Florida Department of Environmental Protection

Division of Environmental Assessment and Restoration

Wekiva River, Rock Springs Run, and Little Wekiva Canal Draft Basin Management Action Plan (BMAP)

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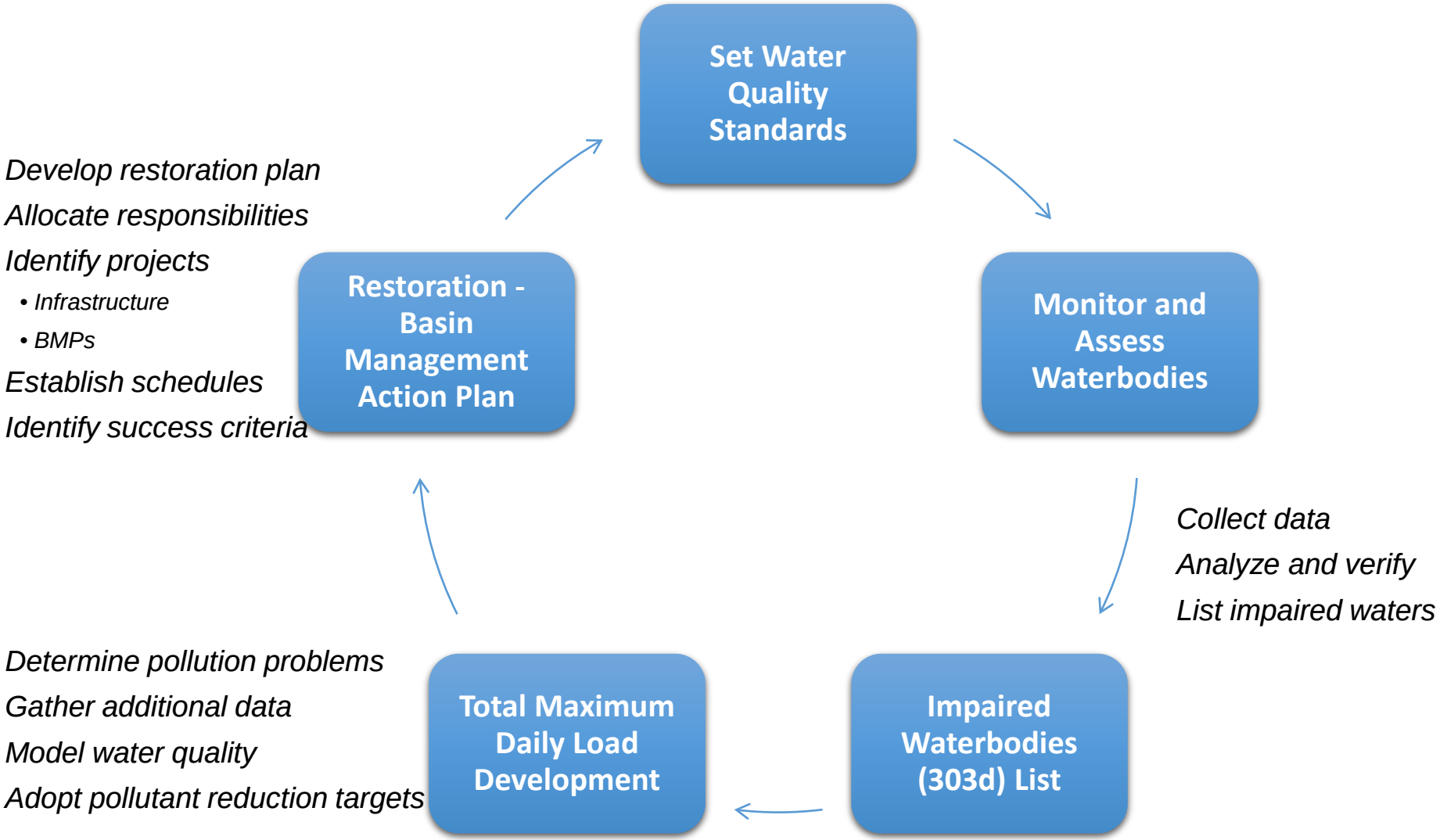
Agenda

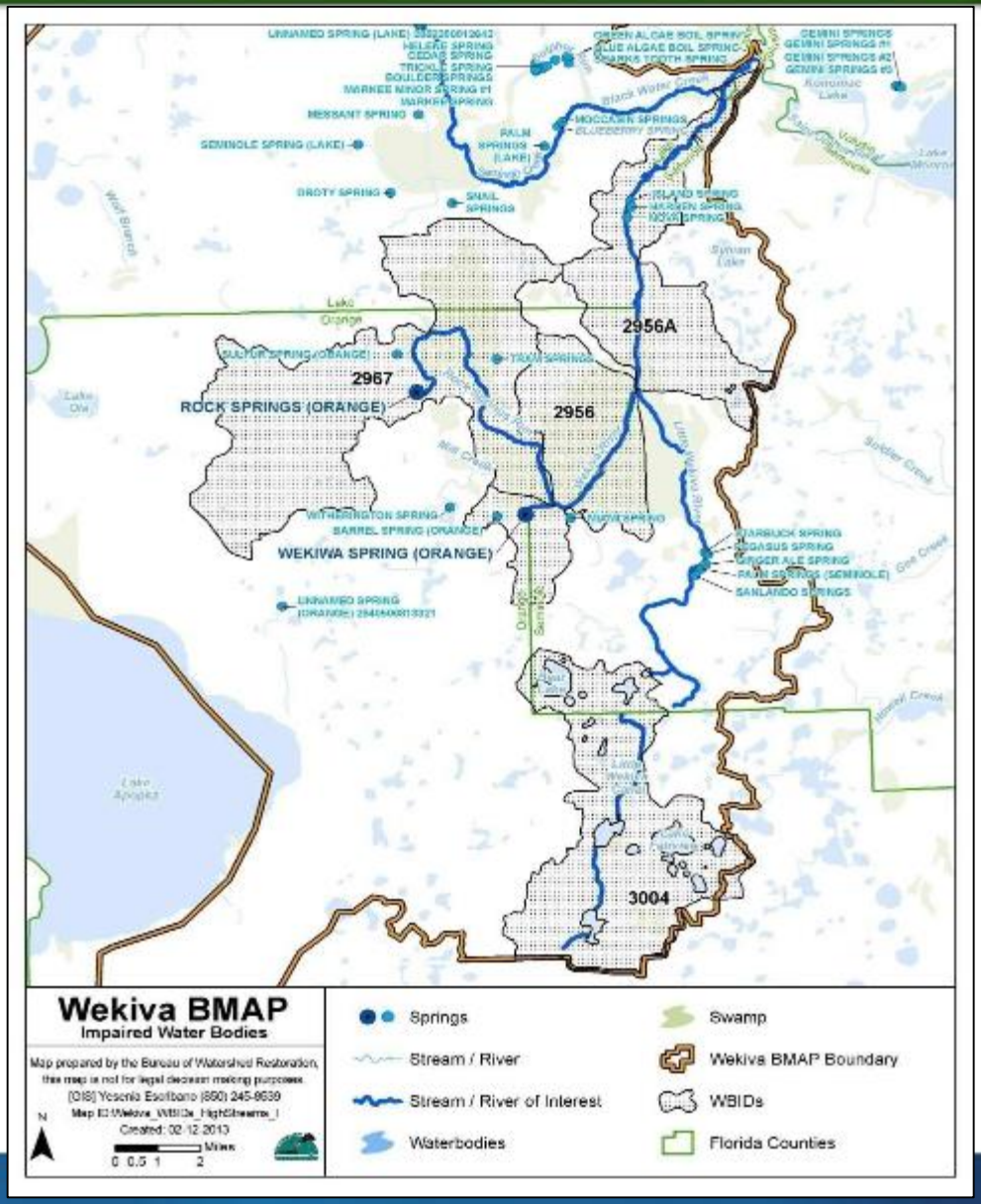
- Welcome and Introductions
- Brief Review
  - Watershed Management Approach
  - Total maximum daily loads (TMDLs)
  - BMAP Approach
- Review of Draft BMAP Sections
- Overview of Revisions since the Previous Draft BMAP
- Wekiva-Area Septic System Studies
- Nitrogen Source Inventory and Loading Tool (NSILT)
- Timeline for Wekiva BMAP Adoption
- Questions

Water Quality Framework



Wekiva River, Rock Springs Run and Little Wekiva Canal TMDLs

- Wekiva River, Wekiwa Springs, and Rock Springs Run
  - Impaired in 2007
    - Nitrate-nitrogen and Total Phosphorus (TP)
  - TMDLs in April 2008
- Little Wekiva Canal
  - Impaired in 2007
    - Total Nitrogen (TN) and biochemical oxygen demand (BOD) which caused impairment for dissolved oxygen (DO)
  - TMDLs in June 2008
- TMDL Targets
  - Monthly average nitrate concentration of 0.286 milligrams per liter (mg/L)
  - Monthly average TP concentration of 0.065 mg/L



Nitrate and Total Nitrogen TMDLs

Water-body Identifi-cation (WBID) Number	WBID Name	Parameter	TMDL Target (mg/L)	TMDL (% reduction)	Wasteload Allocation (WLA) NDPES Wastewater (lbs/month)	WLA NPDES Stormwater (% reduction)	Load Allocation (LA) (% reduction)
2929A	Blackwater Creek	Nitrate	0.286	52%	N/A	52%	52%
2956	Wekiva River (upstream)	Nitrate	0.286	68%	2,805	68%	68%
2956A	Wekiva River (downstream)	Nitrate	0.286	47%	N/A	47%	47%
2956C	Wekiwa Spring	Nitrate	0.286	79%	N/A	79%	79%
-	Rock Spring	Nitrate	0.286	81%	N/A	81%	81%
2967	Rock Springs Run	Nitrate	0.286	63%	N/A	63%	63%
2987	Little Wekiva River	Nitrate	0.286	59%	N/A	59%	59%
3004	Little Wekiva Canal	TN	-	45.2%	N/A	45.2%	45.2%

Total Phosphorus TMDL

WBID Number	WBID Name (Number)	Parameter	TMDL Target (mg/L)	TMDL (% reduction)	WLA NDPES Wastewater (lbs/month)	WLA NPDES Stormwater (% reduction)	LA (% reduction)
2929A	Blackwater Creek	TP	0.065	36%	N/A	36%	36%
2956	Wekiva River (upstream)	TP	0.065	61%	40	61%	61%
2956A	Wekiva River (downstream)	TP	0.065	57%	191	57%	57%
2956C	Wekiwa Spring	TP	0.065	64%	N/A	64%	64%
-	Rock Spring	TP	0.065	23%	N/A	23%	23%
2967	Rock Springs Run	TP	0.065	58%	N/A	58%	58%
2987	Little Wekiva River	TP	0.065	78%	N/A	78%	78%

Sources: Table 6.1 Gao (2008) and Table 6.1 Bailey (2008)

BMAPs

- Department's method for restoring water quality to an impaired waterbody
- BMAPs are adopted by FDEP through a Secretarial Order
- BMAPs are enforceable through the following:
  - National Pollutant Discharge Elimination System (NPDES) permits
  - The authority of the adopted BMAP itself

Key BMAP Components

- TMDLs being addressed
- Defines area addressed by the restoration plan
- Future growth impacts
- Projects to meet the TMDLs including
  - Implementation timeline
  - Commitment to project
  - Expected water quality improvement
- Process to assess progress towards achieving the TMDLs

