



Florida Department of Environmental Protection

Basin Management Action Plan (BMAP) Weeki Wachee

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Topics

- On-site Sewage Treatment and Disposal System (OSTDS) Remediation Plan
 - Florida Department of Health (FDOH) Study – Elke Ursin
 - Requirements of Florida Law 2016-1
 - Legal requirements
 - Data needs
 - Process to develop the OSTDS Remediation Plan



Springs Coast

BMAPs in development:

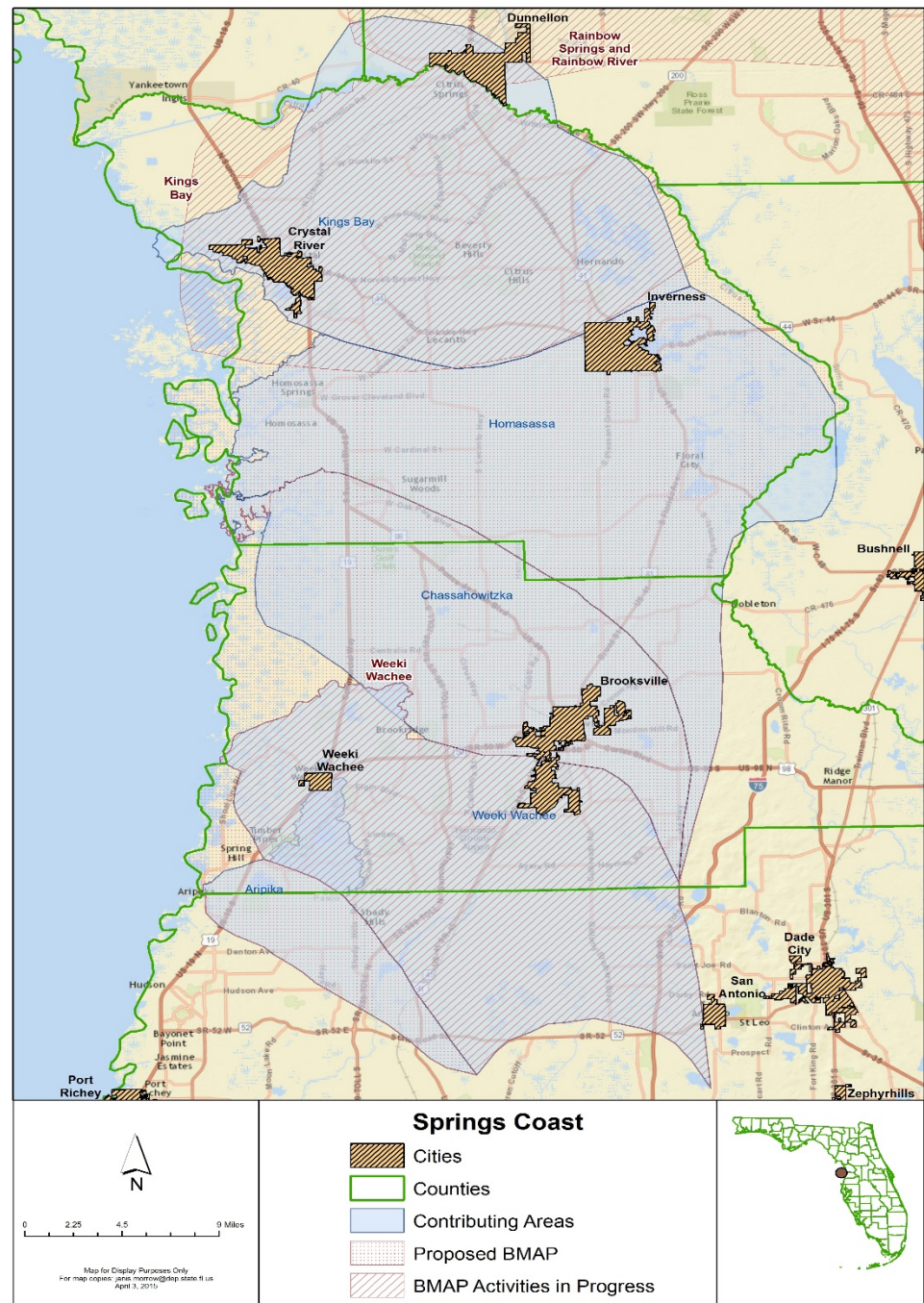
- Crystal River / Kings Bay
- Weeki Wachee

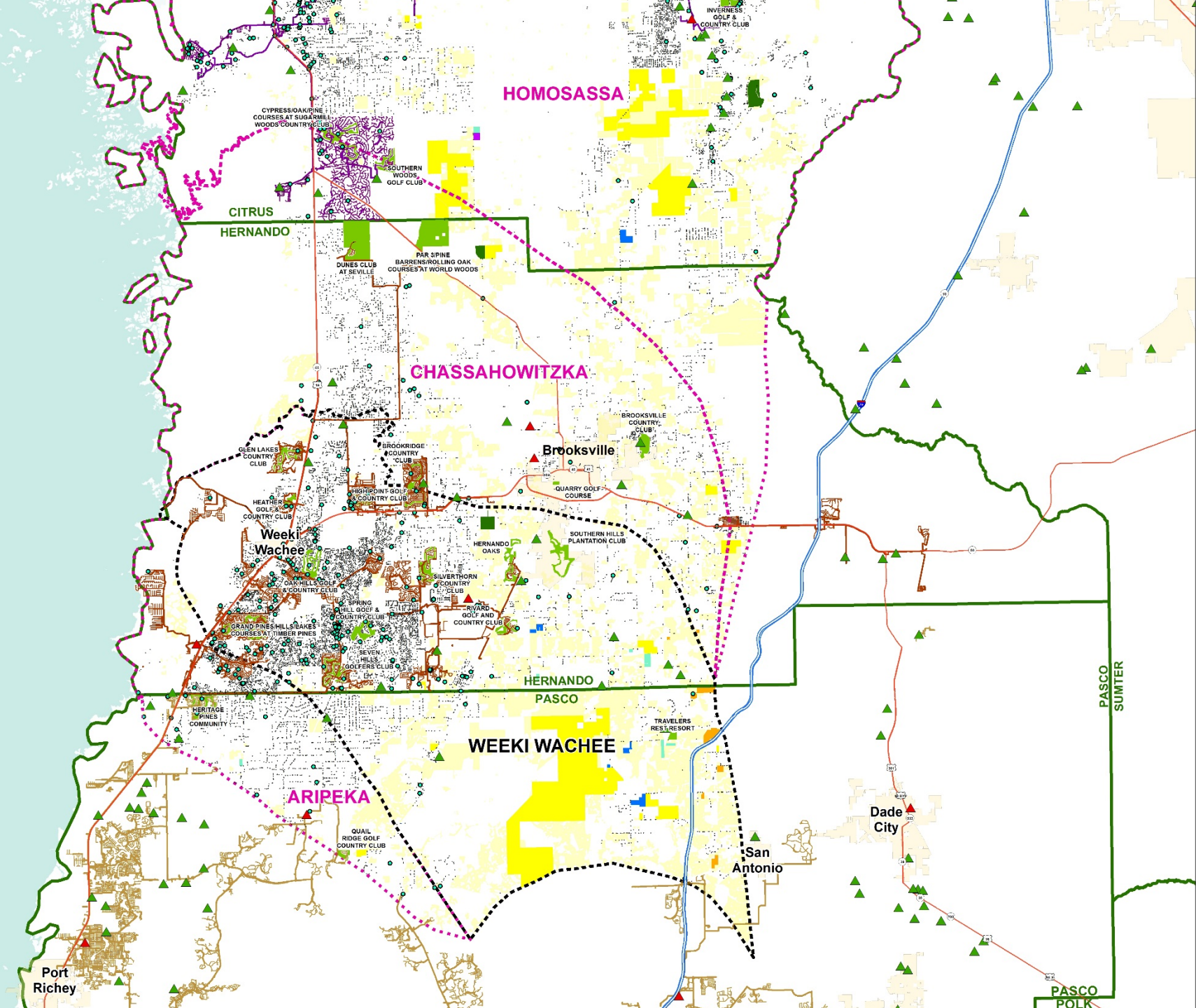
Total maximum daily loads (TMDLs) finalized:

- Homosassa
- Chassahowitzka

TMDL in development:

- Aripeka







Weeki Wachee TMDLs

Table 6.2. TMDL Components for Weeki Wachee Spring and River

* N/A = Not applicable

Waterbody (WBID)	Parameter	TMDL (mg/L)	TMDL % reduction	Wasteload Allocation for Wastewater*	Wasteload Allocation for NPDES Stormwater % Reduction*	LA % reduction	MOS
Weeki Wachee Spring (WBID 1382B)	Nitrate as annual average	0.28	71.1	N/A	71.1	71.1	Implicit
Weeki Wachee River (WBID 1382F)	Nitrate as annual average	0.20	77.3	N/A	77.3	77.3	Implicit

WBID: Waterbody identification number

mg/L: milligrams per liter

NPDES: National Pollutant Discharge Elimination System (permit)

LA: Load allocation

MOS: Margin of safety



TMDLs

Table 6.2. TMDL components for Boat Spring, Bobhill Spring, Magnolia Spring, Jenkins Creek Spring, Mud Spring, Salt Spring, and Wilderness Spring

