

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

Wekiva Watershed Management Plan

**Commission Workshop
February 14, 2023**

Meeting Goals

- Provide Overview of Project
- Provide Summary of Scope of Work
- Summarize Improvement Projects
Recommendations
- Discuss Steps to Finalization
- *Solicit Input from the Commission*

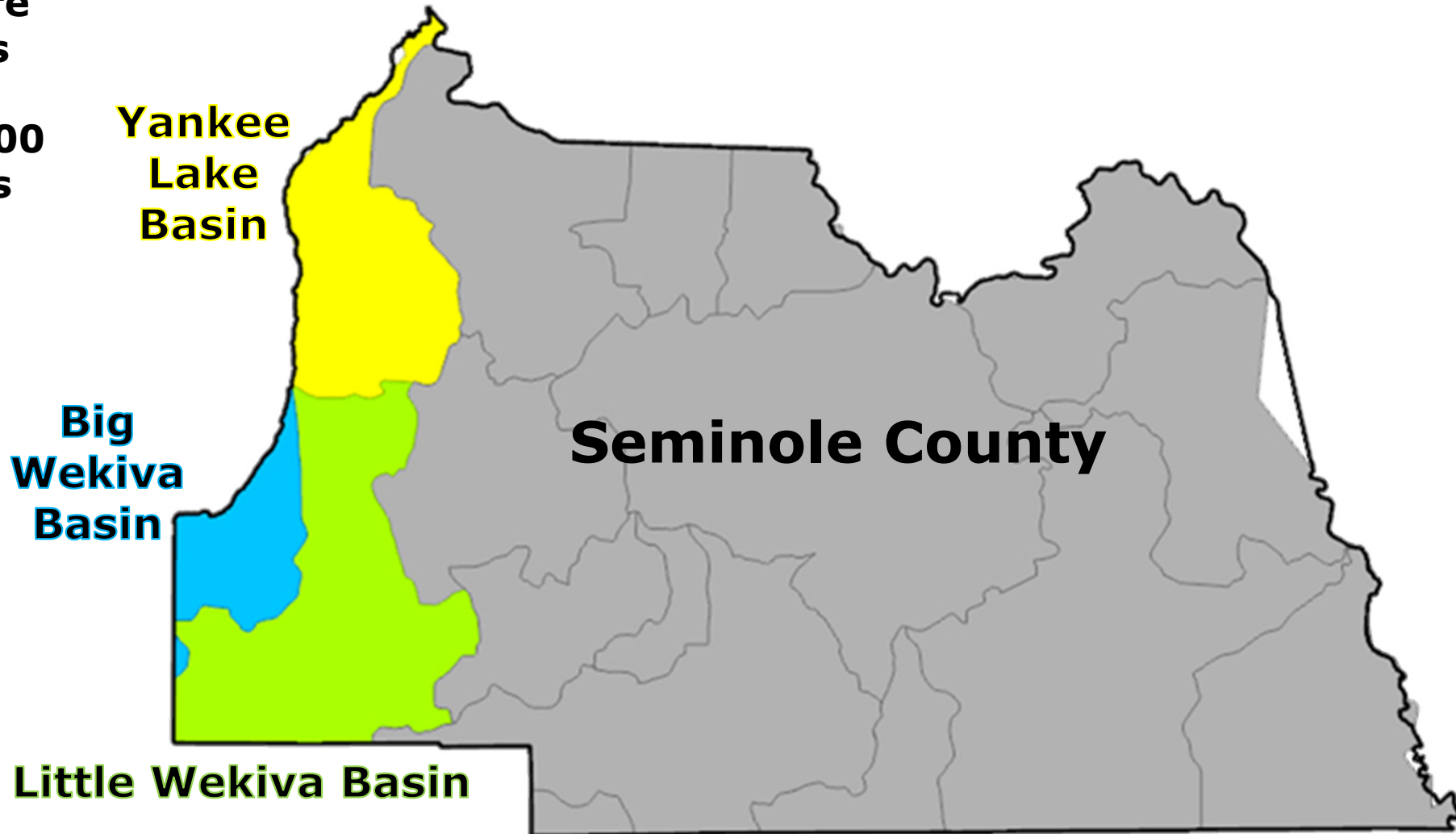
Presentation Outline

- Background
- Watershed Characteristics
- Flooding Assessment
- Water Quality Assessment
- Deficiency Identification
- Improvement Project Prioritization
 - Priority Flooding and Water Quality Improvement Projects
 - Little Wekiva River Evaluation
 - Lakes Markham & Sylvan Evaluation
- Next Steps to Complete