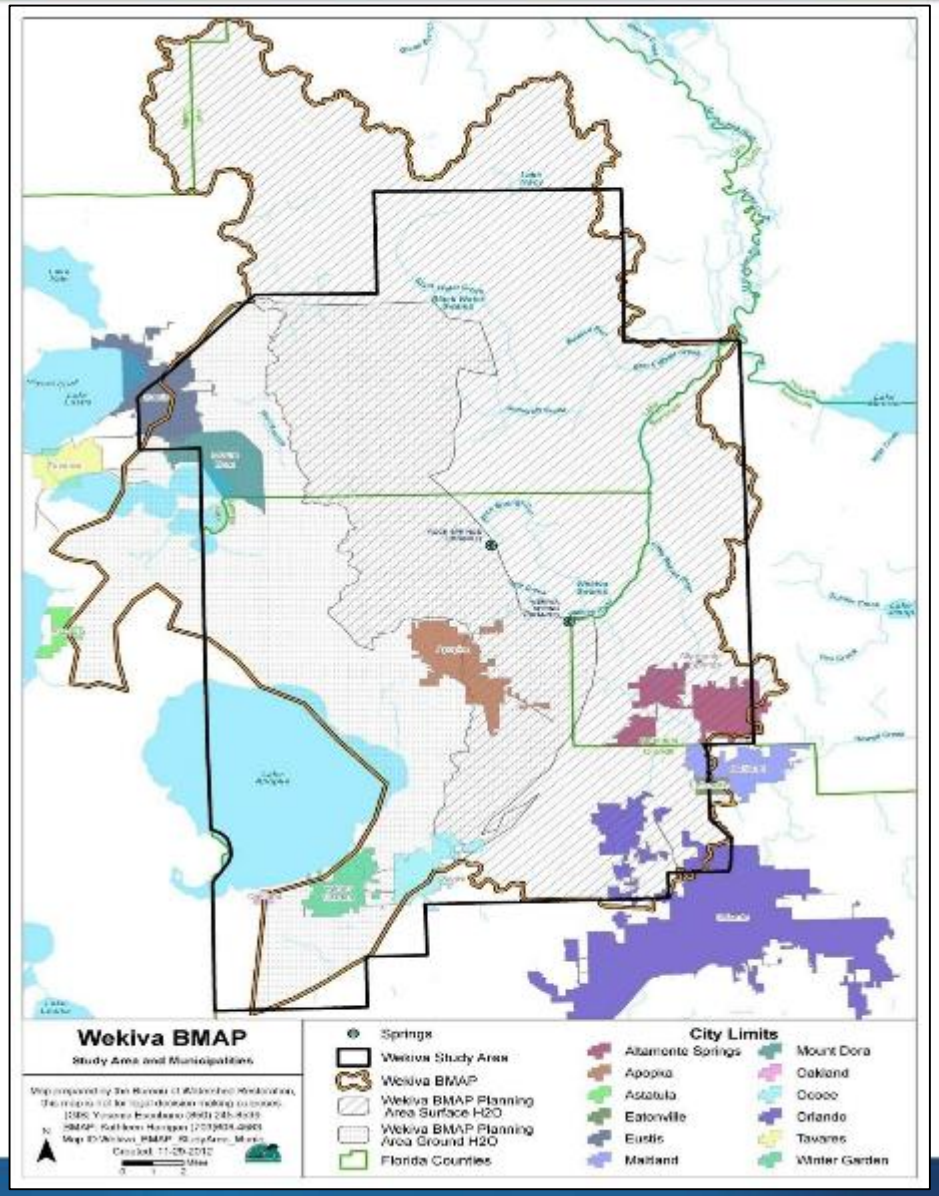
Review of Major Elements of the Draft BMAP Document

Major BMAP Elements

- Chapter 1 – Context, Scope & Purpose of Plan
- Chapter 2 – Wekiva River, Rock Springs Run and Little Wekiva Canal Basin Setting
- Chapter 3 – Pollutant Sources
- Chapter 4 – Management Actions
- Chapter 5 – Assessing Progress and Making Changes
- Chapter 6 – Management Actions, Sufficiency of Effort, and Enforcement

Chapter 1
Context, Scope & Purpose of Plan

- BMAP Planning Area
  - 513 square miles
  - Surface Watershed
    - Wekiva River
    - Rock Springs Run
    - Little Wekiva Canal
  - Black Water Creek and Springshed
    - Wekiwa Springs
    - Rock Springs
  - Roughly corresponds to boundaries of the Wekiva Study Area



BMAP Approach

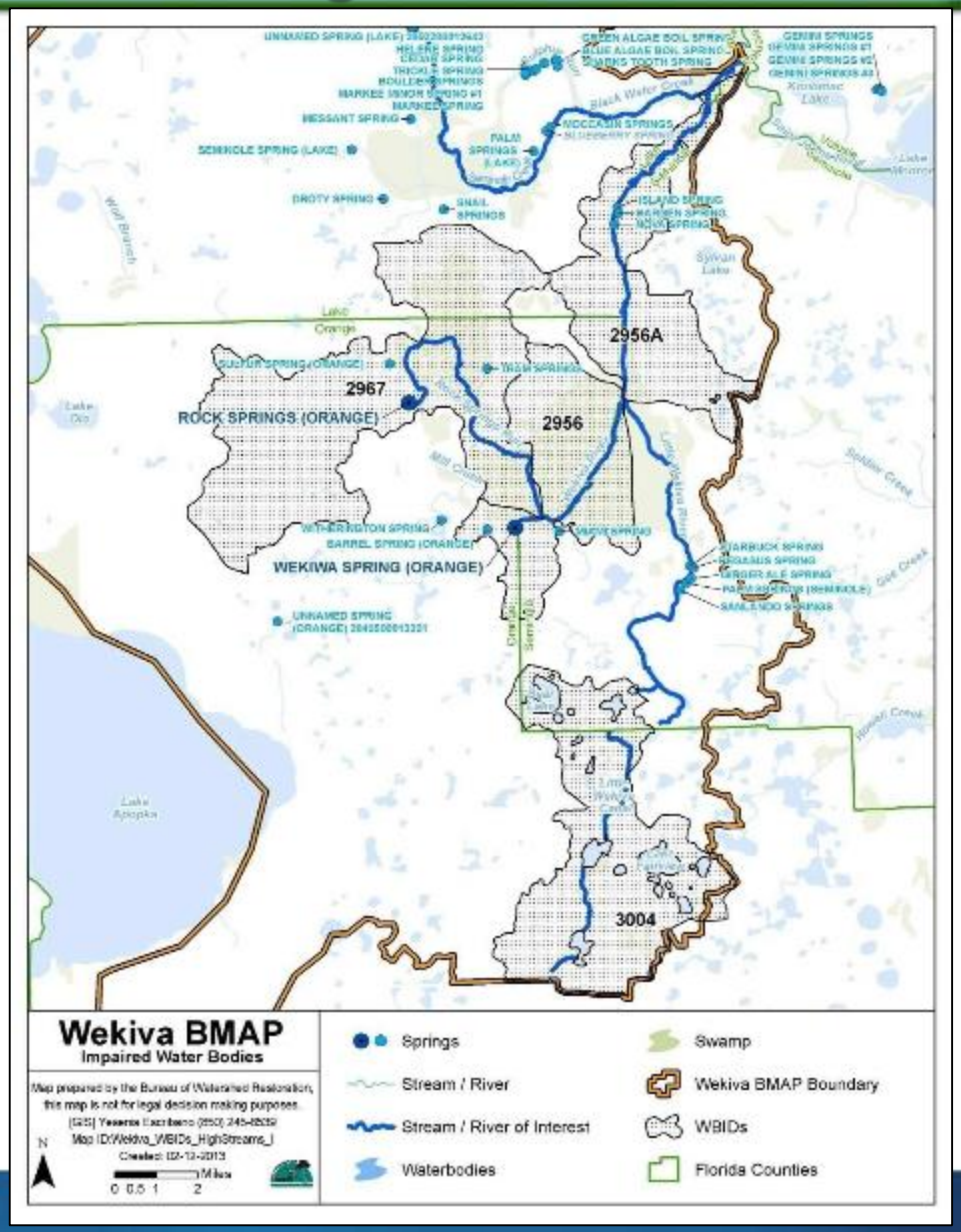
- Phased BMAP
  - Designed to achieve incremental reductions
  - Monitor for improving trends and assess sources and conditions affecting trends in the contributing area
  - Full attainment of TMDLs long term process that will be managed in iterative 5-year BMAP cycles
- Phase I – first five years
  - Projects included in BMAP to be implemented within first 5-year cycle
  - Regular monitoring, follow-up, and continued coordination and communication

BMAP Approach (cont'd.)

- Future Phases
  - Stakeholders will formally evaluate progress in project implementation and the results of surface water and ground water monitoring
  - To meet TMDL targets future actions will be needed beyond those included in the first 5-year BMAP cycle
  - Use additional science-based tools to reduce loadings
  - Identify priority areas for additional reduction projects and BMP implementation

Chapter 2
Wekiva River, Rock Springs Run and Little Wekiva Canal Basin Setting

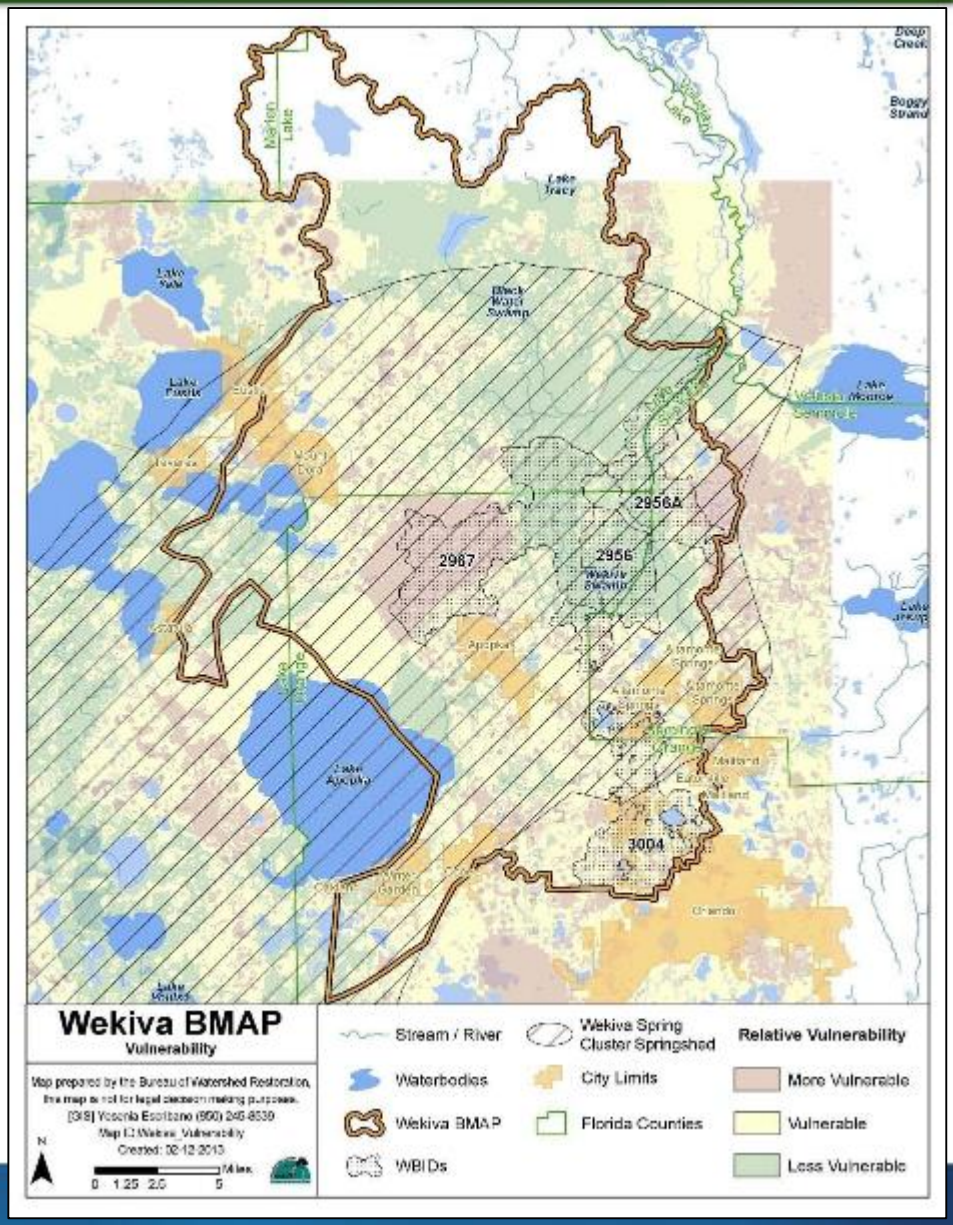
- Relationship between streams in the Wekiva Basin and the impaired waters
- Direct runoff to streams is limited
- Primary source of flow is via ground water discharge to springs



Aquifer Vulnerability

Wekiva Aquifer Vulnerability Assessment model created by Florida Geological Survey

- Pink = More vulnerable
- Yellow = Vulnerable
- Green = Less vulnerable



Land Uses

- Broad range of land uses – based on St. Johns River Water Management District (SJRWMD) 2009 data
  - Rangeland, upland forest, and water and wetlands - 50% of the area
  - Agricultural land uses - approximately 15% of the area
  - Urban land uses – remaining 34% of the total area
    - Largest subcategories of urban lands include low- and medium-density residential (8.57% and 12.51%, respectively)

Chapter 3
Pollutant Sources

- Information based on:
  - DEP TMDLs (2008)
  - Additional studies to categorize nitrogen inputs
- Sources that contribute to nutrient loading include:
  - Domestic wastewater discharges
  - Fertilizers on agricultural and residential sites
  - Septic systems
  - Atmospheric deposition
  - Animal waste
- Stormwater and ground water transport nutrients from these sources to impaired waters

Pollutant Sources (cont'd.)