N/A = Not applicable

WATERBODY (WBID)	PARAMETER	TMDL (MG/L)	TMDL % REDUCTION	WASTELOAD ALLOCATION FOR WASTEWATER	WASTELOAD ALLOCATION FOR NPDES STORMWATER % REDUCTION	LOAD ALLOCATION % REDUCTION	MOS
Boat Spring	Nitrate as Annual Average	0.23	65%	N/A	65%	65%	Implicit
Bobhill Spring	Nitrate as Annual Average	0.23	77%	N/A	77%	77%	Implicit
Magnolia Spring	Nitrate as Annual Average	0.23	63%	N/A	63%	63%	Implicit
Jenkins Creek Spring	Nitrate as Annual Average	0.23	73%	N/A	73%	73%	Implicit
Mud Spring	Nitrate as Annual Average	0.23	48%	N/A	48%	48%	Implicit
Salt Spring	Nitrate as Annual Average	0.23	62%	N/A	62%	62%	Implicit
Wilderness Spring	Nitrate as Annual Average	0.23	52%	N/A	52%	52%	Implicit



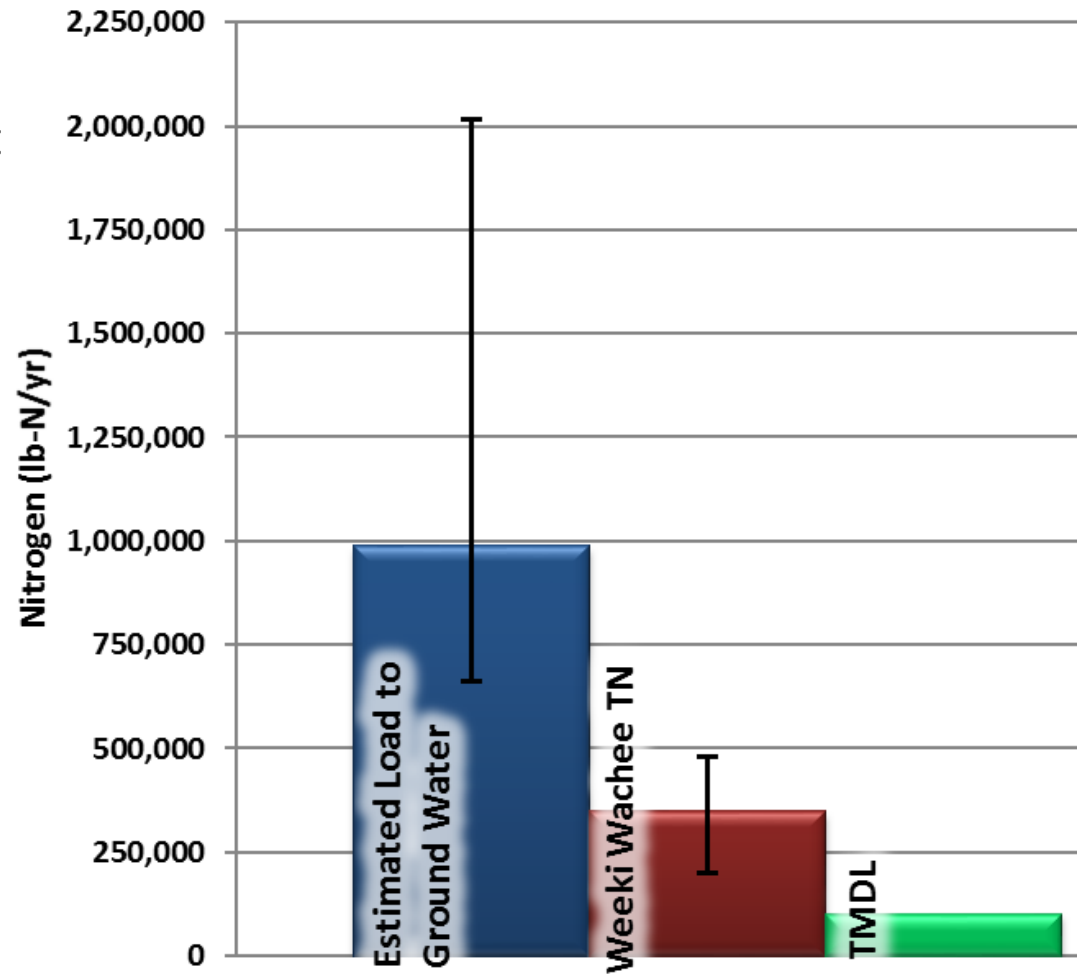
Weeki Wachee Spring Discharge of Nitrogen

Current

- Discharge = 185.6 cubic feet per second (ft^3/sec)
- Total nitrogen (TN) = 0.96 mg/L
- Load = 349,411 pounds of nitrogen per year (lbs-N/yr)

TMDL

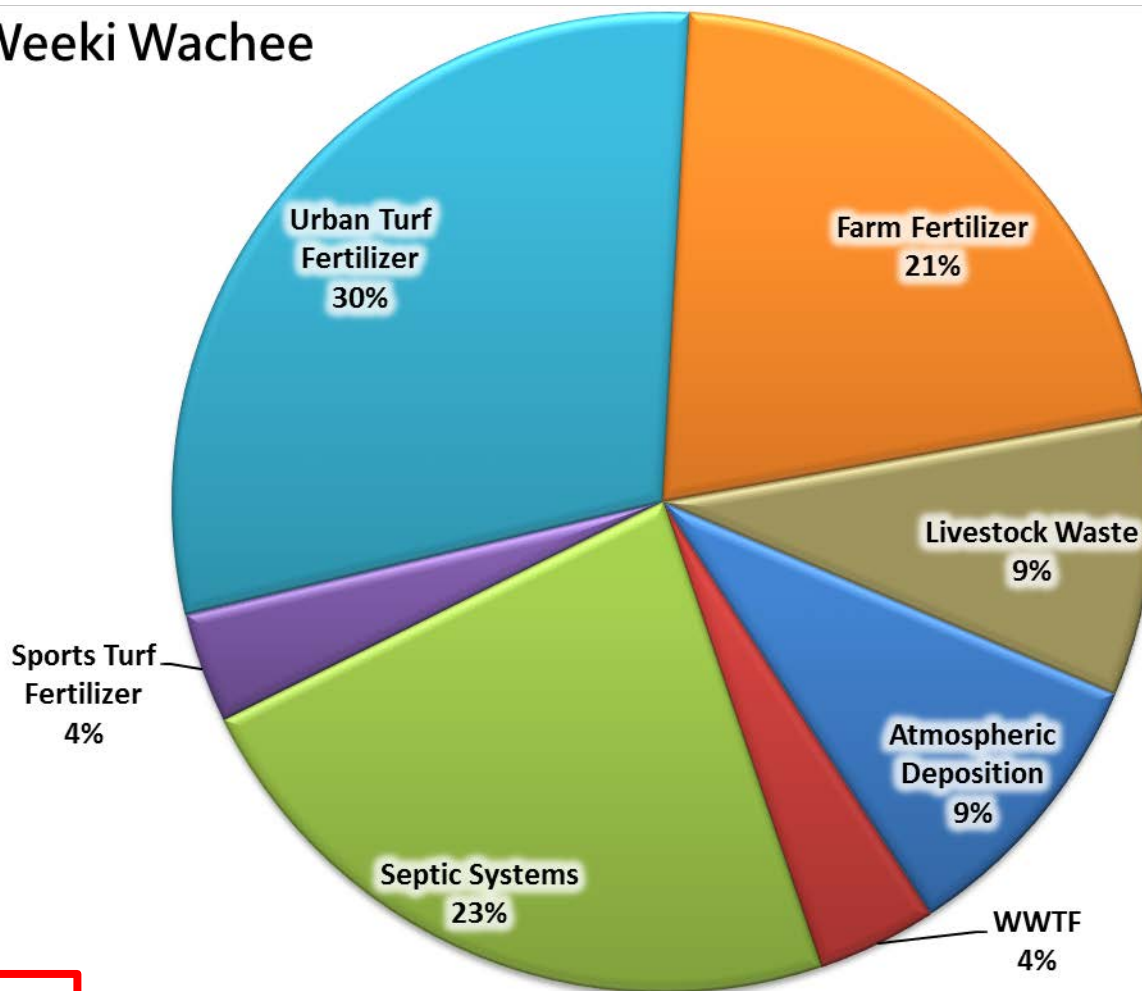
- Using current discharge
- TN = 0.28 mg/L
- Load = 102,178 lbs-N/yr





Nitrogen Source Inventory Loading Tool (NSILT) Load to Ground Water

Weeki Wachee



988,548 lbs-N/yr



OSTDS Loads to Ground Water

- NSILT estimated load to ground water (WW) = 988,548 lbs-N/yr
- TMDL % reduction needed = 71% (Weeki Wachee Spring)
- Total reduction needed = 701,869 lbs-N/yr
- OSTDS load is 23% of total nitrogen load in springshed
 - $701,869 \times 0.23 = \mathbf{161,429 \text{ lbs-N/yr from OSTDS}}$
- OSTDS load per system estimated at 18 lbs-N/yr
 - 40% (0.4) of OSTDS load is NOT attenuated (reaches ground water) and recharge rate is 90% (0.9)(high)
 - $18 \text{ lbs-N/yr} \times 0.4 \text{ not attenuated} \times 0.9 \text{ recharge rate} = \mathbf{6.48 \text{ lbs-N/yr/OSTDS reaches ground water}}$
- We need to estimate the final TN concentration of the possible projects to determine the minimum number of OSTDS remediation (additional *in situ* treatment or sewer) needed to meet the target