Watershed Location

Total Area
~56.2
Square
Miles
or
~36,000
acres

WEKIVA WATERSHED



Watershed Location in Local Context

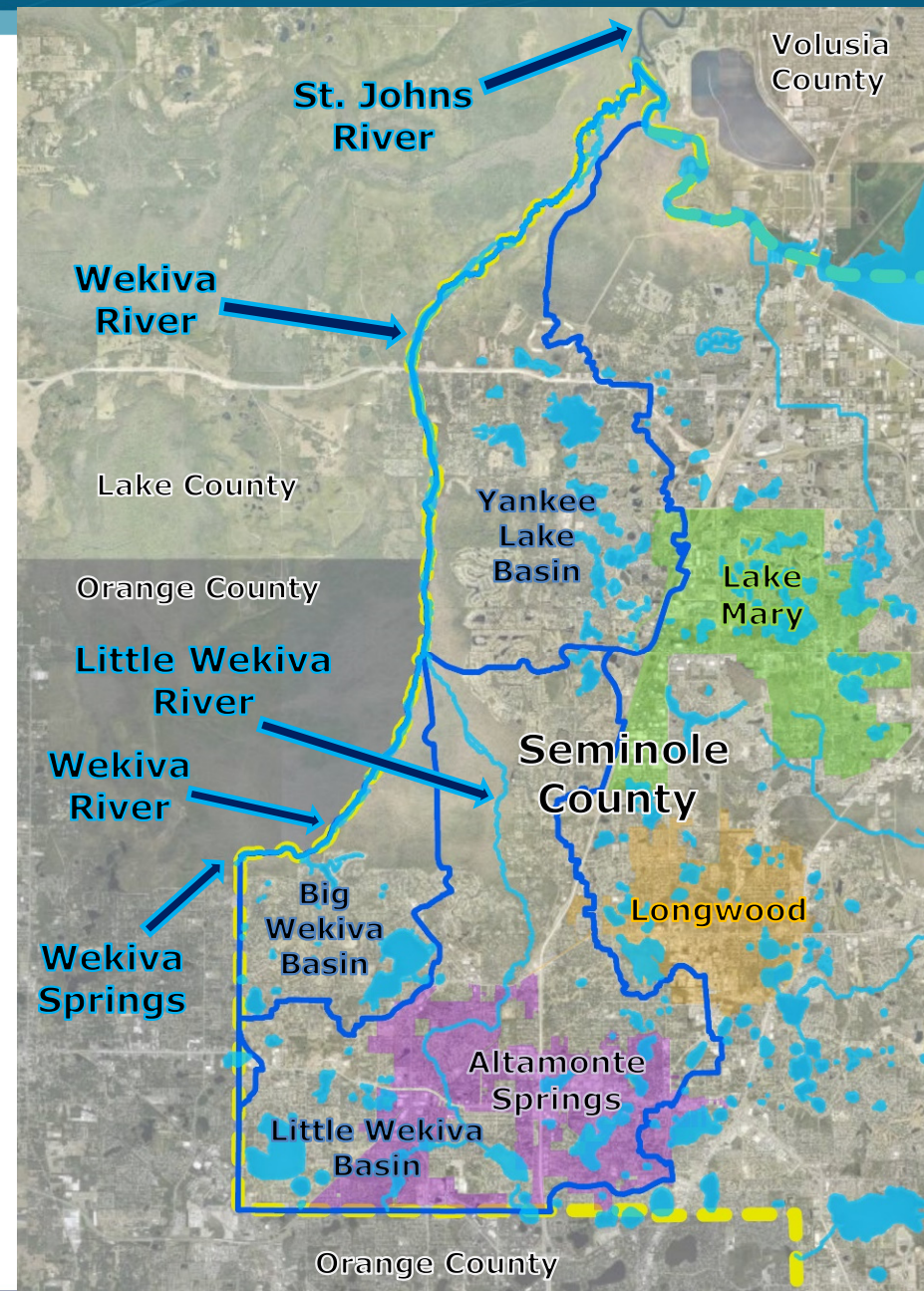
Local Setting

- Seminole County Areas that Drain to the Wekiva River including Little Wekiva River
- Includes areas of Altamonte Springs, Longwood, and Lake Mary
- Highly Urbanized
- Mix of Old and New Development