- Loading occurs as
  - Direct runoff to surface waters
  - Runoff to closed depression, which then percolates to ground water
    - Pathway responsible for the nitrate and TP loading discharging from the spring vents
- Loads calculated to
  - Help focus management strategies in specific regions
  - Provide some scale to the load reduction efforts in the basin
  - Assess BMAP efforts for this first five-year implementation phase
- New tool – Nitrogen Source Inventory and Loading Tool
  - More on this later

Chapter 4
Management Actions

- Address nutrient loads (TN, TP, or both)
- Located in the Wekiva River, Rock Springs Run, or Little Wekiva Canal BMAP planning area
- Completed since January 1, 2000
- Load reductions only noted for management actions where the load reduction was over and above any permit requirements (and only the "extra" reduction was noted in the BMAP)

Point Source Management Strategies

- Wastewater facilities discharging to impaired surface waters:
  - Treatment plant upgrades
  - Elimination/reduction of surface water discharge
- Stormwater
  - Best management practice (BMP) installation
  - Stormwater system rehabilitation
  - Street sweeping

Nonpoint Source Management Strategies

- Agricultural BMPs
- Wastewater facilities discharging to ground water
  - Treatment plant upgrades
  - Collection system rehabilitation
  - Water reuse projects
  - Septic tanks (connection to central sewer)
- Other
  - Road paving with added treatment
  - Stream bank protection and restoration
  - Land conservation and preservation
  - Local ordinances for landscaping, fertilizer, etc.
  - Public education

Projects Currently in the BMAP

Collection system projects

Collection System Projects	Little Wekiva Canal and/or Little Wekiva River	Wekiva River	Springshed	Total Number of Projects
Improve Reuse System (e.g., collection, transmission, storage)	Altamonte Springs (2) Apopka (1)	-	Apopka (2)	5
Expand Collection System (i.e., septic systems to sewer; decommission WWTF)	Altamonte Springs (3) Orlando (5)	Wekiwa Springs State Park (1)	Apopka (6) Mount Dora (1)	16
Rehabilitate/Upgrade Sanitary Collection System (e.g., pipe relining, manhole sealing, lift station replacement and relocation)	Altamonte Springs (1) Orlando (7)	Seminole County (4) Sanlando Utilities (1)	Apopka (3) Mount Dora (2) Ocoee (1) Orange County(3) Winter Garden (1)	23
Inspect Sanitary Sewer System	Orlando (1)	-	Mount Dora (1)	2
Carry Out Studies	Altamonte Springs(1)	-	-	1
Total Collection System Projects	**21 projects**	**6 projects**	**20 projects**	**47**

Projects Currently in the BMAP

Stormwater Projects

Stormwater Projects	Blackwater Creek	Little W. Canal	Little Wekiva River	Rock Sp. Run	Wekiva River	Springshed	Total
Dirt Road Paving	Lake Co. (1)	Orange(10)	Orange (1)	Orange (5)	Seminole (2)		**19**
System Inspections			Orlando (2)				**2**
System Rehab.			Orlando (1)			Mt. Dora (12)	**13**
Stormwater Treatment Systems	Florida Depart-ment of Transpor-tation (FDOT) (1) Seminole (1)	FDOT (2) Orlando (1) Orange (7) Seminole (2)	Altamonte (11) Apopka (1) FDOT (9) Orlando (9) Seminole (2)	Apopka (1) Orange (1)	Seminole (5)	Eustis (2) FDOT (16) Lake Co. (2) Mt. Dora (8) Oakland (1) Ocoee (19) Turnpike (2) W. Garden (4)	**109**
Street Sweeping		Orange (1)	Altamonte (1) Orlando (1) Maitland (1)	Apopka (1)	Seminole (1)	FDOT (1) Mt. Dora (1) Ocoee (1) W. Garden (1)	**10**
TOTAL	**3**	**23**	**39**	**8**	**8**	**70**	**151**

Projects Currently in the BMAP

Nonpoint Source Projects

Nonpoint Source Project	Blackwater Creek	Little W. Canal	Little Wekiva River	Rock Sp. Run	Wekiva River	Springshed	Total
Education, & ordinances	Lake Co. (1)		Orange Co. (1)				**2**
Bank Stabilization			Altamonte (2) Orange Co. (8) Seminole (5)	Orange (1)	Seminole (2)		**18**
Exotic Veg. Removal			Seminole (4)				**4**
Land Pres. And Conservation	Lake Co. (1)			Orange (3)	Altamonte (1) FDEP (1) Seminole (2)	Lake (3) W. Garden (1) Combined effort (FDEP, SJRWMD, OOCEA, Orange) (1)	**13**
Studies	Lake (1)	Orange (2)	Altamonte (2) Orlando (1)		Seminole (4)		**10**
Wetland Restoration					Altamonte (1)	Mt. Dora (1)	**2**
TOTAL	**3**	**2**	**23**	**4**	**11**	**6**	**49**

Projects Currently in the BMAP

Public Education & Ordinances

Basin Working Group (BWG) Member	Florida Yards & Neighborhoods (FYN) Program	Landscape Ordinance	Irrigation Ordinance	Pet Waste Management	PSAs, Website, etc.
Altamonte Springs	Yes	-	Yes	Yes	Yes
Apopka	-	Yes	Yes	-	Yes
Astatula	-	-	Yes	-	-
Eustis	-	Yes	Yes	Yes	Yes
Maitland	-	Yes	Yes	Yes	Yes
Mt. Dora	-	-	Yes	Yes	Yes
Oakland	-	Yes	Yes	-	Yes
Ocoee	-	Yes	Yes	-	Yes
Orlando	Yes	Yes	Yes	Yes	Yes
Tavares	-	Yes	Yes	-	Yes
Winter Garden	-	-	Yes	-	-
Lake County	Yes	Yes	Yes	-	Yes
Orange County	Yes	Yes	Yes	Yes	Yes
Seminole County	Yes	Yes	Yes	Yes	Yes

FDOT District 5 and FOWR – Public service announcements (PSAs), websites, etc.
SJRWMD – District watering restrictions

Estimated Load Reductions

Project	TN Load Reduction (lbs/yr)	TP Load Reduction (lbs/yr)
Domestic Wastewater Treatment Plant (WWTP) and Water Reuse Facility (WRF) Upgrades	171,929	-
Wastewater Facility Collection System Projects	99,450	32,200
Wastewater Reuse	33,779	25,460
Stormwater Projects	32,793	10,946
Road Paving Project	2,212	1,580
Shoreline Stabilization /Erosion Control	3,947	265
Land Preservation	2,092	20
Agricultural BMPs	9,015	5,285
TOTALS	**355,217**	**75,756**

Chapter 5
Assessing Progress and Making Changes

- Tools to assess progress in project implementation and water quality protection and restoration
  - Water Quality and Biological Monitoring
  - Data collected as part of the surface water, ground water, and springs monitoring network will be supplemented with
    - Flow measurement data
    - Monitoring and other reported data submitted by WWTF (or WRF) or MS4 permittees as part of permit requirements
  - Additional studies
  - Approach for tracking progress

Water Quality Monitoring

- Designed to do the following:
  - Enhance the understanding of loads to the basin
    - Track water quality trends across the surface water basin and springshed
      - Primary objective to evaluate success of BMAP
    - Identify areas with high nutrient concentrations
      - Secondary objective to provide information for potential future refinements of the TMDL and/or BMAP.
  - BWG members have coordinated monitoring locations and share data

Biological and Vegetation Monitoring

- Bioassessments
  - Detect the severity of impairments affecting the flora and/or fauna of a waterbody
- Assessments included in the BMAP
  - Lake Vegetation Index (LVI)
  - Stream Condition Index (SCI)
  - Rapid Periphyton Survey (RPS)
  - Submerged Aquatic Vegetation (SAV) and Algal Surveys – conducted by the SJRWMD

Additional Research Planned (as included in current draft BMAP)

- Planned Research To Address Nutrient Sources
  - SJRWMD Springs Research
  - Florida Onsite Sewage Nitrogen Reduction Study
  - Altamonte Springs studies (2)
  - Orange County (1)
  - Seminole County (3)
  - Agricultural Land Uses and Acreage Available for Enrollment in Agricultural BMPs
  - Wekiva-Area Septic System Studies
    - More on this later
- Additional Research and Investigation Needs
  - Updated Land Uses and Load Reduction Estimates
  - Nitrate and TP Loadings
  - Septic Tank Loadings

Tracking Implementation Annual Meetings

- Information Exchange
  - Analyze water quality data each year
  - Project and monitoring plan implementation
  - Sharing new information (e.g., monitoring trends, pollutant reductions strategies)
  - Coordinating TMDL-Related Issues
- Adaptive Management
  - Identify implementation issues and consider new information, and,
  - Determine additional corrective actions are needed (if the Wekiva River, Rock Springs Run, and Little Wekiva Canal are not projected to meet the TMDLs)

Chapter 6
Management Actions, Sufficiency of Effort and Enforcement

- Develop methods to accurately measure
  - Incremental progress
  - Sufficiency of effort
  - Future project needs
- Continue discussions to identify the most equitable and accurate science-based tools for prioritizing reductions and measuring incremental progress
- Enforcement – not main focus of BMAP
  - Point sources (both WWTFs and MS4s)
    - BMAP and TMDL reductions are enforceable through NPDES permits.
  - Nonpoint sources (including agricultural non-point sources)
    - BMAP and TMDL reductions are enforceable under the Florida Watershed Restoration Act (FWRA) 403.067, F.S.
    - Agricultural nonpoint sources in a BMAP area
      - Agricultural producers must implement BMPs or monitor to demonstrate compliance with water quality standards

Overview of Revisions since the Previous Draft BMAP

OSTDS (Wastewater) Initiative

- Goal
  - Develop and implement management strategies necessary to reduce nutrient loading from on-site treatment and disposal systems (OSTDS)
    - Effective and financially feasible strategies
    - Realistic timeframe
- Advisory Committee
  - DEP-organized, will include:
    - Florida Department of Health (FDOH), utilities, government, businesses, homeowners, environmental and community groups
  - Enhance communication and coordination among interested entities
  - Implement initiative

OSTDS Initiative (cont'd.)

Objectives

- Scientific information collection
- Develop education plan
- Identify and develop an OSTDS Plan

Plan

- Prioritize areas where greatest risk exists
- Determine areas of opportunity (cost/benefit ratio)

OSTDS Plan Development

- After BMAP adoption
  - Within three months:
    - Initial technical meeting to present methodology and geographic data
  - Within three years:
    - OSTDS Plan will be developed identifying specific projects to achieve nutrient reductions
- The timing of the implementation of plan components may be subject to change
- The OSTDS Plan will be reviewed and updated annually

Additional New Information in Draft BMAP

- Nitrogen Source Inventory and Loading Tool
  - Added as Section 3.3 in *Chapter 3: Pollutant Sources and Anticipated Outcomes*
  - Rick Hicks will expand on this
- Wekiva-Area Septic System Studies
  - Added as Section 5.2.4 in *Chapter 5: Assessing Progress and Making Changes*
  - Rick Hicks will expand on this

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Updates:

- **Wekiva-Area Septic Tank Study**
- **Nitrogen Source Inventory**

September 2, 2015

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Florida Department of Environmental Protection

Septic Tank Study





Pertinent research/studies- septic systems

- Wakulla septic tank study (2008, 3 intensive study sites, lysimeters, ground water, SF6 ground water trace). Partners FSU, USGS
- Jacksonville backyard septic study (2007-2008, 7 intensive study sites, shallow ground water. Partner FIT
- Wakulla performance based septic study (2009, 30+ sites monitored, 7 intensive study sites, lysimeters, shallow ground water. Partner FSU
- Ichetucknee Springs experimental drainfield study (2014, ongoing) installed experimental nitrogen reducing drainfield, lysimeters, shallow ground water. Partners Park Service, DOH
- ArcNLET septic tank nitrogen loading modeling tool, developed by FSU (2009- ongoing)
- Indian River County South Relief Canal Septic Tank Loading Study, ongoing

Pertinent research/studies- in Wekiva area

- MACTEC 2010 nitrogen source inventory, residential lawn fertilizer study. (1 year + ongoing monitoring, 25 residential properties and shallow ground water wells). Partners, SJRWMD, Orange County, UCF
- Wekiva area residential well sampling\nitrogen source assessment. (2009, 25 residential wells sampled near nurseries and other sources (2 week sampling effort)
- Reclaimed water source sampling (2010, two mobilizations to collect samples from RIB monitoring sites, golf course irrigation systems, residential locations.
- Wekiva lawn fertilizer use survey, 2009. UCF
- Liner Source container nursery site assessment, 2010
- SF6 tracer work, ongoing

Septic Tank Study Objectives

This study would help us better understand:

- Attenuation and leaching of nitrogen from existing septic systems into the soil and ground water
- Other sources of nitrogen in residential areas
- Conditions that may influence nitrogen attenuation local to this area

- **Findings can be used to help us all understand how to best prioritize efforts and money spent to reduce nitrogen loads to the system.**