OSTDS Remediation Plan

- Required - If OSTDS within a priority focus area (PFA) contribute greater than or equal to 20% of the nitrogen load
- Include FDOH, Florida Department of Environmental Protection (DEP), relevant local governments, relevant local public and private wastewater utilities
- 5-, 10-, and 15-year project schedules
- Goal is a Weeki Wachee OSTDS Remediation Plan with the 2016-1 provisions



OSTDS Remediation Plan

2016-1 Requirements

- Collect and evaluate credible scientific information on the effect of nutrients, particularly forms of nitrogen, on springs and springs systems
- Develop a public education plan to provide area residents with reliable, understandable information about onsite sewage treatment and disposal systems and springs



OSTDS Remediation Plan

2016-1 Requirements (continued)

- Include options for repair, upgrade, replacement, drainfield modification, addition of effective nitrogen reducing features, connection to a central sewerage system or group of systems within a PFA (meet 20% of source - Weeki Wachee 23% overall)
- Priority ranking of the projects to assist with funding

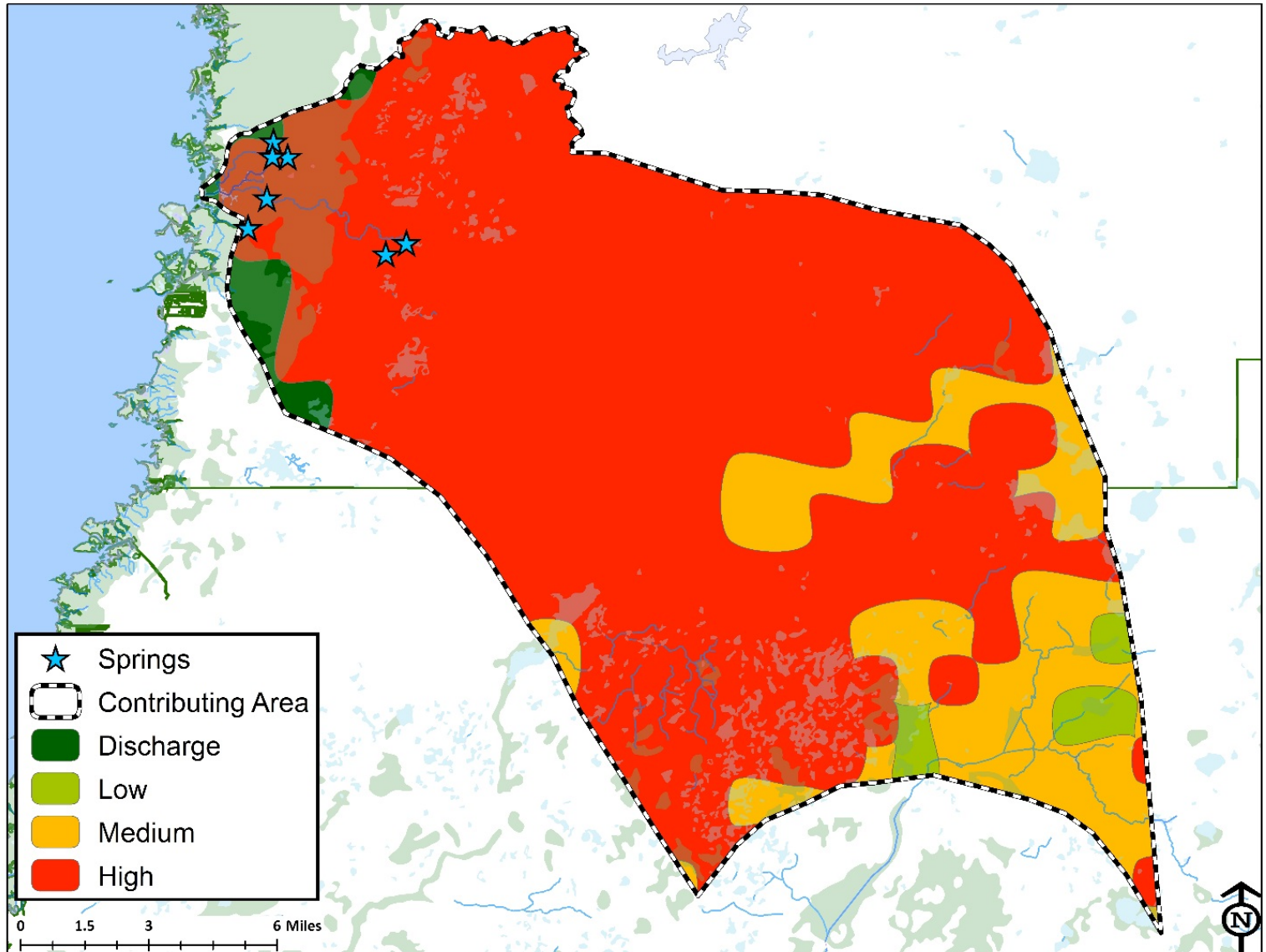


PFA Requirements

- Sub-Section 373.802, Chap. 2016-1 Laws of Florida:
 - Definition: Area or areas of a basin where the Floridan Aquifer is generally most vulnerable to pollutant inputs where there is a known connectivity between ground water pathways and an Outstanding Florida Spring (OFS)
- Sub-Section 373.803, Chap. 2016-1 Laws of Florida:
 - To be delineated considering factors that may lead to degradation of an OFS, such as:
 - Ground water travel time to the spring
 - Hydrogeology
 - Nutrient load, etc.