Little Wekiva River

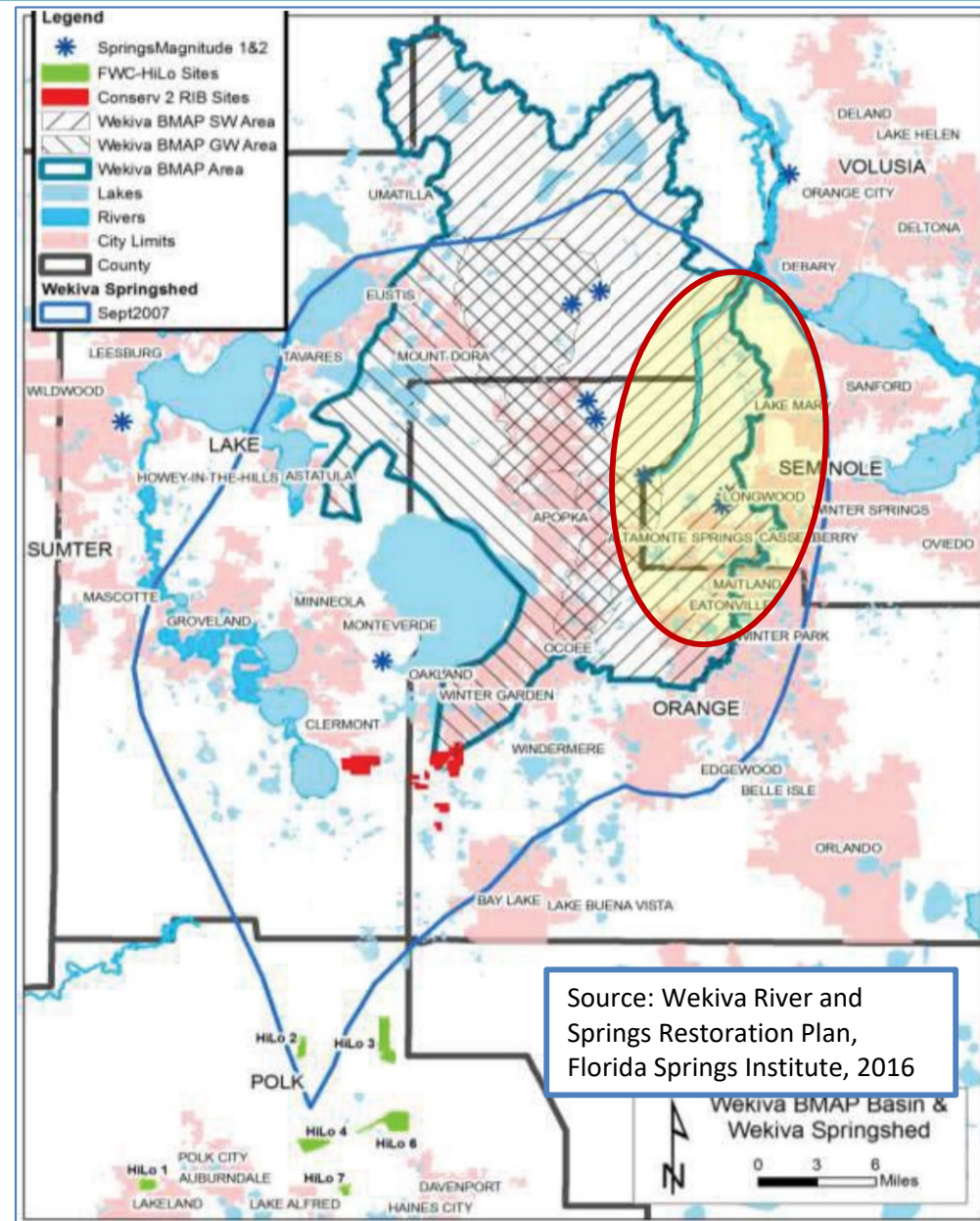
Source: Seminole County Water Atlas



Watershed Location in Regional Context

Regional Setting

- Watershed Drains to Wekiva River
- Tributary to St. Johns River
- Middle St. Johns River Basin
- Wekiva Springshed
- Significant Contribution to Little Wekiva River from Orange County



Project Goals

- The Watershed Management Plan will:
 - Develop a Plan to Effectively Manage Stormwater and Related Water Resources
 - Reflect developments and infrastructure improvements built since previous studies
 - Identify flood-prone areas within the basins
 - Estimate flood impacts to roadways and buildings
 - Update 100-year floodplains
 - Assess Water Quality Improvement Needs
 - Evaluate and rank conceptual Capital Improvement Projects that will serve to alleviate flooding and improve water quality