History of the Study

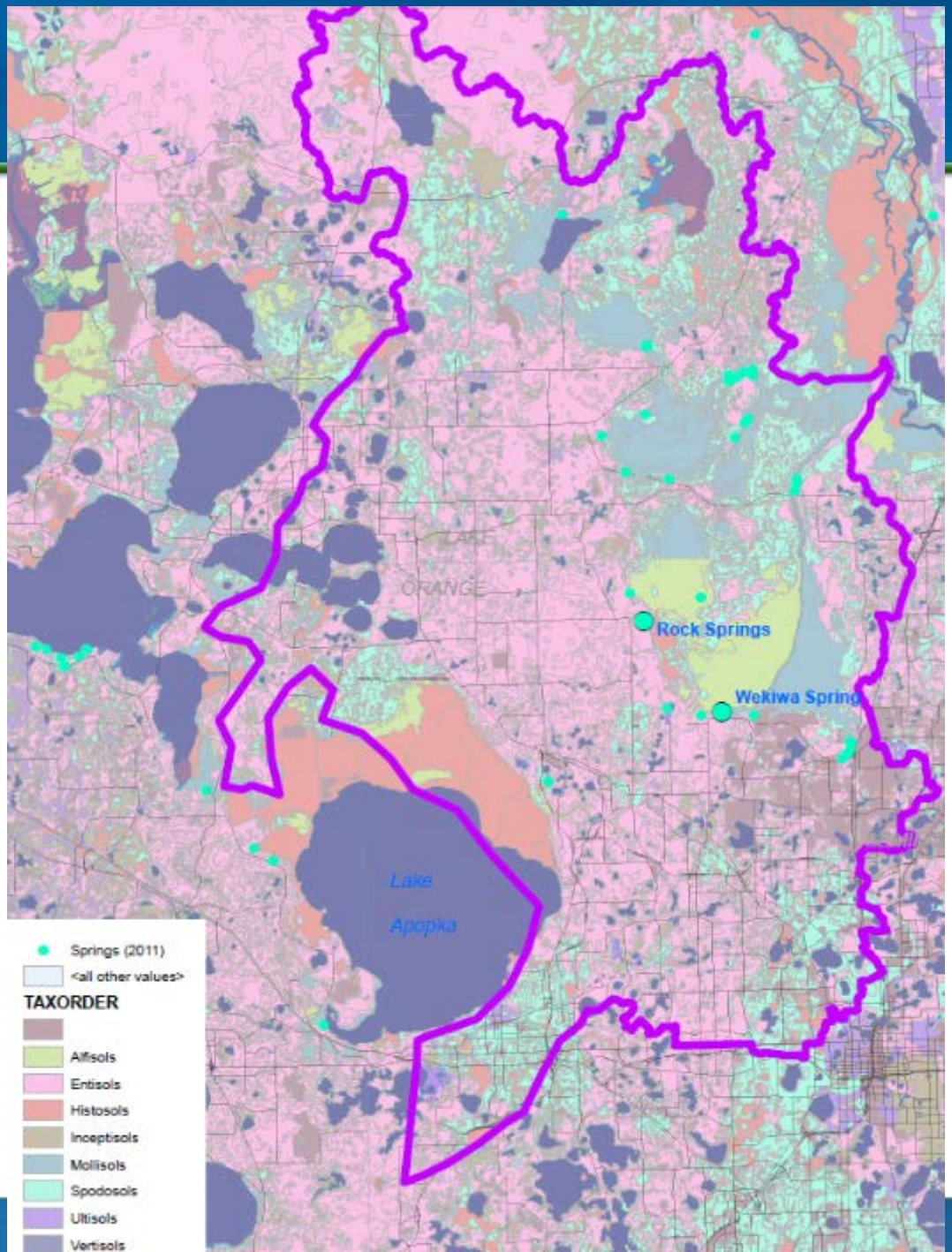
- Discussion on data sufficiency for decision making
- Collaborative study plan development, FDEP and Coalition for Property Rights (winter 2014/2015)
- Outreach to volunteer homeowners to participate in study (Feb-March 2015)
- Hire septic tank contractor/recon 18 candidate sites (June 2015)
- Select 11 sites for instrumentation, install lysimeters (July-August 2015)
- SF6 ground water tracer study (ongoing)

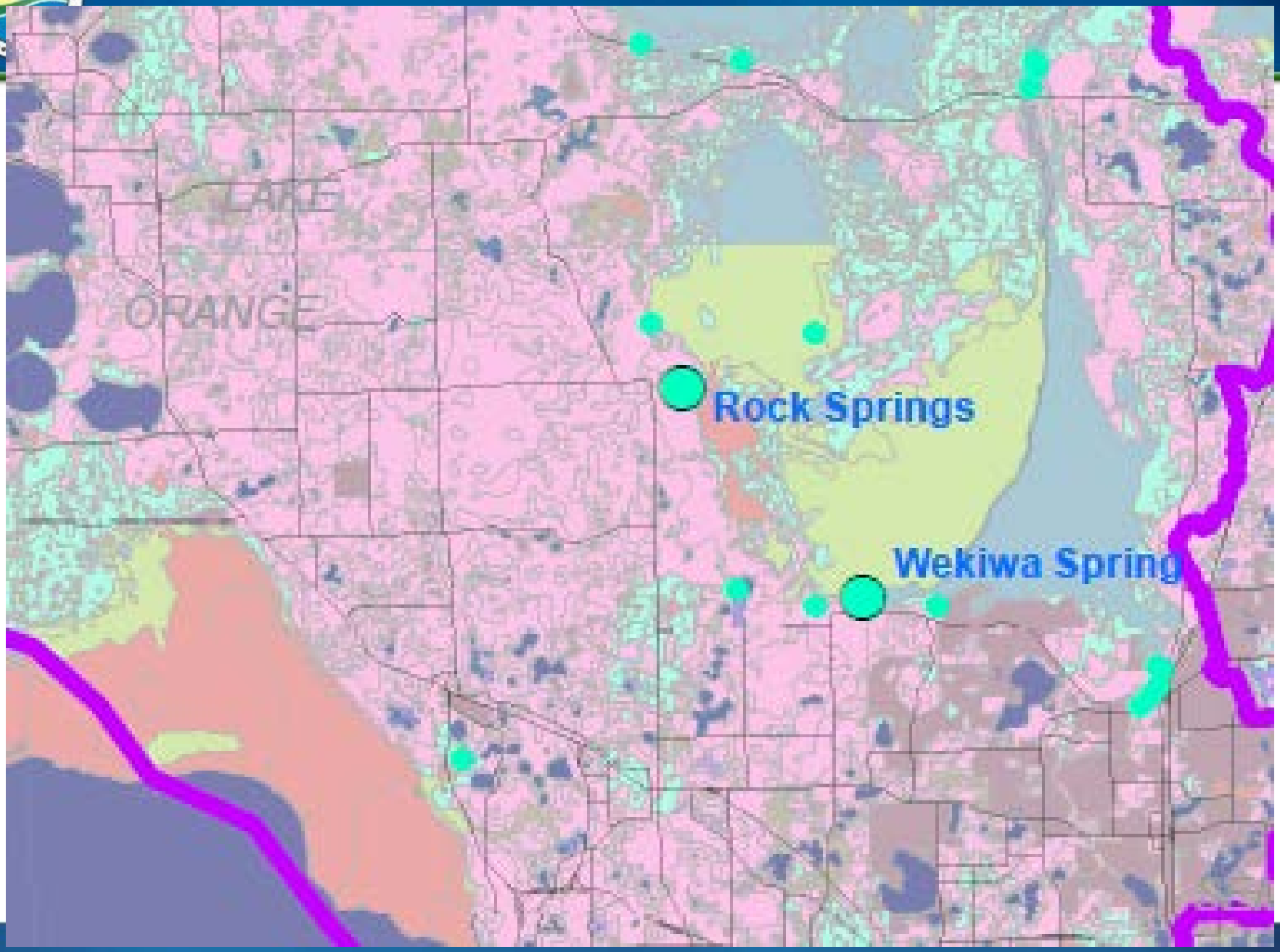
Potential factors that influence nitrogen loading

- Soil characteristics
- Geology, ground water recharge and flow pathways
- Septic system construction, age and usage
- Influence from other nitrogen sources

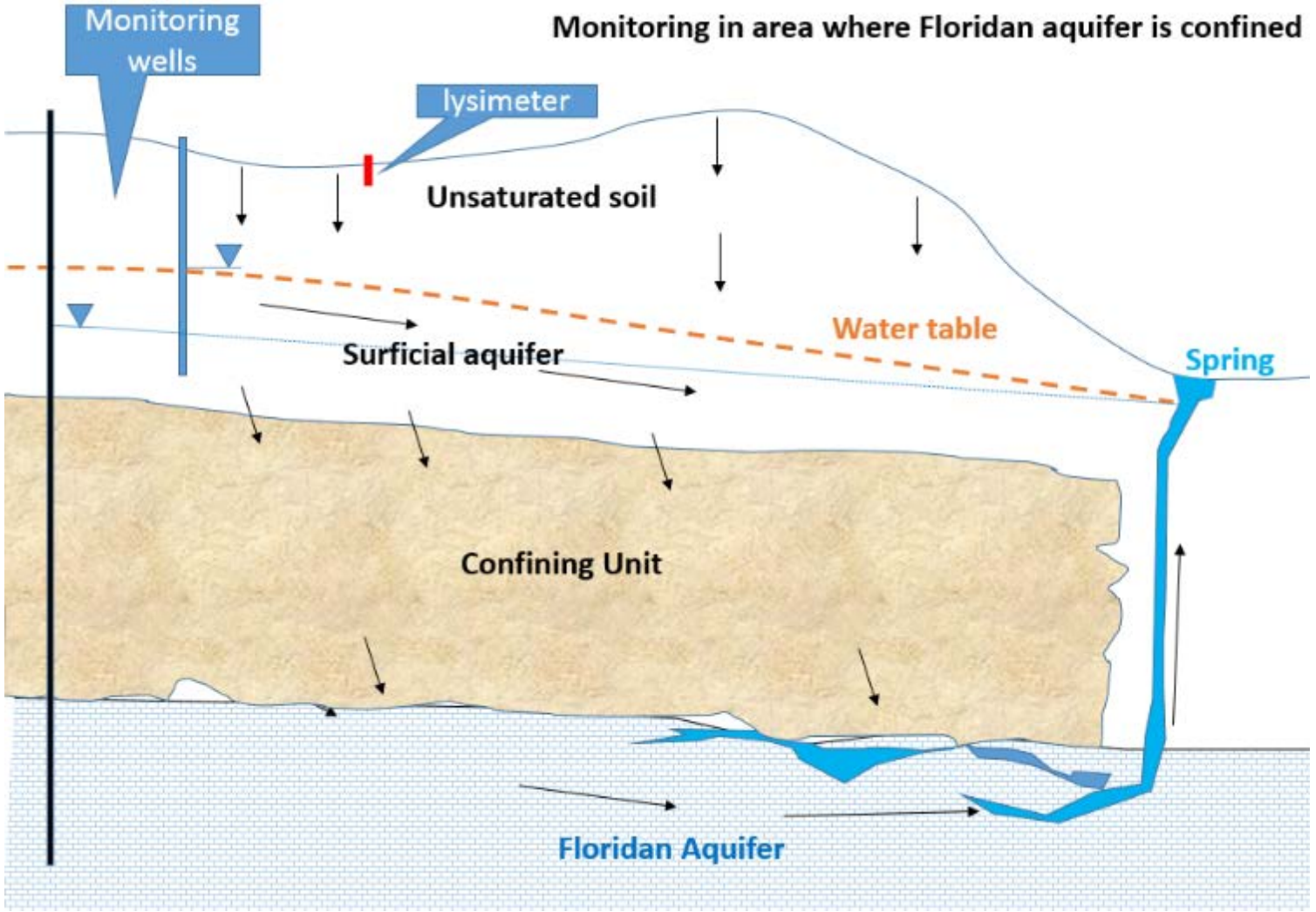
Soils

- Soil texture and organic content are major factors in conversion and utilization of nitrogen (from any source)
- Soil drainage affects nitrogen conversion, as well as treatment
- Sandy, low organic content, well drained = more nitrogen leaching
- Soils with more clay or organics and are more poorly drained = less nitrogen leaching
- Wekiva-area soil orders and drainage classes.