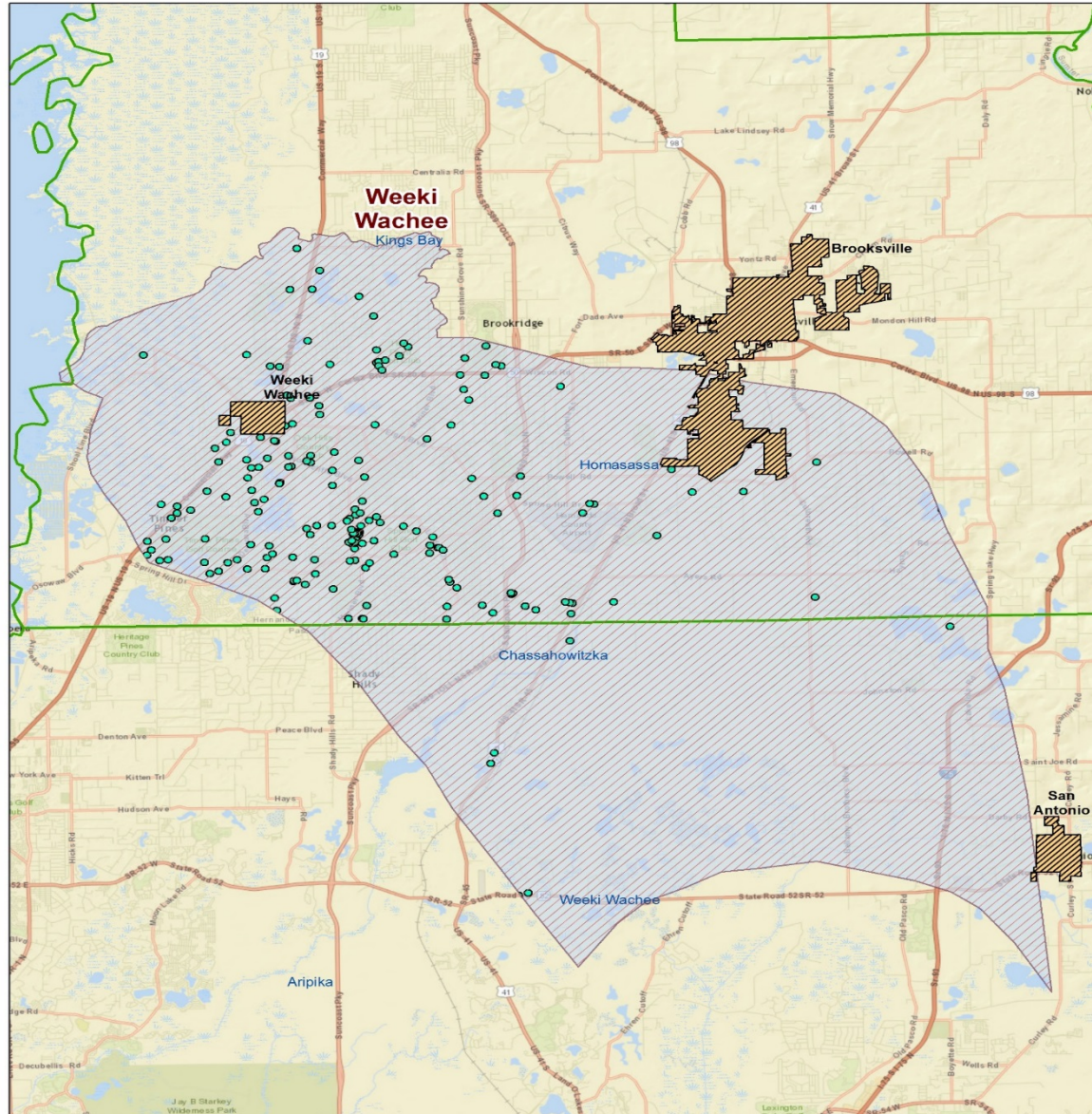
Weeki Wachee PFA Designation

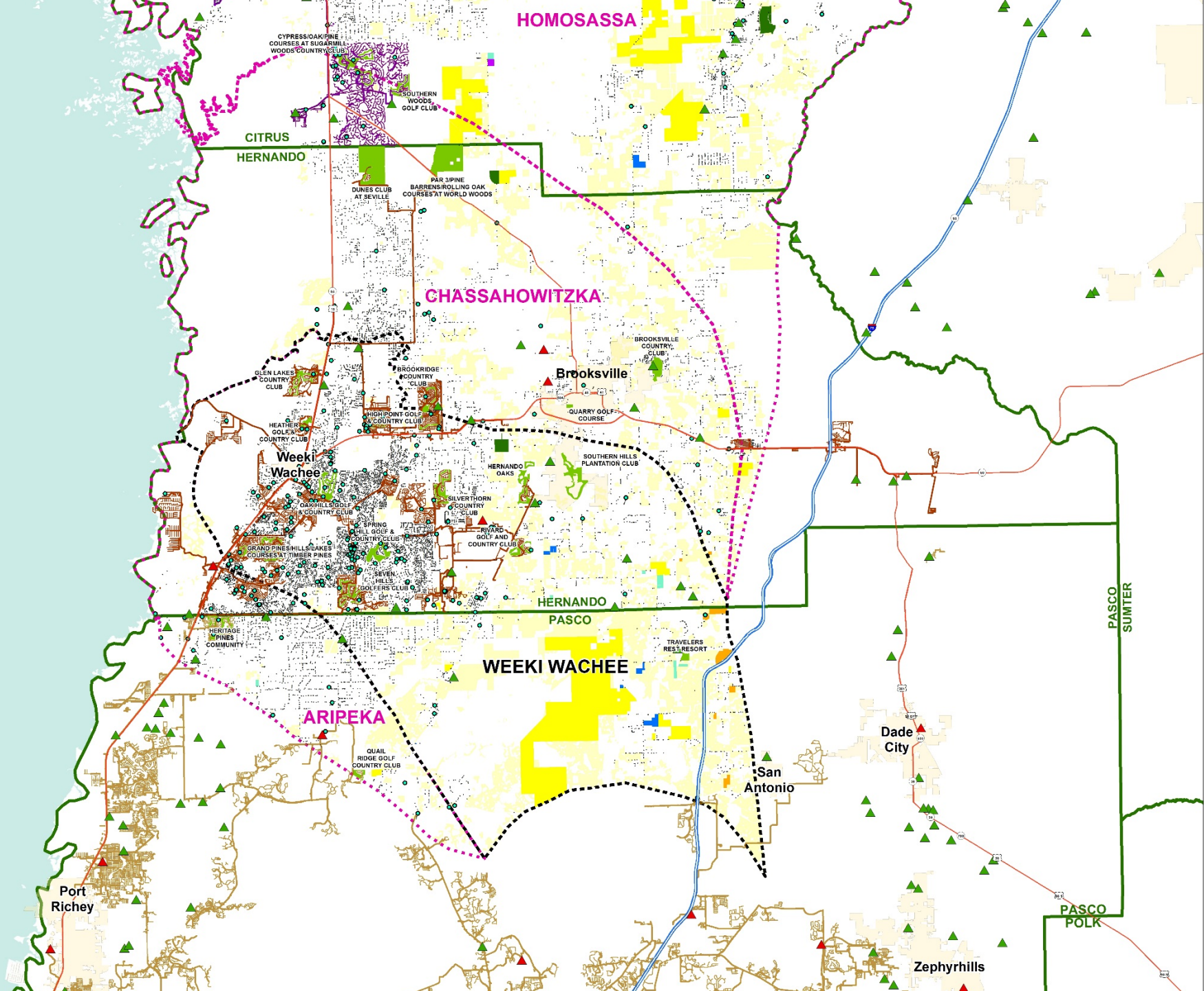


This map was prepared on 05/20/16 by FDEP Ground Water Management Section. For display purposes only. For more information: C. Lyon (850)245-5683.



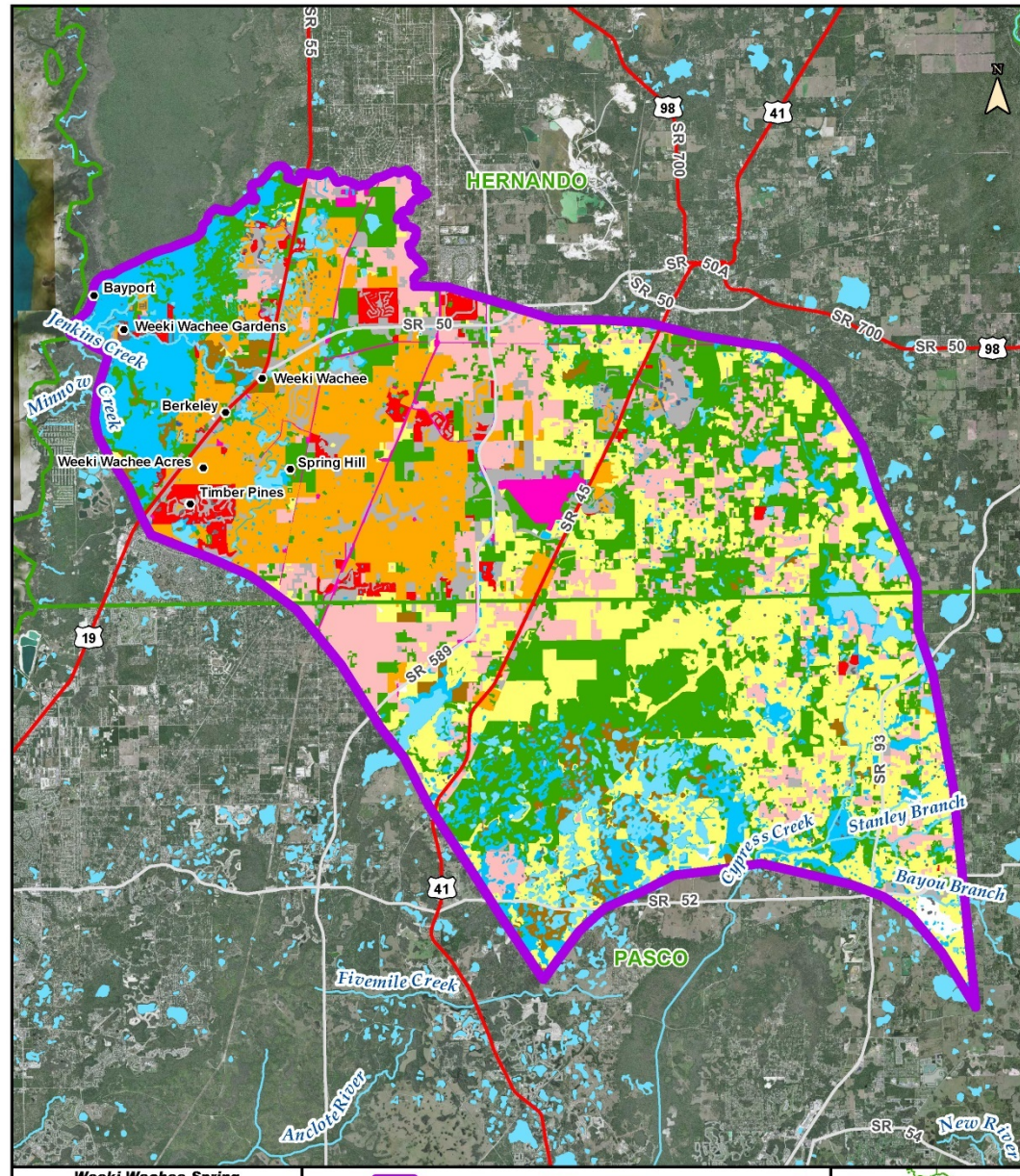
PFA Designation- Sinkholes in Weeki Wachee