Scope of Work

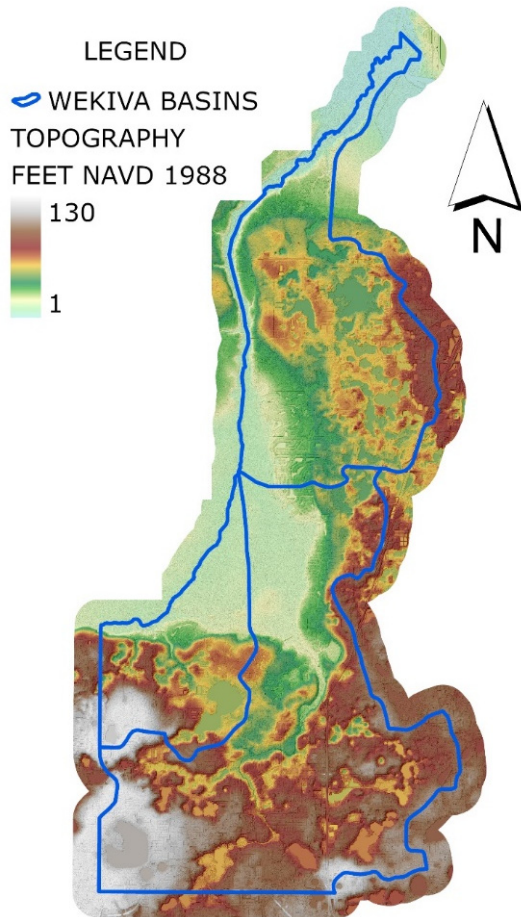
- Project Initiation and Information
 - Data Compilation, Evaluation and Gap Analysis
 - Stakeholder Coordination
 - Existing Deficiency Identification
 - Field Reconnaissance, Investigation and Survey
- Existing Conditions Analysis
 - Existing Conditions Modelling
 - Infrastructure Level of Service Evaluation
 - Floodplain Delineation
 - Water Quality Assessment
- Alternative Analysis
 - Improvement Alternatives Analysis
 - Improvement Project Prioritization
- Draft and Final Reports
- Public Meetings
- County Commission Workshop



