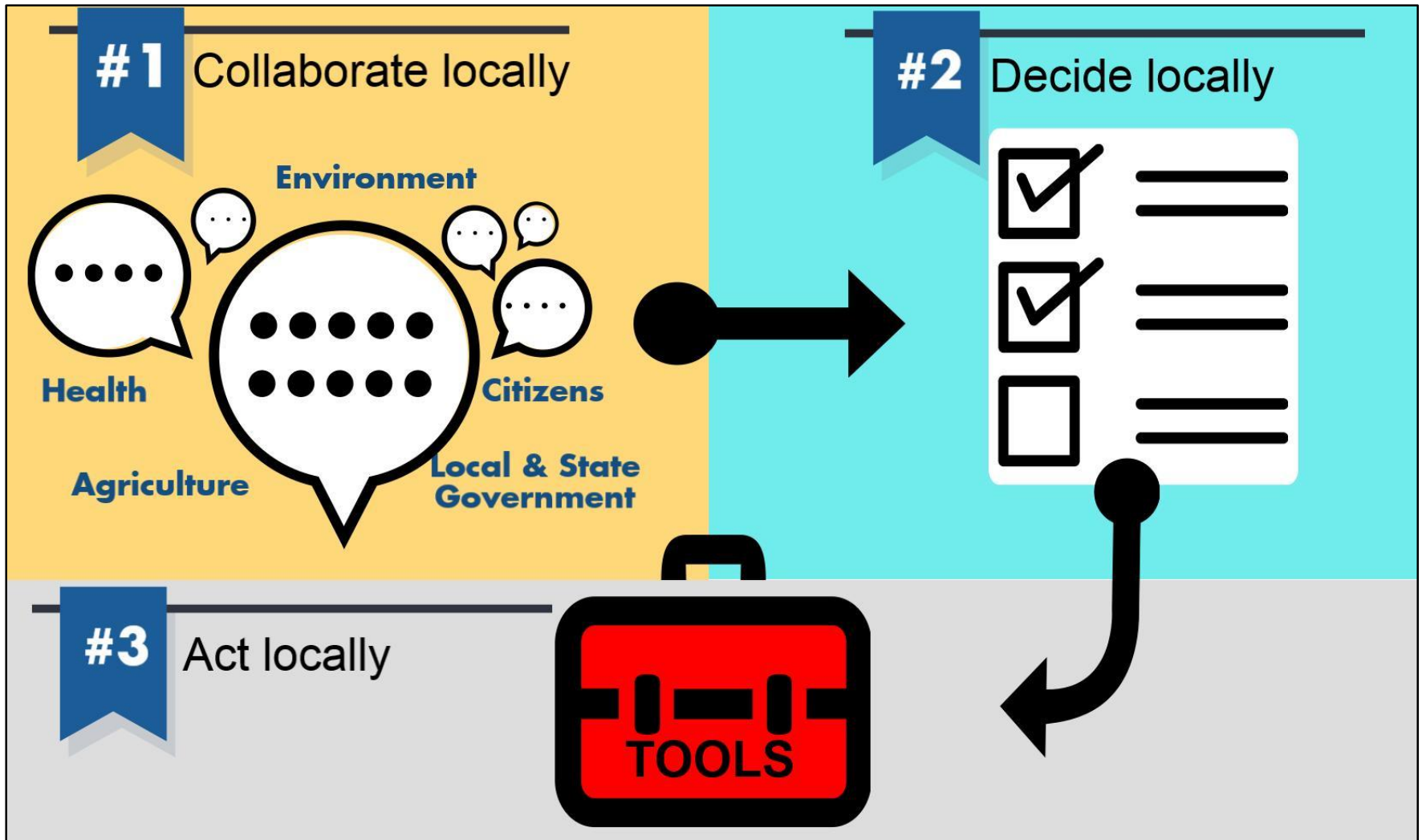
Florida Water Management Inventory



Status	# Counties
Completed	15
Mapping	31
Data Processing	0
Data Gathering	21

Implementation Plan:

Goal: Make tools available to reduce nitrogen contributions from septic systems



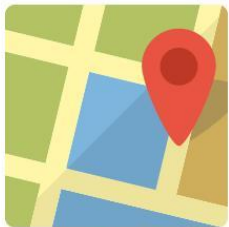
PLAN



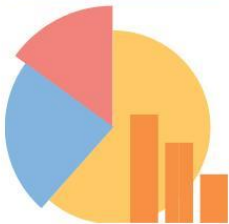
TEACH



BUILD



Inventory locations



Estimate loading



Determine costs



Public meetings



Education campaigns



Train installers & inspectors



Conventional systems



Lined drainfield & existing technologies



Nitrogen reduction systems

A blue circle containing a large white number "1" and the text "Implementation Plan" below it.

1

Implementation
Plan

Approve baseline conventional septic system enhanced for nitrogen reduction (in-ground system)

Requires rule change.

Status: Tabled by Technical Review and Advisory Panel on October 22, 2015 for more details

2

Implementation Plan

Incorporate nitrogen study systems as approved performance-based systems

Requires development of system specifications

Status: Being developed

3

Implementation Plan

Develop new nitrogen reducing systems section
in Chapter 64 E-6 Florida Administrative Code

Requires rule and possibly statute changes

Status: Requires multiple public meetings

4

Implementation Plan

Provide public education and training on nitrogen reduction strategies

Requires training development and message standardization

Status: Ongoing

5

Implementation Plan

Share planning-level tools to assess nitrogen reducing strategies (inventory, model)

Requires coordination with local stakeholders

Status: Ongoing

A blue circular graphic with a white horizontal line. The number "6" is in the top half, and the words "Implementation Plan" are in the bottom half.

6 Implementation Plan

Determine funding solutions for nitrogen reduction efforts

Requires coordination with Department of Environmental Protection and local stakeholders

Status: Pending

Results Benefit Floridians

- Field-tested designs
- Nitrogen model
- Cost estimates
- Options



Seeing Silver Springs in glass bottom boats

Photo Credit: State Archives of Florida, *Florida Memory*,
<http://floridamemory.com/items/show/161202>



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