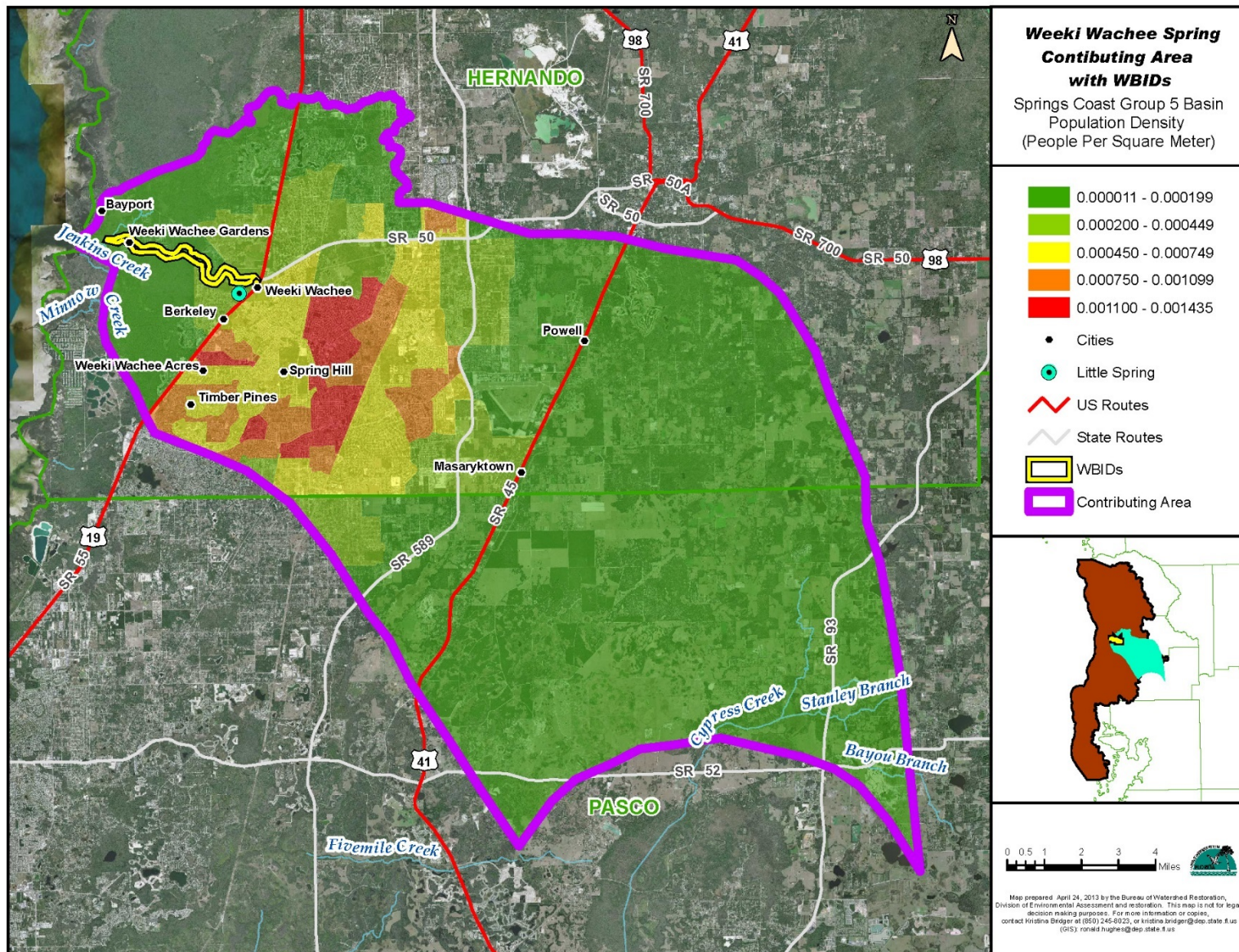


PFA Designation- Land Use in Weeki Wachee





PFA Designation- Population Density





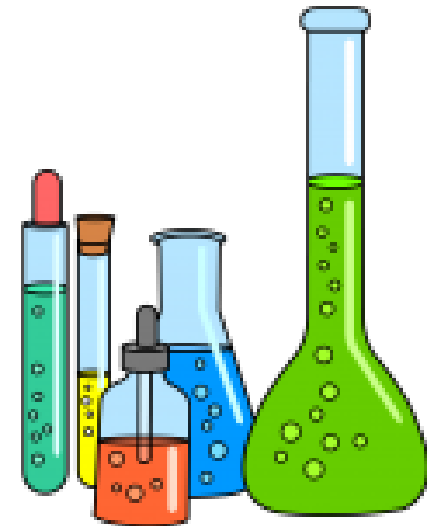
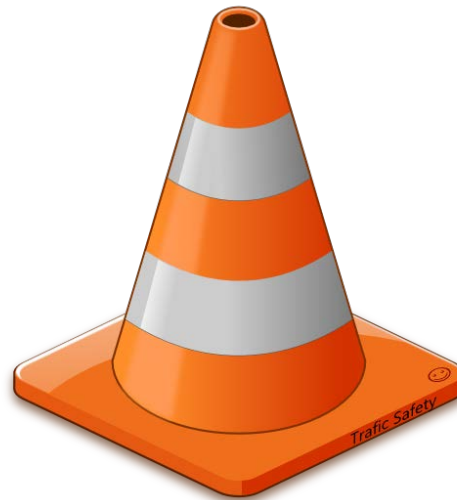
Weeki Wachee PFA Designation

- DEP has not yet determined a PFA for the Weeki Wachee OSTDS Remediation Plan:
 - Uniform high recharge area
 - Flow mechanics not well understood
 - OSTDS locations fairly uniform across area
 - BUT definite land use change across springshed
- Allows for countywide focus on restoration efforts
- Advantageous to have more area be eligible for funding assistance
- 2016-1 provisions will apply in BMAP area/PFA



OSTDS Remediation Plan Components

1. Public education strategy
2. Projects
3. Scientific information on OSTDS effects





Homosassa, Chassahowitzka and Weeki Wachee Rivers

Water Quality Management Actions



Southwest Florida
Water Management District





SCMC DRAFT 1-Weeki Wachee River Surface Water Improvement and Management (SWIM) Plan



Version 11.0

5/25/2016



OSTDS-Related Public Education Actions– Draft Weeki Wachee SWIM Plan*

Management Action

Conduct a social marketing based education campaign

*Version 11.0, 5/25/2016



Public Education and OSTDS-Related Draft SWIM Plan Projects

Ongoing Projects	Lead Entity
Education Campaign--Septic Systems Inspection and Maintenance	SWFWMD



Public Education Discussion

- Discussion objectives:
 - Confirm key audiences
 - Further refine who are the audiences
 - Identify some major themes for communications/education
 - Identify major misconceptions
 - “Piggyback” opportunities
- Future discussion:
 - Prioritize actions
 - Measuring improvements in knowledge





Public Education

- Who are the key audiences that we should target with the Weeki Wachee public education plan?
 - Homeowners
 - Elected officials/leadership
- What specific points do you think we need to convey about OSTDS nitrogen loads?
- Are there additional misperceptions we need to overcome? What are they?
- Are there existing public education efforts with which we could piggyback communications?
- Can we set high, medium, and low priority actions?





OSTDS-Related Actions– Weeki Wachee River Draft SWIM Plan*

Management Action

Septic Tank Systems

Improve existing septic tank performance

Prioritize and convert septic tanks to sewer systems or nutrient reduction methodologies

Limit new septic tank installations

Conduct a social marketing based education campaign

Develop an inventory of septic tank locations, age, and condition if known



OSTDS-Related Projects– Draft Weeki Wachee SWIM Plan

Ongoing Projects	Lead Entity
Septic Tank Systems	
Hernando County Septic to Sewer Conversion <u>Study</u>	Hernando County



OSTDS Remediation-Related Draft Weeki SWIM Plan Projects

Potential Projects	Lead Entity
Oakley Island Sewer Infrastructure Installation	Hernando County Utilities Department
Hernando County's Package WWTP connection initiative (Weeki Wachee North)	Hernando County Utilities Department
Hernando County's Package WWTP connection initiative (Camp-A-Wyle)	Hernando County Utilities Department
Hernando County's Package WWTP connection initiative (Frontier Campground)	Hernando County Utilities Department
Hernando County's Package WWTP connection initiative (Topics RV Community)	Hernando County Utilities Department



OSTDS-Related Remediation Projects

- Discussion objectives:
 - Identify time constraints on different project approaches
 - Data needs to evaluate sewer versus septic field enhancement approaches
 - Understanding of calculation approaches
- Future determinations based on discussion:
 - Constraints on projects to list for the 5-, 10-, and 15-year milestones
 - Areas with site limitations for sewer
 - Areas with site limitations for OSTDS field enhancements
 - Using the calculation approaches to estimate reductions
- Future discussions:
 - Costs and cost differences based on site conditions
 - Estimated wastewater facility treatment levels and disposal methods
 - Addressing growth of OSTDS and wastewater loads



OSTDS-Related Projects

- Understanding time constraints on installing new OSTDS treatment technology:
 - Improving OSTDS treatment is likely going to be the only or best option in some (or many) locations, so...
 - FDOH—
 - When is the expected date that the nitrogen reducing enhancements will be eligible for FDOH permits?
 - OSTDS Industry—
 - Lead time to make these types of systems available for installation?





OSTDS-Related Projects

- Understanding time constraints on installing new OSTDS treatment technology:
 - Local governments—Anticipating a BMAP requirement to reduce OSTDS loading, what would be an overall timeline for putting local policies in place for additional treatment requirements?
 - All—Are there other timing considerations to consider for septic field enhancements?



Sewer Expansion Projects

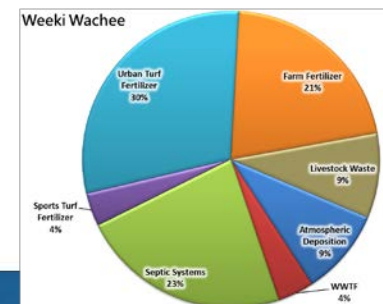
- Understanding time constraints on installing additional sewer and treating nitrogen at a wastewater plant:
 - Phasing out OSTDS to sewer service and facility treatment may be the best option some (or many) locations, so...
 - Utilities—What are your major time constraints for undertaking some sewer expansion?
 - Local governments—Anticipating a BMAP requirement to reduce OSTDS loading, what would be an overall timeline for putting local policies in place for sewer hook up?
 - All—Are there other timing considerations to consider for sewer expansion?