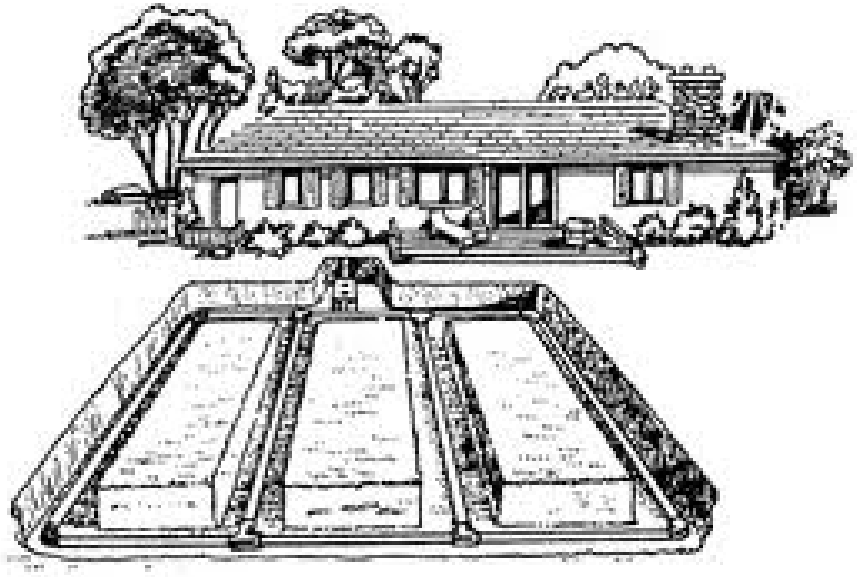

ORANGE
Rock Springs
Wekiwa Spring
Lake
Apopka
Springs (2011)
<all other values>
TAXORDER
Alfisols
Entisols
Histosols
Inceptisols
Mollisols
Spodosols
Ultisols
Vertisols


LAKE
ORANGE
Rock Springs
Wekiwa Spring

Geology and Ground Water



Septic System Design, Age and Use…and other influences

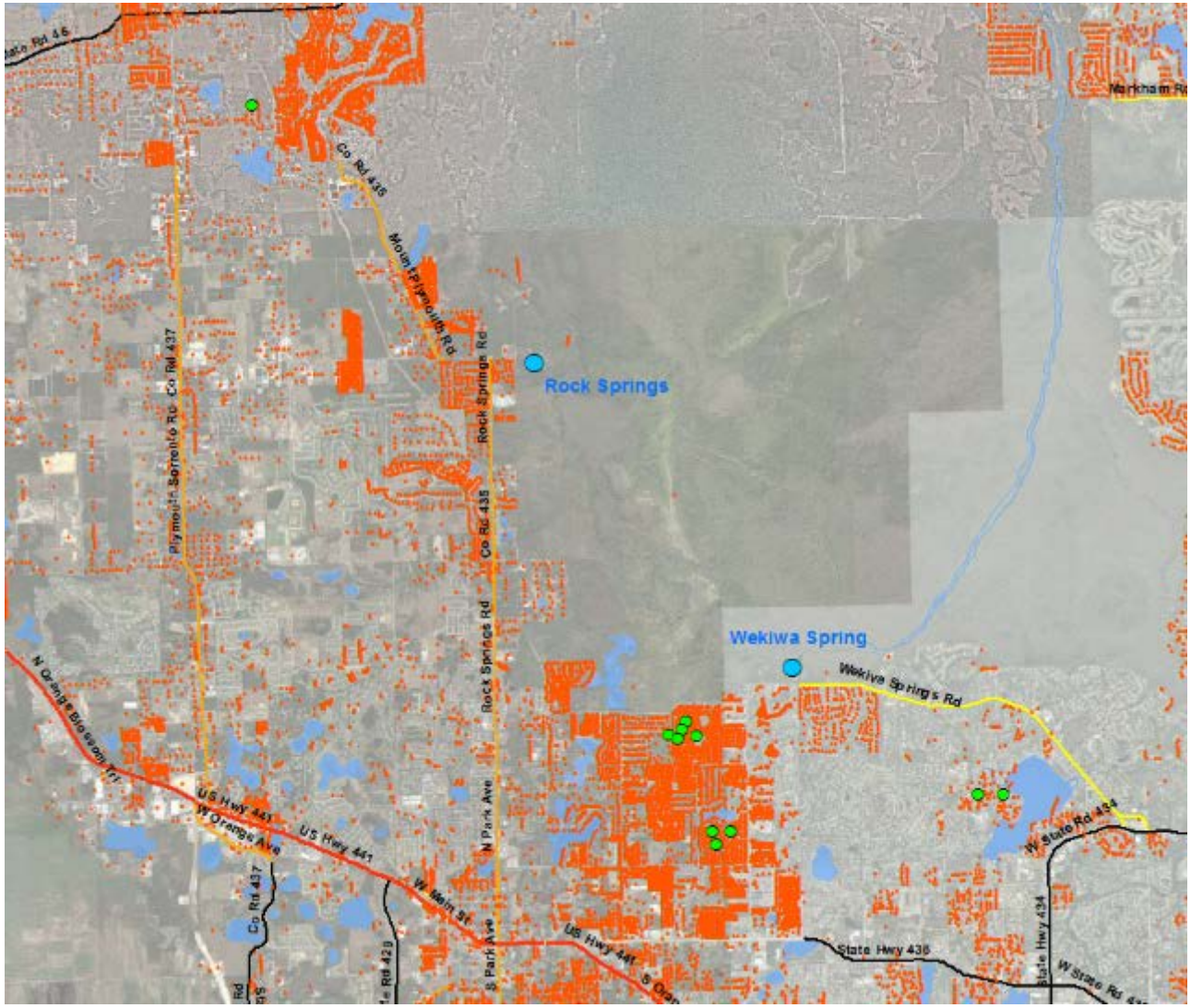


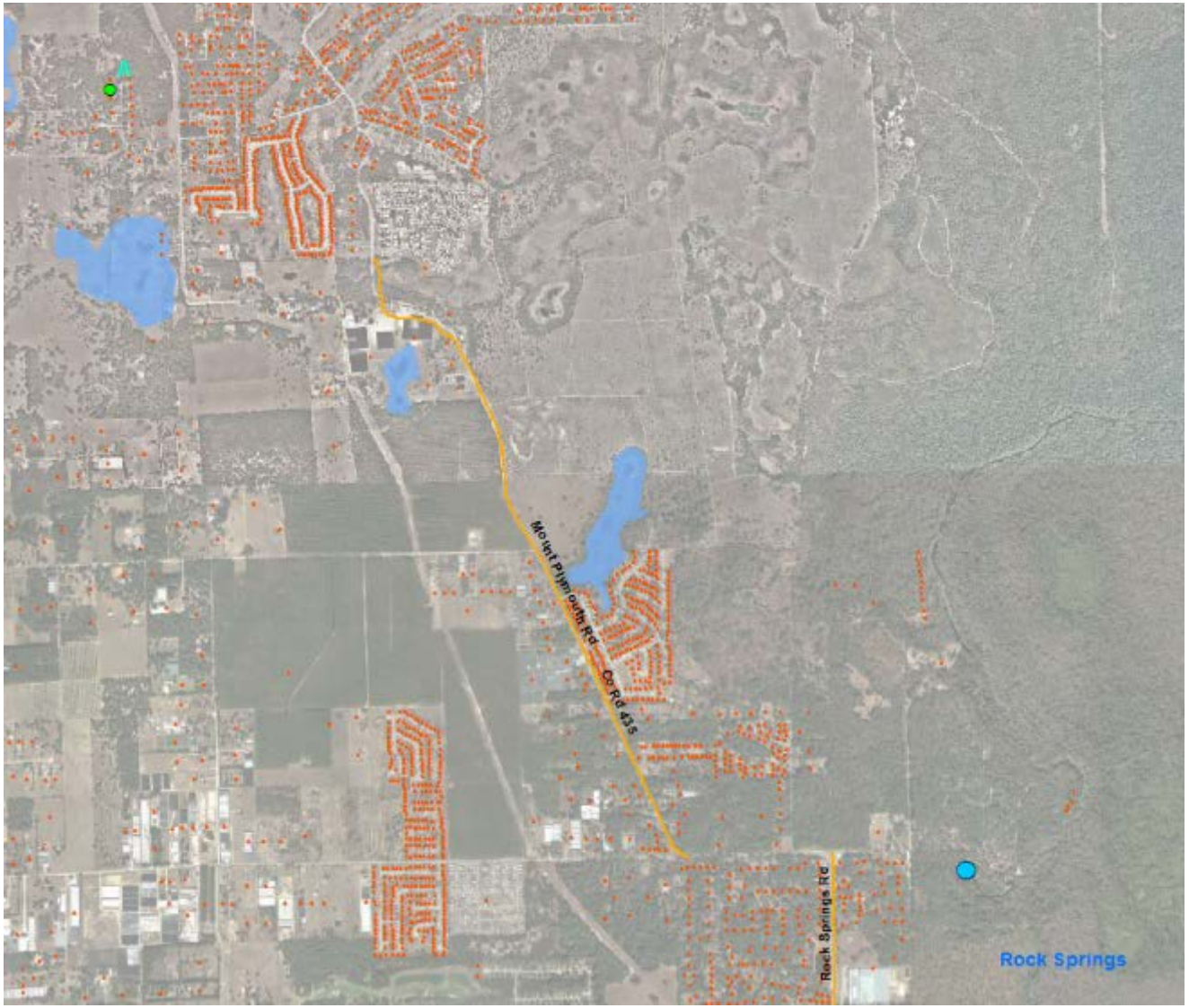
Selecting sites represent most typical septic tank construction, age, volume received

Also need to represent other conditions that would influence results (fertilizer use, irrigation, pets, etc.)

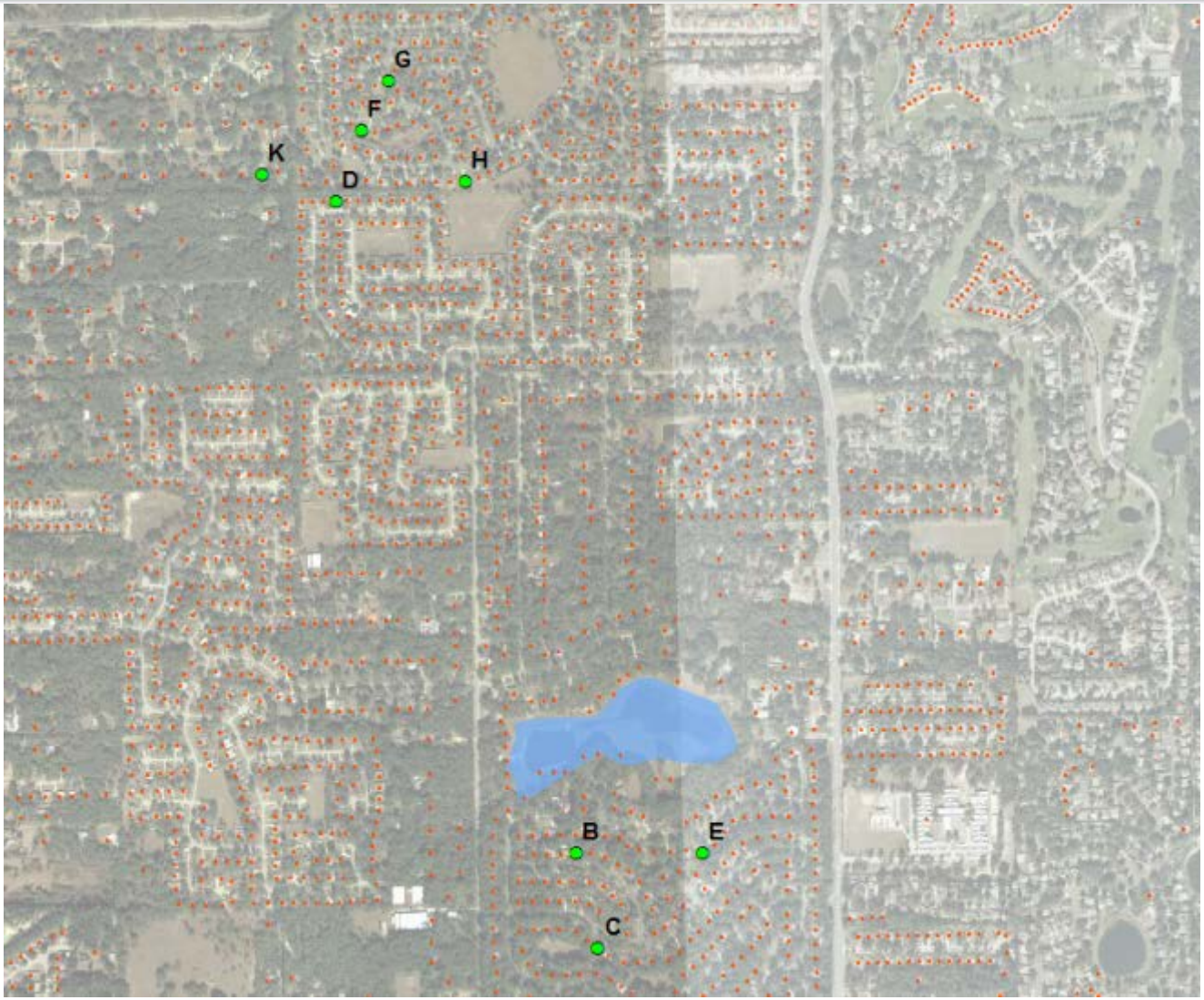
Information on Study Sites

Site ID	City	No. residents	Drainfield repair/replacement history	Maintenance info	Lawn fertilizer use	Soil
A	Sorrento	2	infiltrators (original)	pumped regularly	yes, self applied	Candler fine sand
B	Apopka	3	infiltrators (2009)	pumped in 2013	yes, self applied	Candler fine sand
C	Apopka	3	infiltrators (2010)	septic tank pumped in 2013	yes, self applied	Candler fine sand
D	Apopka	2	pipe in gravel (original)	not pumped out lately	yes, commercial service	Candler fine sand
E	Apopka	2	pipe in gravel (1989)	not pumped	yard mostly mulched beds	Candler fine sand
F	Apopka	4	infiltrators (2010)	pumped in 2014	not lately	Candler fine sand
G	Apopka	3	pipe in gravel (original)	pumped in 2014	yard mostly mulched beds	Candler fine sand
H	Apopka	2	pipe in gravel (original)	not pumped	yes, commercial service	Candler fine sand
I	Longwood	2	infiltrators (1989)	pumped in 2015	yes, commercial service	Urban land
J	Longwood	2	mounded pipe in gravel bed	pumped regularly	yes, commercial service	Urban land
K	Apopka	2	pipe in gravel (original)	pumped in 2015	yard mostly mulched beds	Candler fine sand