Watershed Characteristics

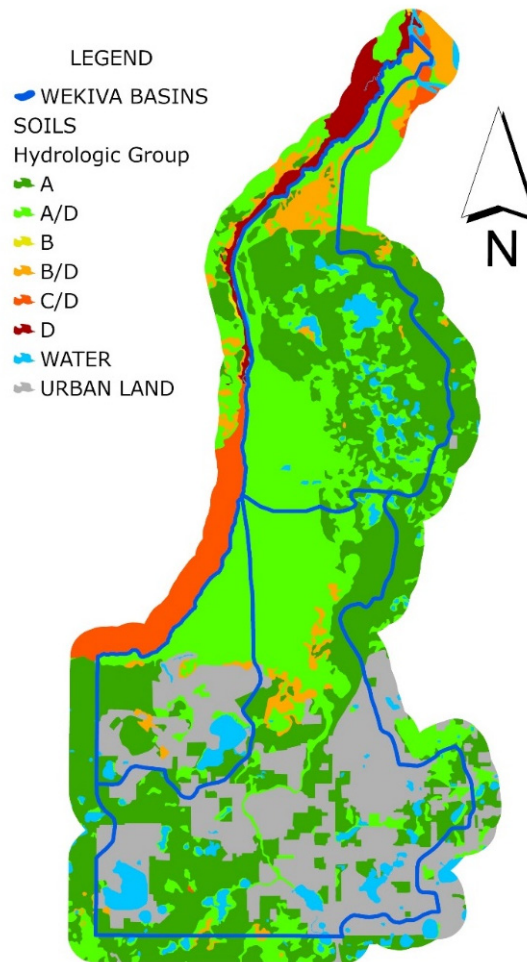
TOPOGRAPHY

2018 LiDAR-based Data
Ranges from ~1' to ~130'



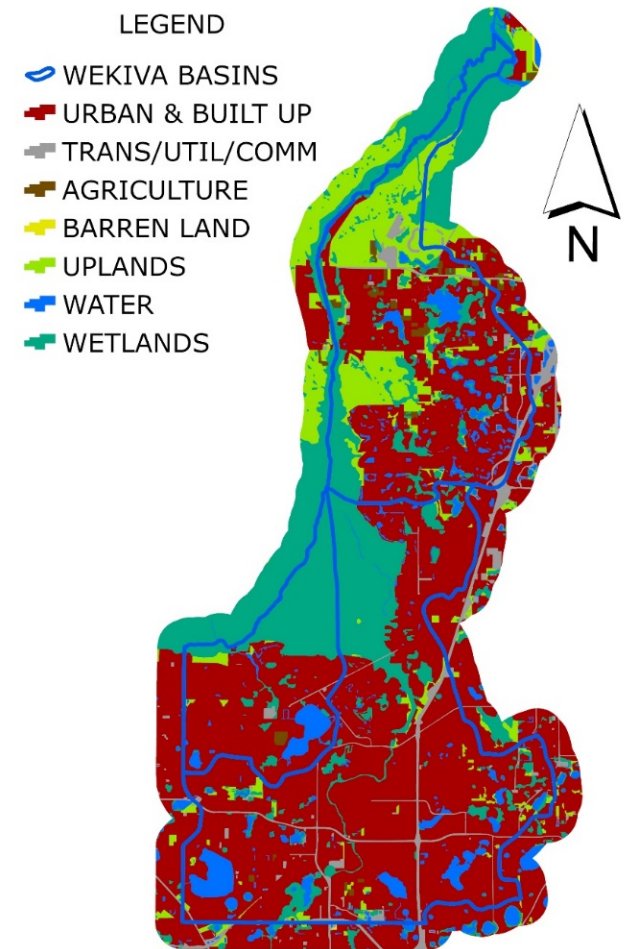
SOILS

Rainfall Infiltration/
Percolation Capacity



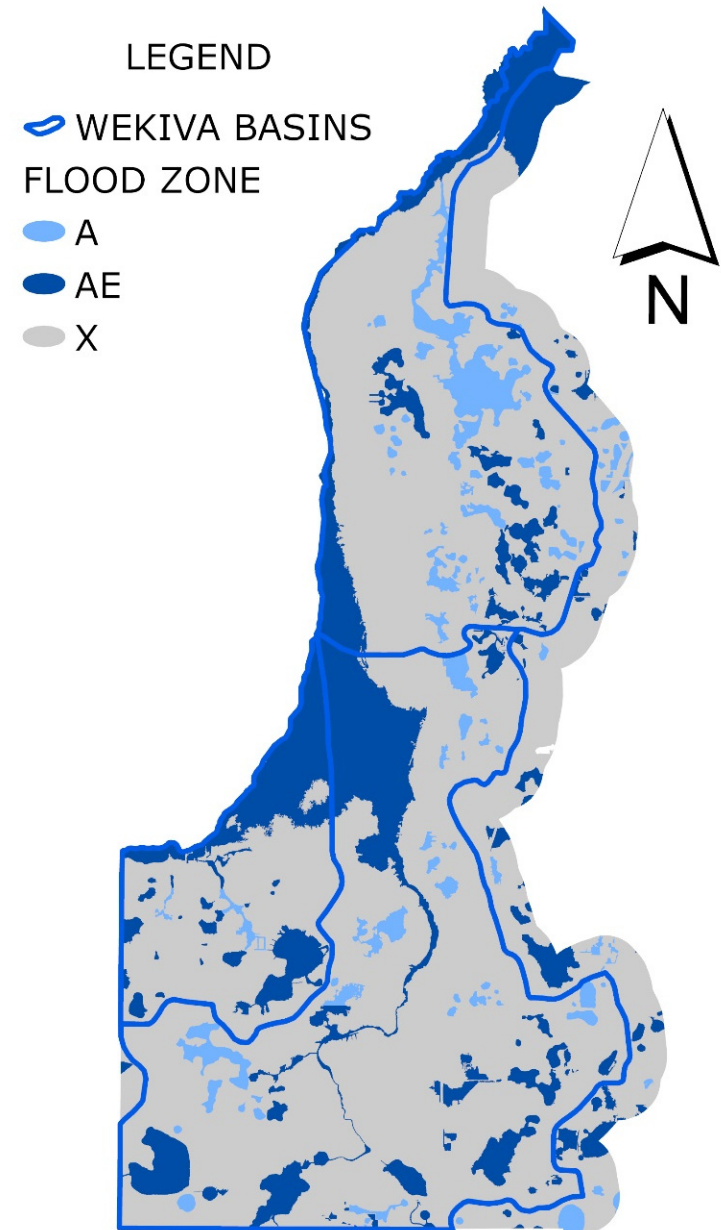
LANDUSE

Relative Imperviousness which Drives
Stormwater Runoff Volume



Watershed Characteristics - Floodplains

- FEMA Floodplains
- Used for Flood Insurance
- 2007 Most Recent Mapping
- Flood Hazard Zones
 - A = No Base Flood Elevation Determined*
 - AE = Base Flood Elevations Determined*
 - X = Areas Outside 1% Annual Chance (100 Year) Flood*
- Floodplains Currently Focused on main conveyances (Little Wekiva River, etc.), lakes and larger depressional areas
- Many Flood Prone Areas Not Currently Mapped



Watershed Characteristics - Water Quality

- Sensitive Resources Include:
 - Wekiva Springs
 - Wekiva River
 - Little Wekiva River
 - Numerous Lakes
- Water Quality Regulations
 - Total Maximum Daily Load (TMDL) Requirements
 - Basin Management Action Plan (BMAP) Requiring County to Reduce Pollutant Loads into Surface Water and Groundwater
 - NPDES Permit Requirements
 - County Required to Reduce Pollutant Loads from Stormwater Entering Receiving Waters

Wekiwa Spring and Rock Springs Basin Management Action Plan

Division of Environmental Assessment and Restoration
Water Quality Restoration Program
Florida Department of Environmental Protection

with participation from the
Wekiwa Spring and Rock Springs Stakeholders

June 2018

FINAL 4/18/2008

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Water Resource Management, Bureau of Watershed Management