Making Reduction Estimates

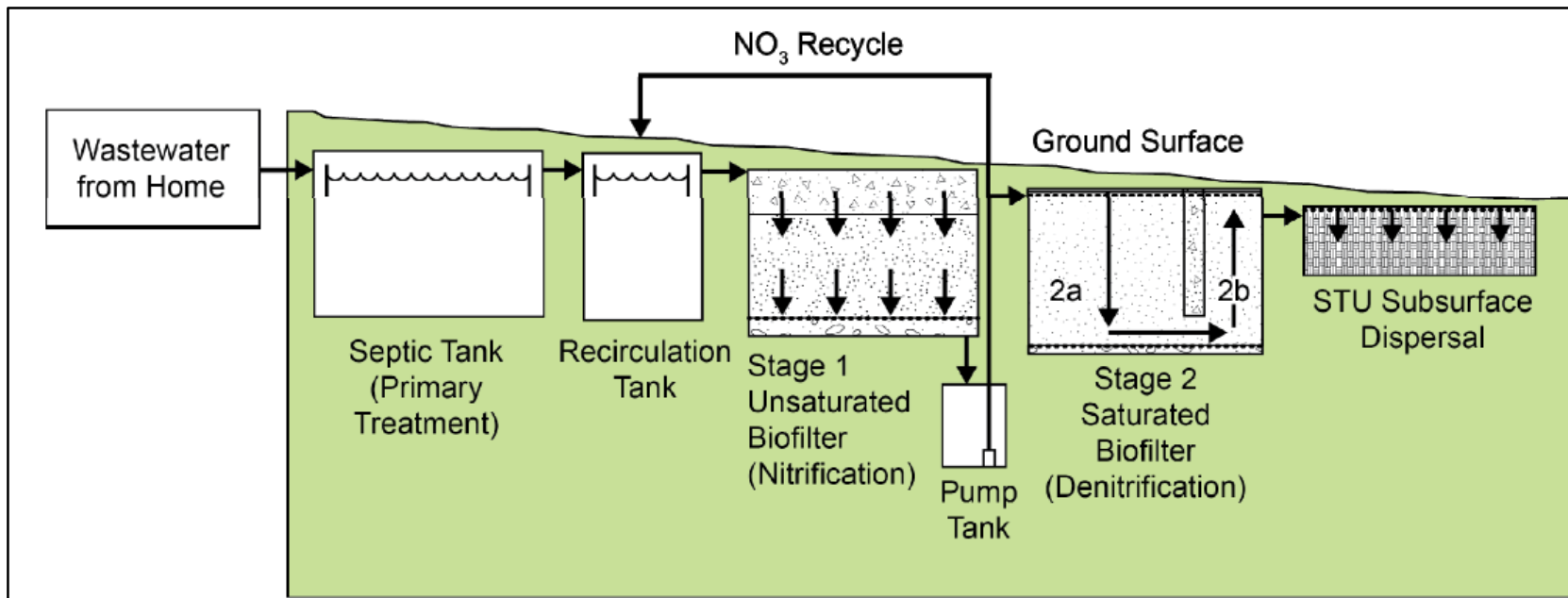
- Use the Weeki Wachee Nitrogen Source Inventory Loading Tool (NSILT) approaches to estimate OSTDS reductions to ground water:
 - Establish OSTDS project location and final disposal method
 - For those being remediated, estimate the current OSTDS load to ground water (based on attenuation and recharge rate)
 - Estimate the OSTDS load to ground water after the project is accomplished--whether field enhancement or sewer/facility discharge to ground water (based on attenuation and recharge rate)
 - Difference in load is the net benefit/project reduction





Draft Reduction Calculations

FDOH Study: In-Tank Passive Nitrogen System



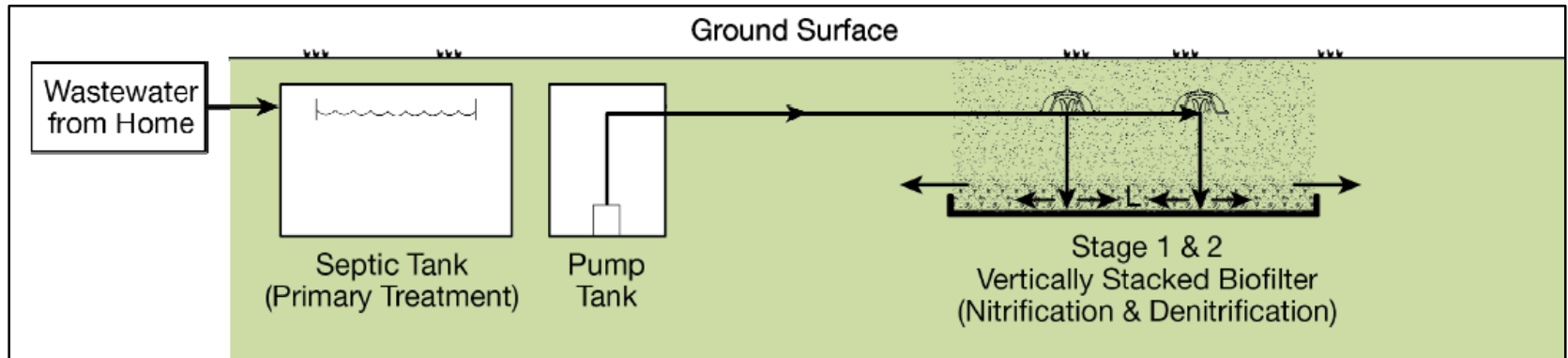
FDOH system performance estimate: 85-95% reduction of nitrogen

DEP BMAP reduction estimate: 85%, unless additional information provided to support higher efficiencies



Draft Reduction Calculations

FDOH Study: In-Ground Passive Nitrogen System



FDOH system performance estimate: 40-70% reduction of nitrogen
DEP BMAP reduction estimate: 40%, unless additional information provided to support higher efficiencies



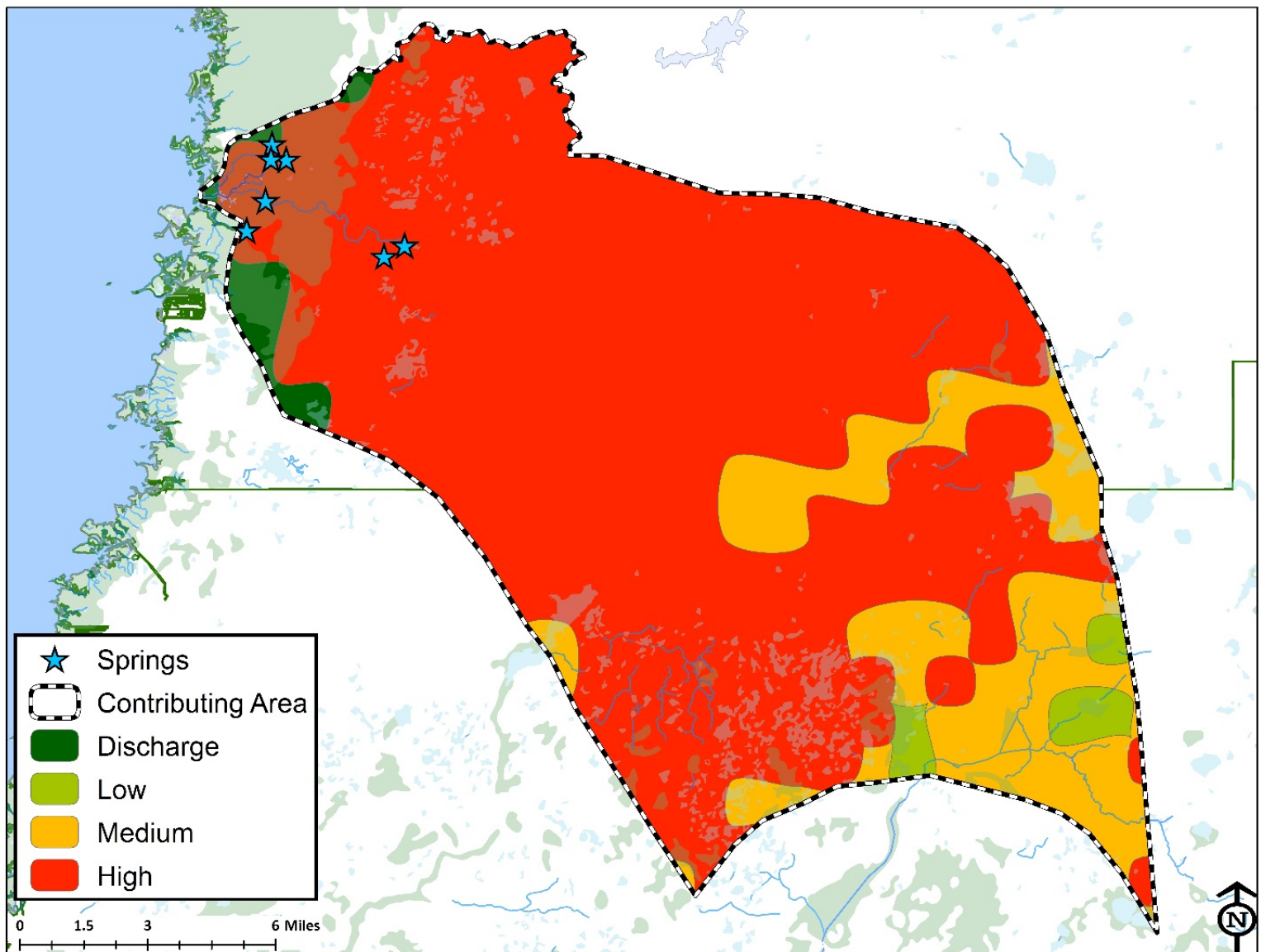
Draft Reduction Calculations

- Location matters for the calculations:
 - Recharge rate at the remediated OSTDS location
 - Recharge rate at disposal location (same site or moved to plant)





Draft Reduction Calculations



This map was prepared on 05/20/16 by FDEP Ground Water Management Section. For display purposes only. For more information: C. Lyon (850)245-5683.