Rock Springs
Wekiwa Spring
Wekiva Springs Rd
Co Rd 435
Rock Springs Rd
Co Rd 437
Plymouth Sorrento Rd
Mount Plymouth Rd
N Orange Blossom Trl
US Hwy 441
W Orange Ave
W Main St
N Park Ave
S Park Ave
State Hwy 436
W State Rd 434
State Hwy 434


Mowat Plymouth Rd
CR Rd 435
Rock Springs Rd
Rock Springs


Wekiwa Spring
G
F
K
H
D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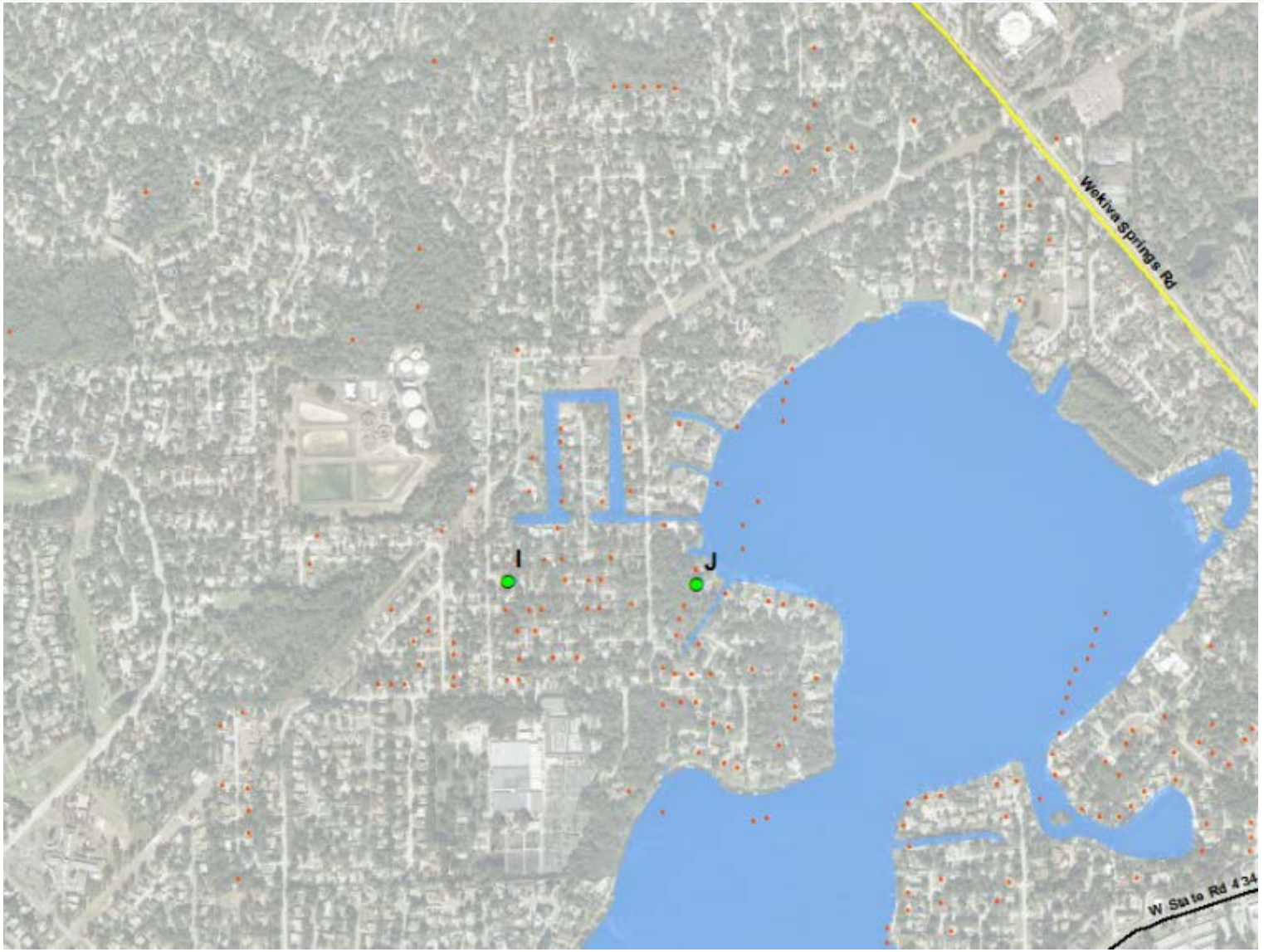
C

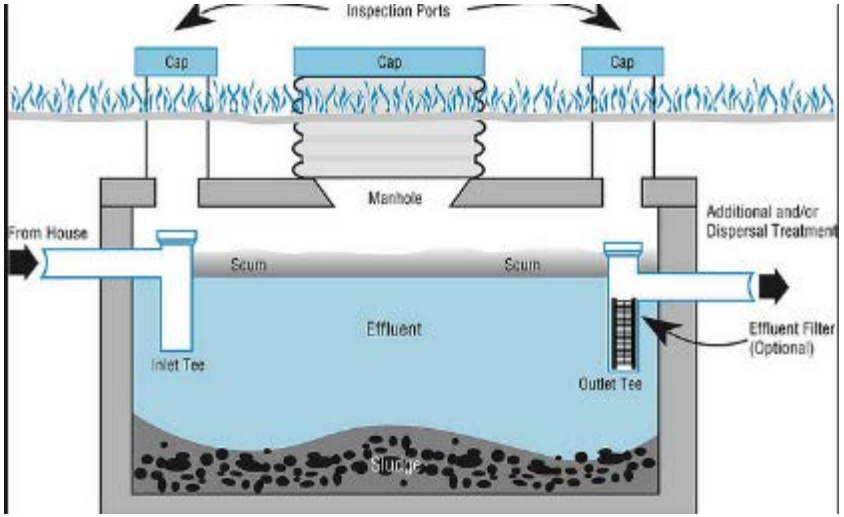

Wekiva Springs Rd
I
J
W State Rd 434

Scope

- Lysimeters to monitor soil pore water below df and background
- Riser installation and effluent monitoring
- Monitoring wells at some locations
- Collect data on water use to estimate loading

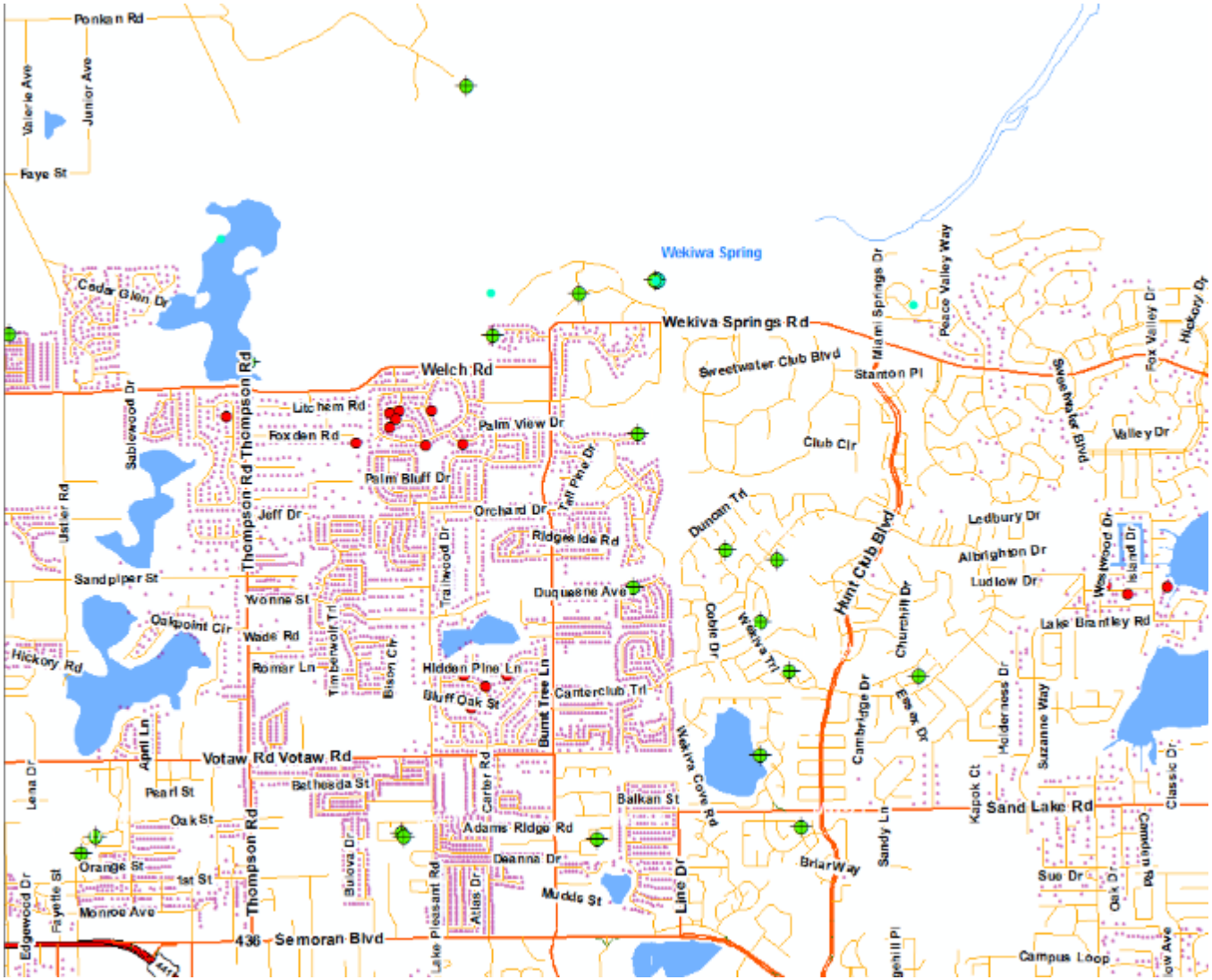
Soil pore water sampling using lysimeters