CENTRAL DISTRICT • MIDDLE ST. JOHNS BASIN

TMDL Report

**Nutrient TMDLs for the Wekiva River
(WBIDs 2956, 2956A, and 2956C) and
Rock Springs Run (WBID 2967)**

Xueqing Gao



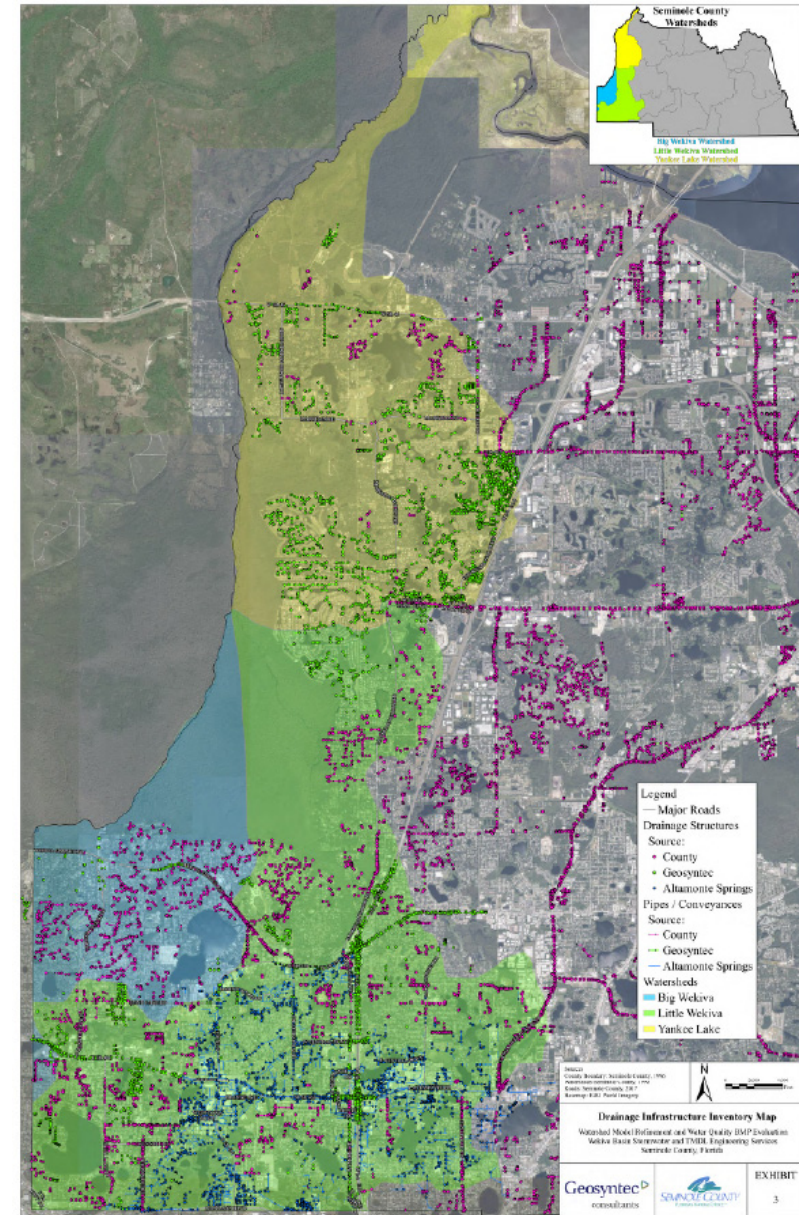
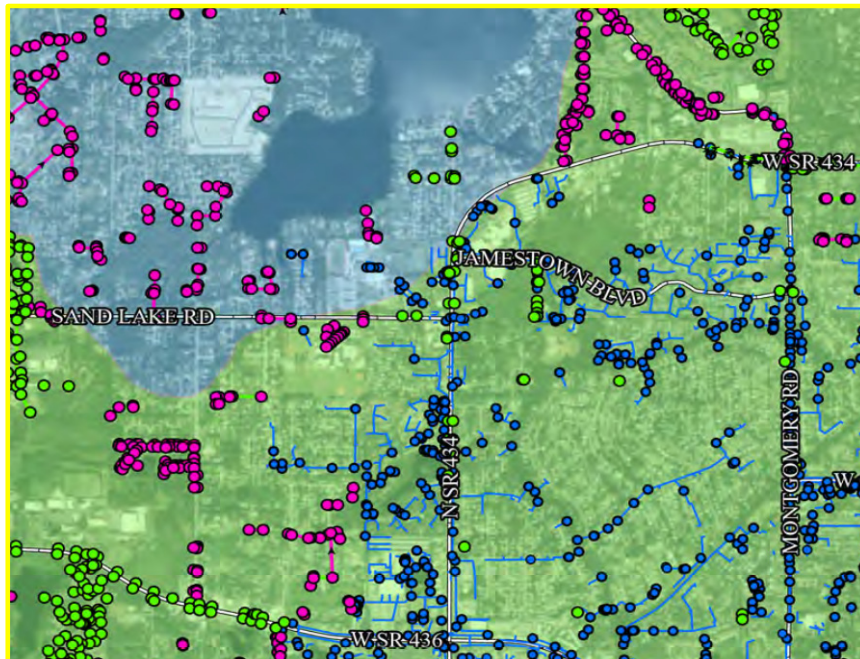
April 18, 2008

2600 Blair Stone Rd.
Tallahassee, FL 32399
floridadep.gov



Drainage Infrastructure

- Update Drainage Infrastructure Inventories
- Existing County Survey and Data
 - Drainage Structures – Inlets, Manholes, Weirs
 - Culverts / Storm Sewer Piping
 - River, Canal, Ditch Cross-sections
 - Pond Outfalls



Existing Conditions Analysis

- Existing Conditions Model Assessment
 - Design Storms and Rainfall Depths
 - Hydrological Parameters (Surface Runoff Volumes)
 - Hydraulic Model Development (Conveyance and Storage)
 - Verification Storm to Calibrate Model – Irma & Ian
- Level of Service (LOS) Criteria Assignment and Evaluation
 - Develop Criteria Based on Infrastructure Type and Design Storm
 - Type – Storm Sewer / Culvert 10 Year Storm, Outfall Channel / Stormwater Pond 25 Year Storm
 - Road – Local 10 Year Storm, Collector 25 Year Storm, Evacuation 100 Year Storm
 - Habitable Structures – 100 Year Storm
- Floodplain Assessment
 - Evaluate Using Combination of 100 Year 24 and 96 Hour Storms
 - Assess Road and Structure Impacts
- Water Quality Assessment
 - Pollutant Load Hot Spot Analysis
 - Compare to Existing Surface and Ground Water Quality Data