Calculation Steps for On-site Sewage Treatment and Disposal System (OSTDS) Remediation

DRAFT

**Step 1: Calculate OSTDS
Nitrogen Load ^{1,2,3}**

*(Avg. pph (x) Avg.
input/person) = A*

**Step 2: Apply Attenuation
Factor**

*(40% reaches ground water)
(A*40% = B)*

Step 3: Apply Recharge Factor

*(High-90%; Med.-50%; Low-
10%; based on location of
OSTDS)
(B*Recharge % = C)*

**Total Unremediated OSTDS
Nitrogen Load to Ground
Water = C**

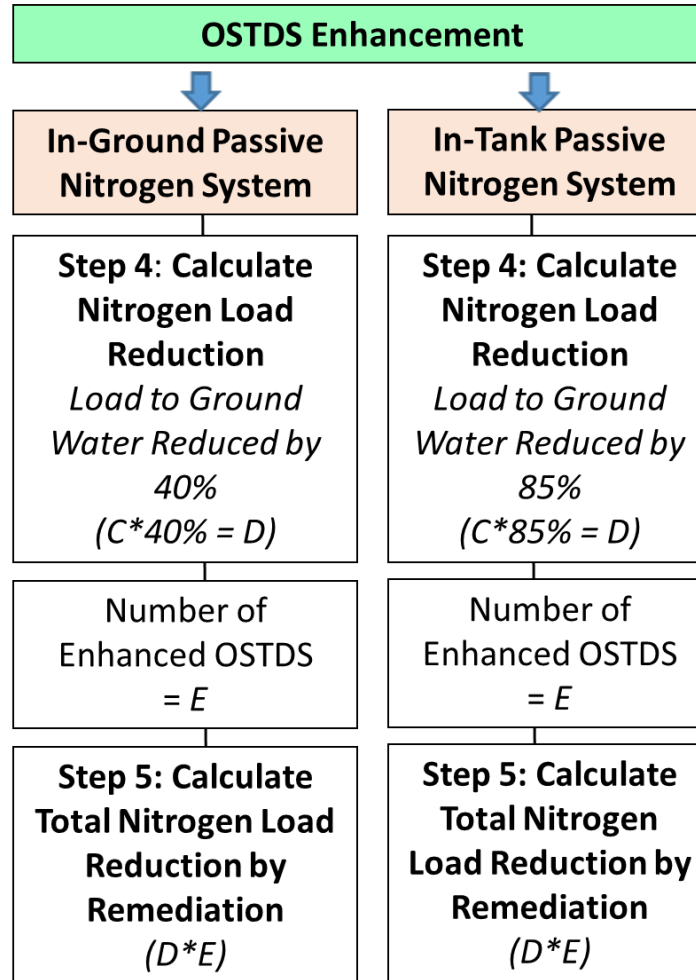
Notes:

1. pph = person per household
2. Per U.S. 2010 Census, 1.95 pph in Citrus County; 2.08 pph in Hernando County; and 2.07 pph in Pasco County
3. Average input/person is 9.012 lb-N/person (U.S. EPA)



Calculation Steps for On-site Sewage Treatment and Disposal System (OSTDS) Remediation

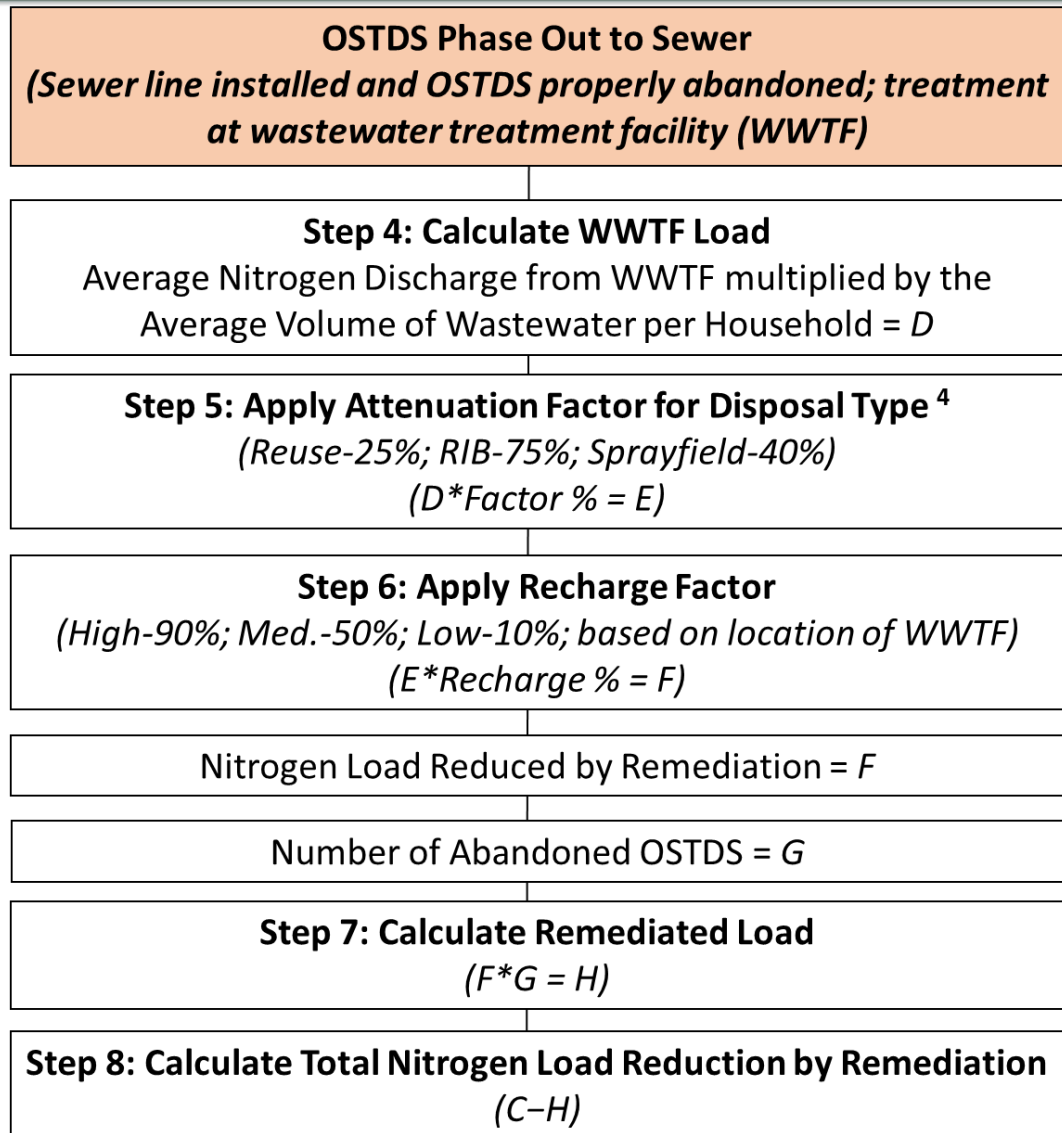
DRAFT





Calculation Steps for On-site Sewage Treatment and Disposal System (OSTDS) Remediation

DRAFT



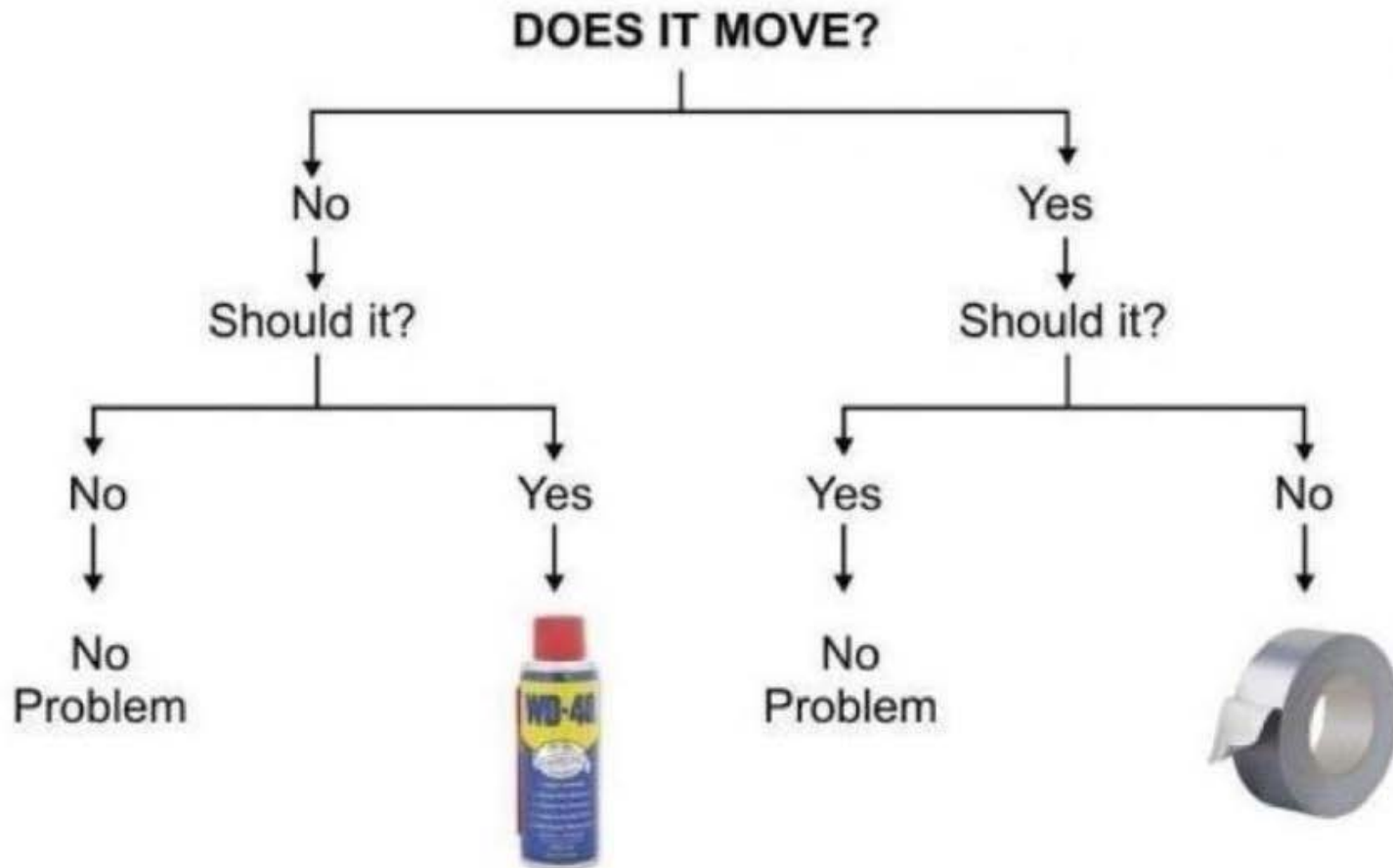
Note:

4. RIB = rapid infiltration basin



Alternate Calculation Flowchart

Engineering Flowchart





OSTDS Loads to Ground Water

- Initial inputs to reduction calculations
- OSTDS portion of total load to ground water estimated at **162,000 lbs-N/yr**
- OSTDS load per system to ground water estimated at **6.5 lbs-N/yr/OSTDS**
- We need to estimate the final N concentration of the possible projects to determine the minimum number of OSTDS remediation (additional *in situ* treatment or sewer) needed to meet the TMDL target



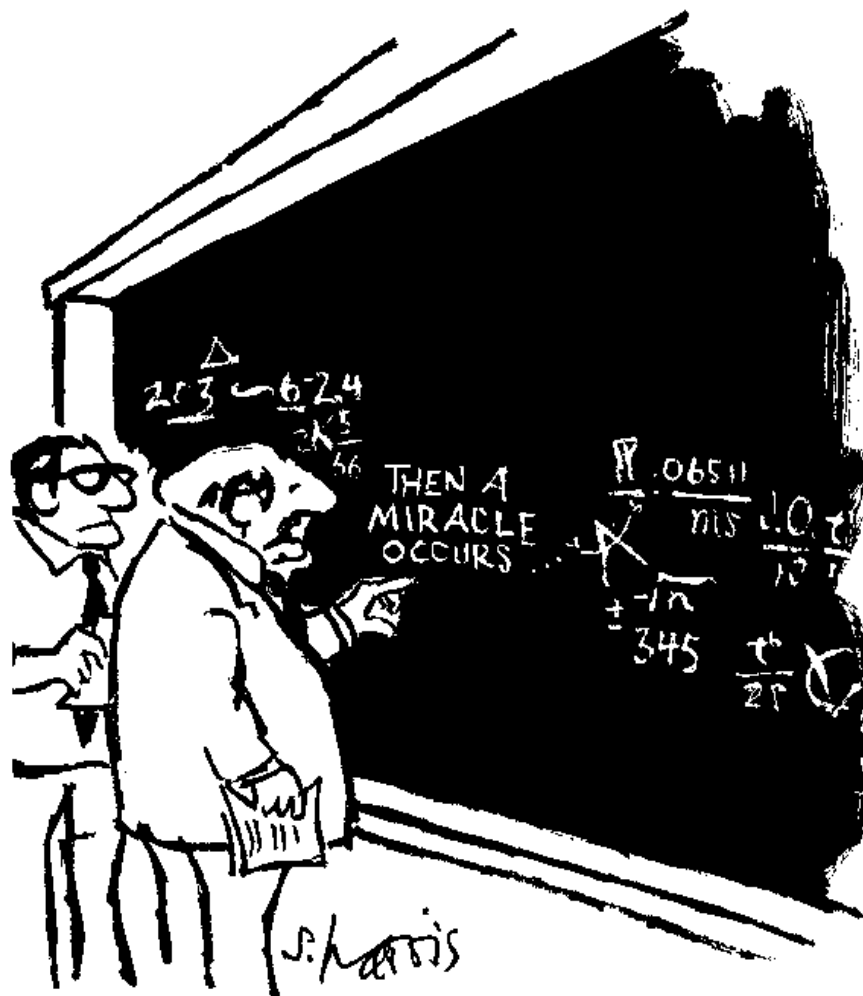
Draft Reduction Calculations

- OSTDS estimated loading will be averaged—not specific to each individual system
 - Average people per household
 - Conservative reduction estimate of field enhancements
- Wastewater facility loading will be estimated (if applicable):
 - Treatment level/remaining nitrogen concentration
 - Disposal method (reuse, rapid infiltration basin [RIB] or sprayfield)
 - Recharge rate at disposal site
- Reduction benefits will be estimated, not individually measured—approach may need refinement over time





Questions About Calculations?



"I think you should be more explicit here in step two."



Science-Related Actions– Weeki Wachee River Draft SWIM Plan*

Management Action
Monitoring and Research
Improve our understanding of the ecological responses to nutrient enrichment and reductions
Maintain and expand water quality monitoring programs
Report annual status and trends
Evaluate new and emerging technologies
Identify nutrient sources and vulnerable (karst) areas
Septic Tanks
Develop an inventory of septic tank locations, age, and condition if known



Science-Related Projects– Weeki Wachee River Draft SWIM Plan*

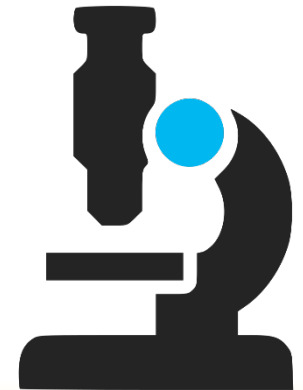
Ongoing Projects	Lead Entity
U.S. Geological Survey (USGS) Ground Water Data Collection	USGS/SWFWMD
USGS Surface Water Data Collection	USGS/SWFWMD
Evaluation of Nitrogen Leaching from Reclaimed Water Applied to Lawns, Spray Fields, and RIBs	SWFWMD
Project COAST	SWFWMD
Quarterly Springs Water Quality Monitoring	SWFWMD
Springs Initiative Monitoring	SWFWMD
Stream Water Quality Monitoring	SWFWMD
Upper Floridan Aquifer Nutrient Monitoring	SWFWMD

*Version 11.0, 5/25/2016



Science Strategy

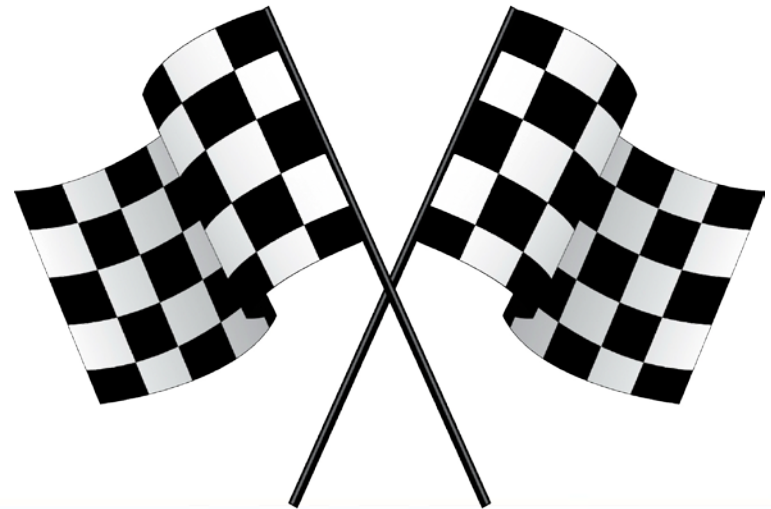
- SWIM Plan Item: Research and develop advanced septic tank systems
- Are there other OSTDS-related science questions we haven't covered?
 - Are there data needed to identify potential project areas?
 - Are there specific questions about the ground water system we would like to answer?
 - Are there specific questions about project effectiveness we would like to answer?





Wrap Up

- Next meeting date
- Other comments/announcements
- Action items
- Prepare for next meeting





Basin Management Action Plan

CONTACTS: **BMAP**

Terry Hansen, P.G. terry.hansen@dep.state.fl.us

<http://www.dep.state.fl.us/water/>

http://publicfiles.dep.state.fl.us/DEAR/BMAP/Springs Coast/BMAPs/WW_BMAP/





OSTDS Field Enhancements— next meeting???

- FDOH—Are there site conditions/limitations that should be considered for installation of field enhancements?
- All—Do we have the information we need to evaluate site conditions for field enhancements?
- FDOH—What are the site conditions that affect the cost estimates (up or down)?
- All—Do we have the information we need to estimate costs of field enhancements?