Effluent monitoring



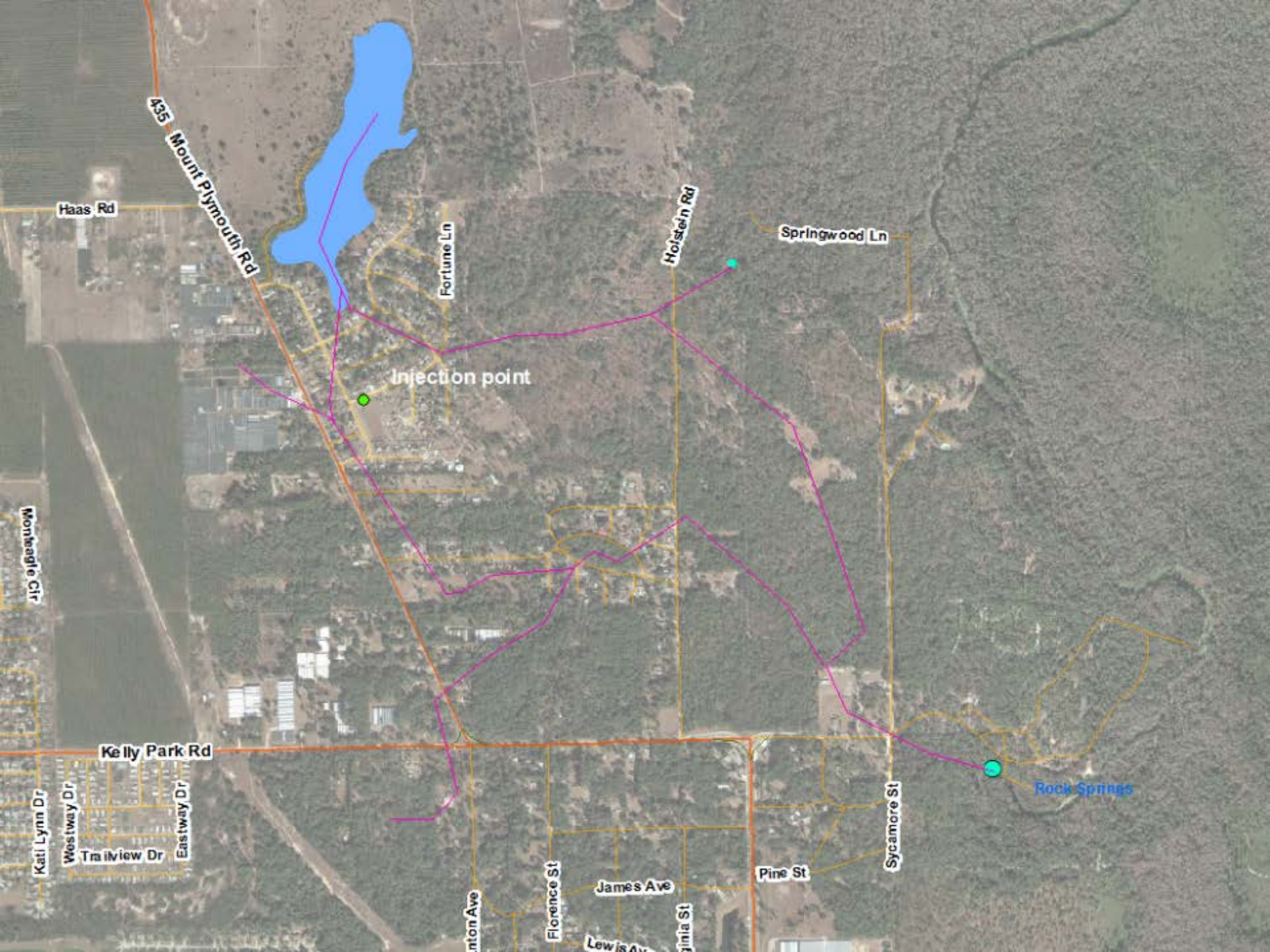
Monitoring well installation for ground water sampling, direct push rigs or auger rigs

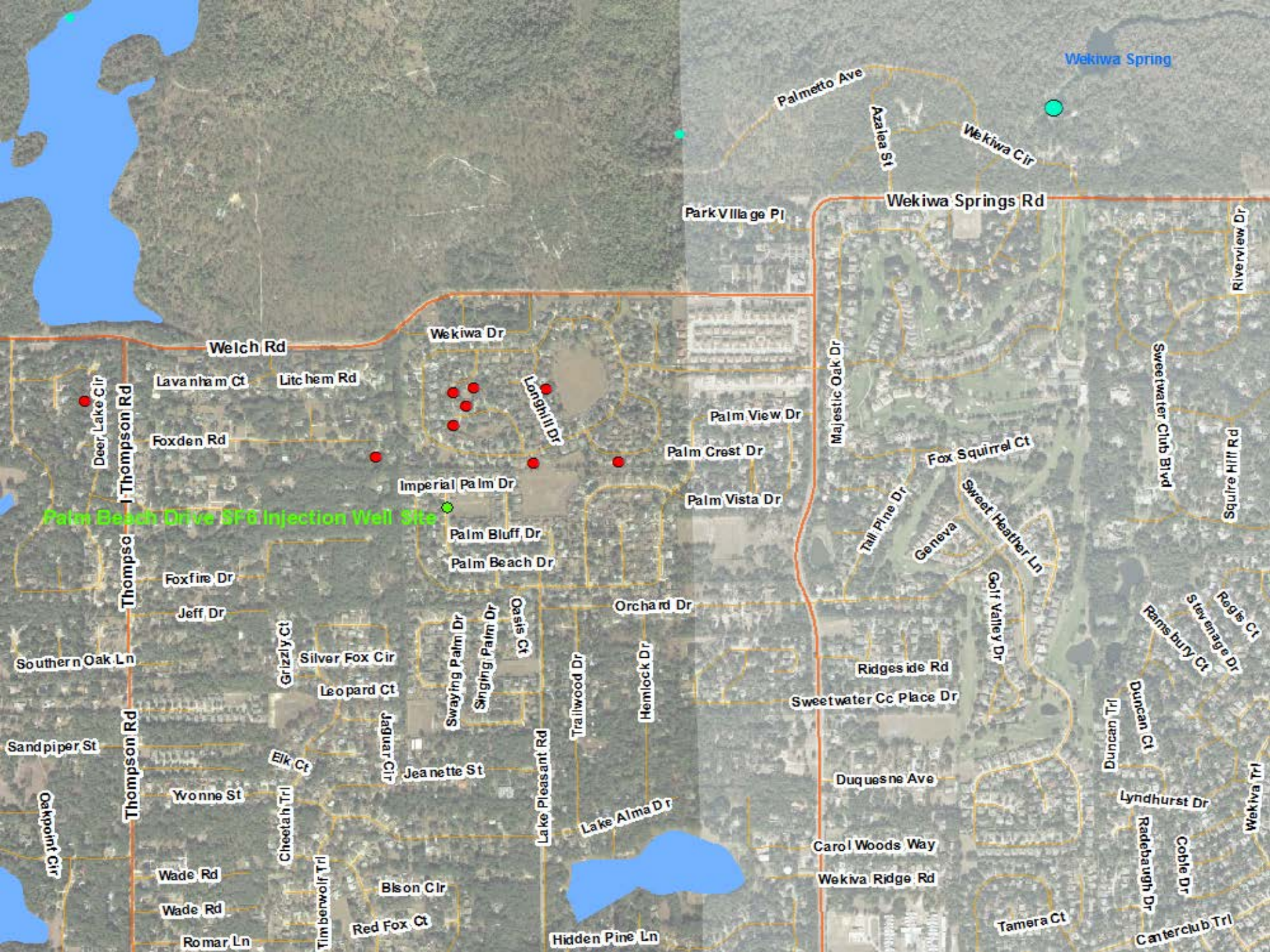
Existing wells from 2010 fertilizer study



Deeper well installation, sampling of geologic material

SF6 tracer study, Fortune Lane site


435
Mount Plymouth Rd
Haas Rd
Fortune Ln
Holstein Rd
Springwood Ln
Injection point
Montague Cir
Kelly Park Rd
Katl Lynn Dr
Westway Dr
Trailview Dr
Eastway Dr
Florence St
James Ave
Pine St
Sycamore St
Rock Springs


Wekiwa Spring
Palmetto Ave
Azalea St
Wekiwa Cir
Wekiwa Springs Rd
Park Village Pl
Riverview Dr
Welch Rd
Wekiwa Dr
Lavanham Ct
Litchem Rd
Longhill Dr
Majestic Oak Dr
Sweetwater Club Blvd
Deer Lake Cir
Thompson Rd
Foxden Rd
Palm View Dr
Palm Crest Dr
Fox Squirrel Ct
Squire Hill Rd
Imperial Palm Dr
Palm Vista Dr
Tall Pine Dr
Sweet Heather Ln
Geneva
Palm Beach Drive SF6 Injection Well Site
Palm Bluff Dr
Palm Beach Dr
Foxfire Dr
Golf Valley Dr
Jeff Dr
Orchard Dr
Regis Ct
Stevenage Dr
Ramsbury Ct
Southern Oak Ln
Grizzly Ct
Silver Fox Cir
Swaying Palm Dr
Singing Palm Dr
Oasis Ct
Hemlock Dr
Trailwood Dr
Ridgeside Rd
Leopard Ct
Sweetwater Cc Place Dr
Duncan Trl
Duncan Ct
Sandpiper St
Jaguar Cir
Elk Ct
Jeanette St
Duquesne Ave
Yvonne St
Cheetah Trl
Lake Pleasant Rd
Lake Alma Dr
Lyndhurst Dr
Wekiva Trl
Oakpoint Cir
Carol Woods Way
Radebaugh Dr
Coble Dr
Wade Rd
Timberwolf Trl
Bison Cir
Wekiva Ridge Rd
Wade Rd
Red Fox Ct
Tamera Ct
Romar Ln
Hidden Pine Ln
Canterclub Trl

Other Activities

- **Evaluate changes in septic tank treatment after pumpouts**
  - By selectively sampling septic tank effluent, pre and post pumpout we hope to help provide some actual data on the potential benefit of tank pumping
- **Conduct alternative nitrogen reducing drainfield study**
  - Bold and Gold or other similar reactive media
  - Passive low-cost construction
  - Wekiwa Springs State Park location

Use of Data for Modeling

Soil Science Society of America

SSSA Onsite Wastewater Conference
April 7-8, 2014

The Florida Onsite Sewage Nitrogen Reduction Strategies (FOSNRS) Project

FOSNRS 6: STUMOD-FL - A Tool for Predicting Fate and Transport of Nitrogen in Soil Treatment Units in Florida

April 7, 2014

Mengistu Geza[1], Kathryn S Lowe[1], Cliff Tonsberg[1], John McCray[1] and Eberhard Roeder[2]

[1]Civil and Environmental Engineering, Colorado School of Mines, Golden, CO

[2]Division of Disease Control and Health Protection Bureau of Environmental Health, Florida Department of Health, Tallahassee, FL

Current Status Summary

- 11 sites selected and instrumented with shallow lysimeters, they will all be sampled by this week
- Contractor will next install risers on septic tanks
- Begin regular sampling program
- Install deeper lysimeters at some locations
- Soil borings and monitoring well installation

Nitrogen Inventory Tool

Nitrogen Inventory for Nitrate-Impaired Spring Waters

- GIS-based tool for estimating N loading to ground water, and identifying potential priority areas for BMAPs
- Estimates N loads from main source categories
- Customized for each spring basin
- Completed inventories area Wakulla, Silver, and Rainbow Springs BMAP areas
- In progress inventories include King's Bay, Weeki Wachee, Jackson Blue, and Volusia Blue

Nitrate-Impaired Spring Waters

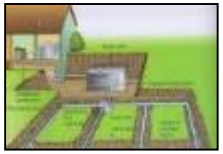
- Many springs and spring runs have FDEP-adopted TMDLs for nitrogen because of algal growth
- Multiple non-point source contributions of nitrogen fall within these main categories:
  - atmospheric deposition
  - fertilizer (farm and non-farm)
  - septic tanks
  - land applied wastewater
  - livestock manure
  - stormwater runoff

Estimating Nitrogen Loads to Ground Water

Steps:

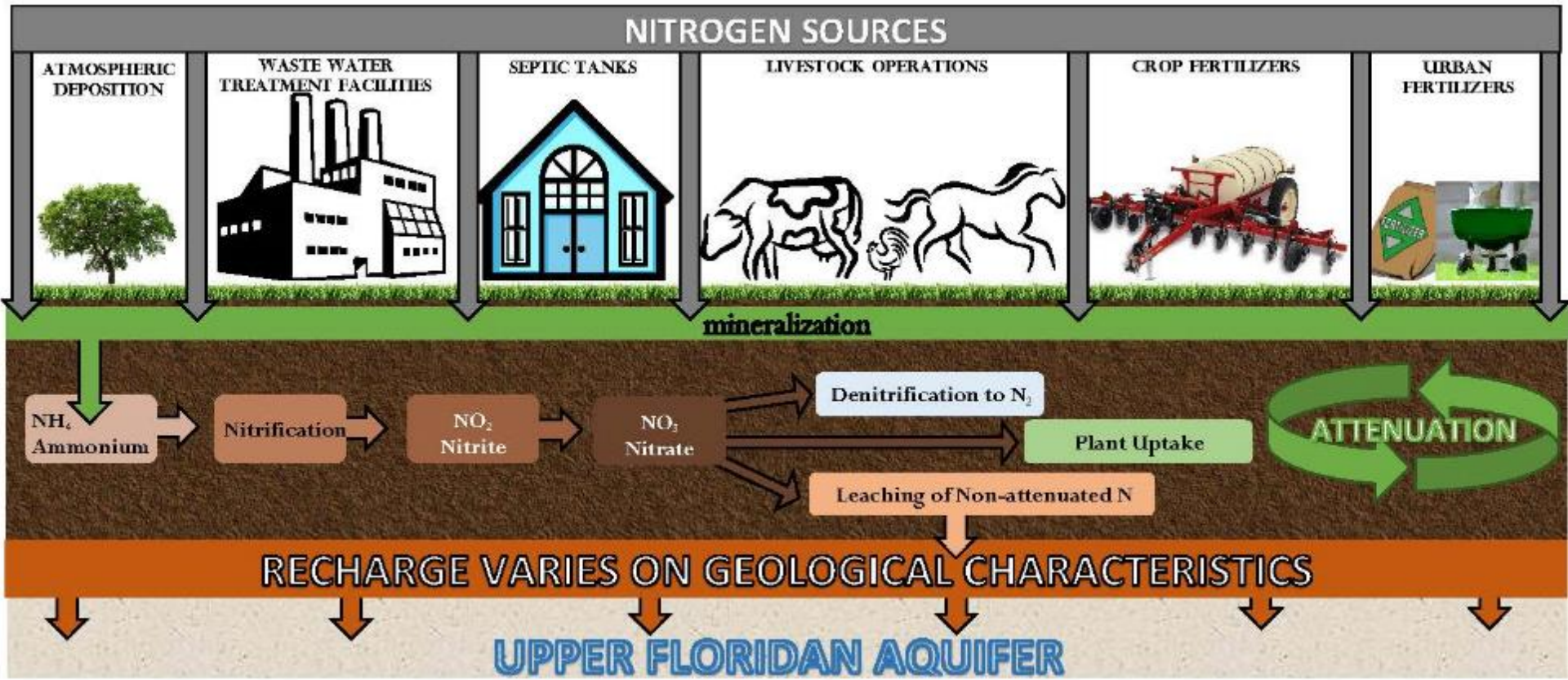
1. **Estimate the inputs of nitrogen to the land surface from the source inventory information (best available).**
2. **Apply attenuation factors based on the various environmental processes that could transform the various forms of nitrogen in the subsurface (such as denitrification, nitrification of ammonia, uptake by plants, mineralization of organic nitrogen).**
3. **Apply weighting factors based on the rates of recharge to ground water in certain areas for estimating nitrogen loads to ground water.**
4. **Account for proximity of N source to spring. Fine-tune estimates after getting feedback from stakeholders.**








Nitrogen Cycle and Nitrogen Attenuation

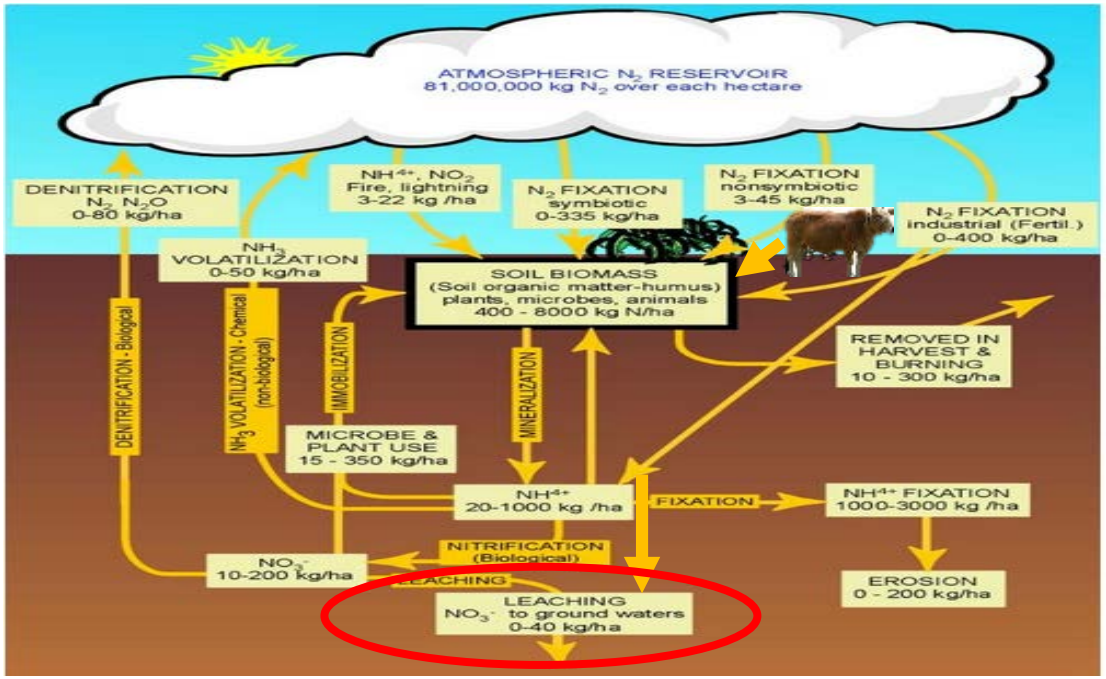


Processes that control the transformation of N in soils and the subsurface.

The wide ranges reflect variable soil conditions, fertilizer material, livestock, crop types, etc.,
ALL AFFECT LEACHING OF N TO GROUND WATER

Environmental Attenuation Factors (EAFs)

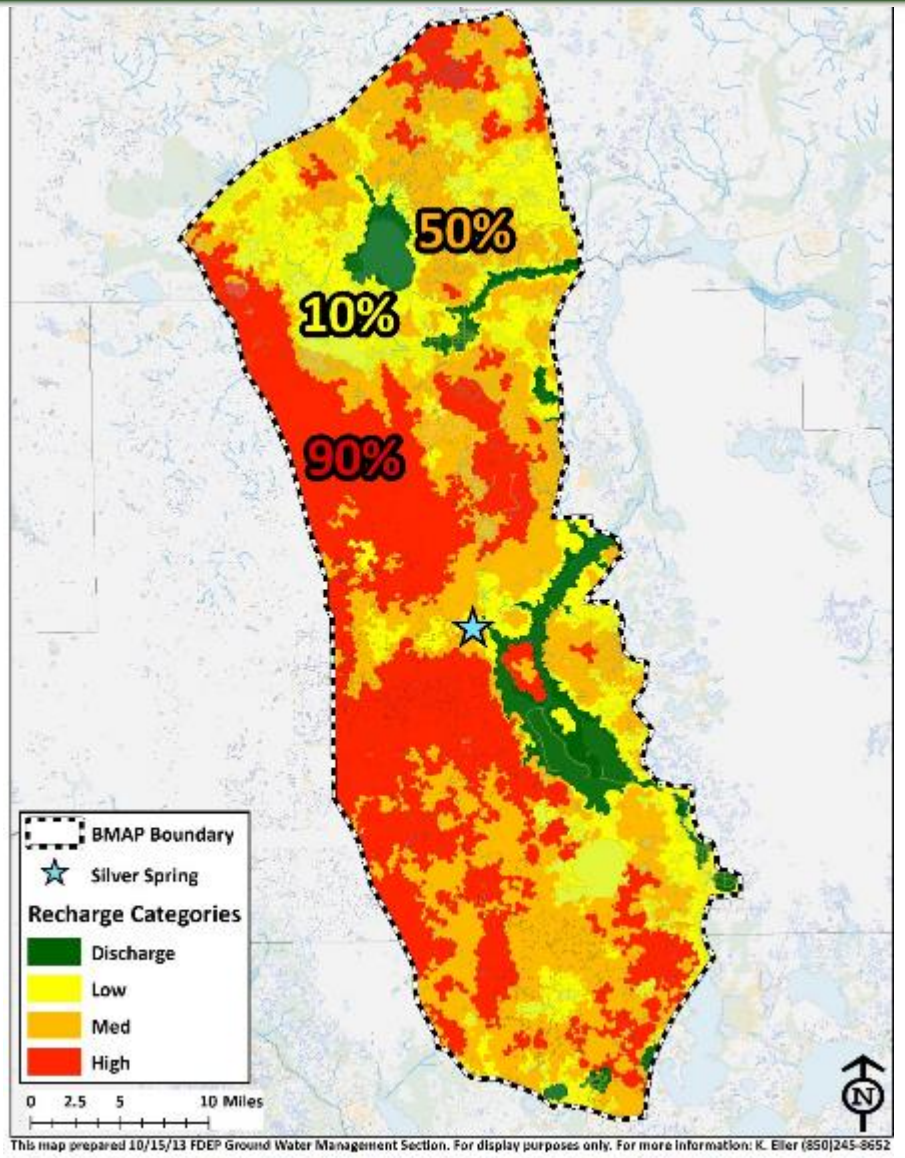
- EAFs represent the percentage of N removed and therefore not available for leaching to groundwater
- Examples
  - Volatilization
  - Plant uptake
  - Denitrification
- Based on factors used in previous studies and found in relevant literature



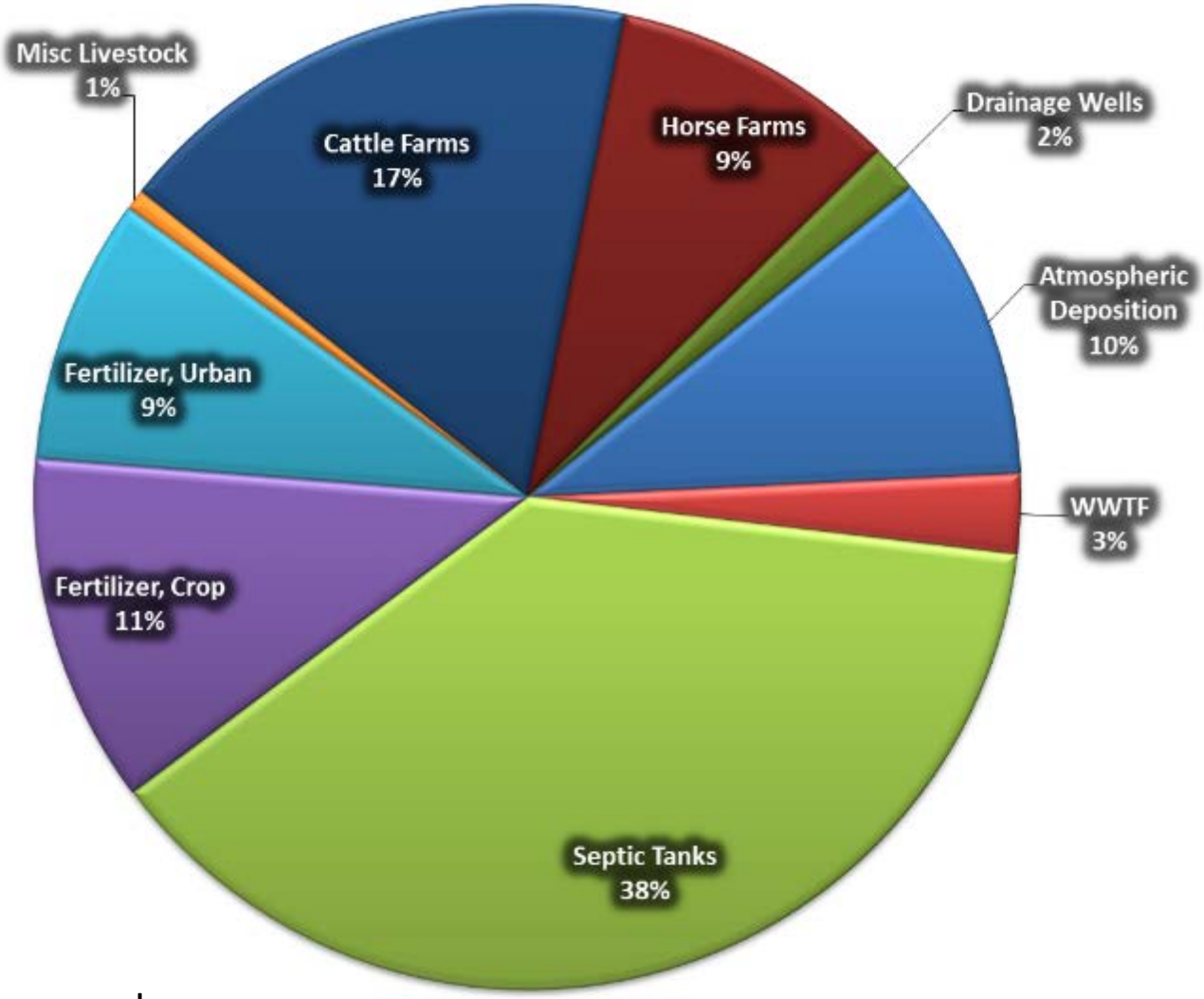
Loading Category	Attenuation Factor
Atmospheric Deposition	90%
Wastewater Treatment Facilities	60%
Septic Tanks	40%
Urban Fertilizers	80%
Crop Fertilizers	70%
Livestock	90%
Stormwater via Drainage Wells	35%

Recharge Factors

- Recharge factors are used to estimate the percentage of the non-attenuated nitrogen expected to reach the aquifer annually
- City of Ocala drainage wells are a direct conduit to the aquifer; therefore, we assume 100% recharge



Annual Average Loading to Ground Water



Silver Springs example

1,658,973 lb-N/yr

For Wekiva…

- Within the BMAP schedule, FDEP intends to develop a customized nitrogen loading tool that updates/supercedes the previous product developed by MACTEC
- Will incorporate current Wekiva-specific source information and data obtained from Wekiva-specific studies
- This can serve as a planning tool for stakeholders

BMAP Review Process

Action	Involved Parties	Date
Revised Draft BMAP for stakeholder and public review	Department	August 26, 2015
Public workshop on the BMAP	Department and Public	September 2, 2015
Public comment period ends	Department	September 16, 2015

Action	Date
Brief Department management on BMAP	Late-September 2015
Brief Department Deputy Secretary on BMAP	Mid-October 2015
Brief Department Secretary on BMAP and obtain Secretarial approval/Notify interested parties	Mid-October 2015
BMAP becomes final and effective 21 days after Secretarial approval	Mid-November 2015


Questions?