Flooding Level of Service Criteria

Evaluate Design Performance of Drainage Infrastructures and Conveyances



Service Level A
FLOW CONTAINED WITHIN SYSTEMS



Service Level C
WATER CONTAINED WITHIN FRONT YARD



Service Level B
WATER CONTAINED WITHIN RIGHT-OF-WAY



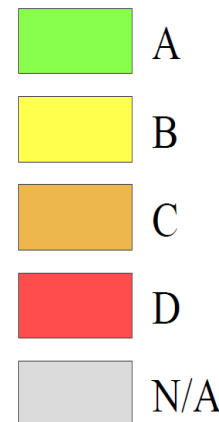
Service Level D
STRUCTURE FLOODING

Example Level of Service Criteria

LOS Assessment Results

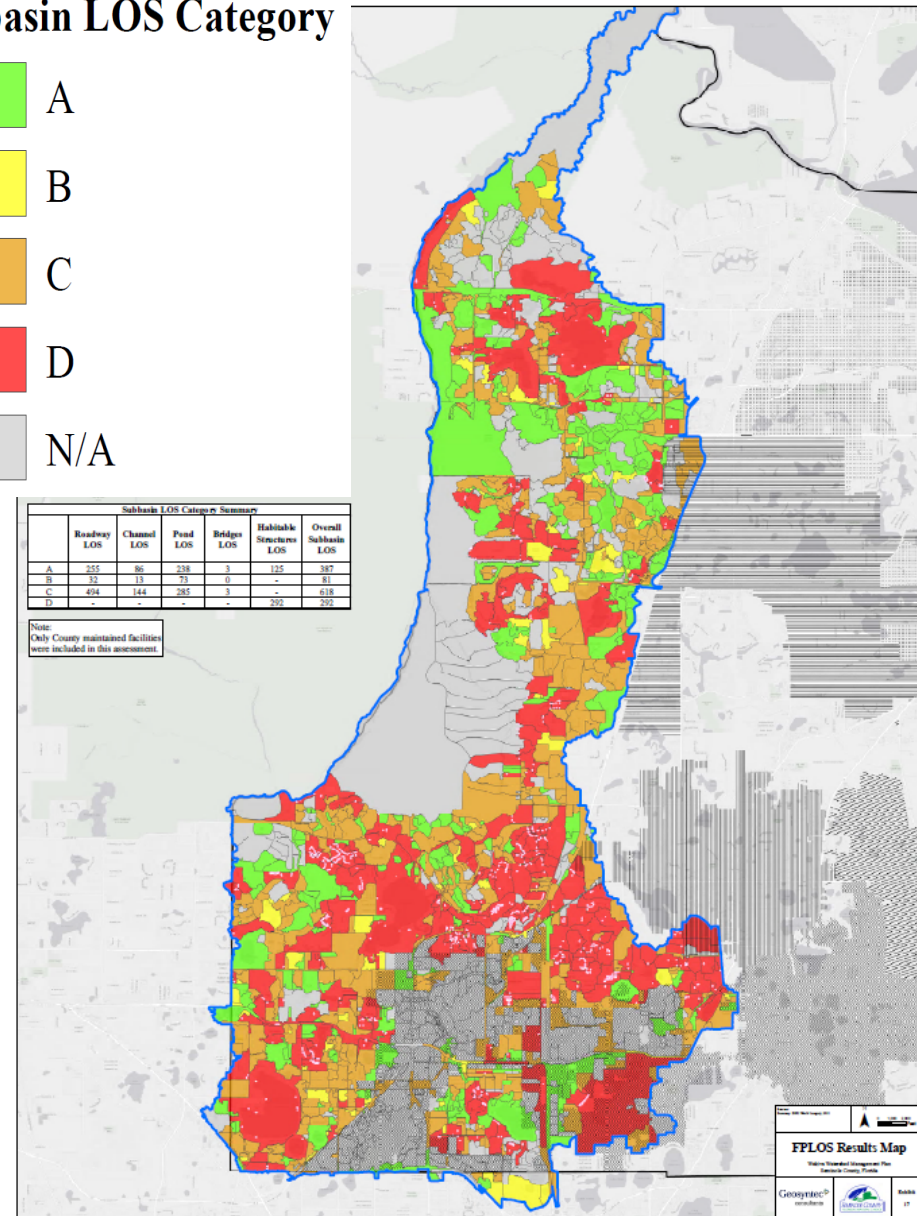
- Unincorporated Areas and County Maintained Roads
- Infrastructure
 - Roadways
 - Storm pipe systems
 - Local / Collector / Arterial
 - Evacuation Routes
 - Channels
 - Stormwater Ponds
 - Bridges
- LOS A, B, C, D Designations
 - Structure Flooding = LOS D
 - LOS Grades of C & D Warrant Consideration for Improvements

Subbasin LOS Category



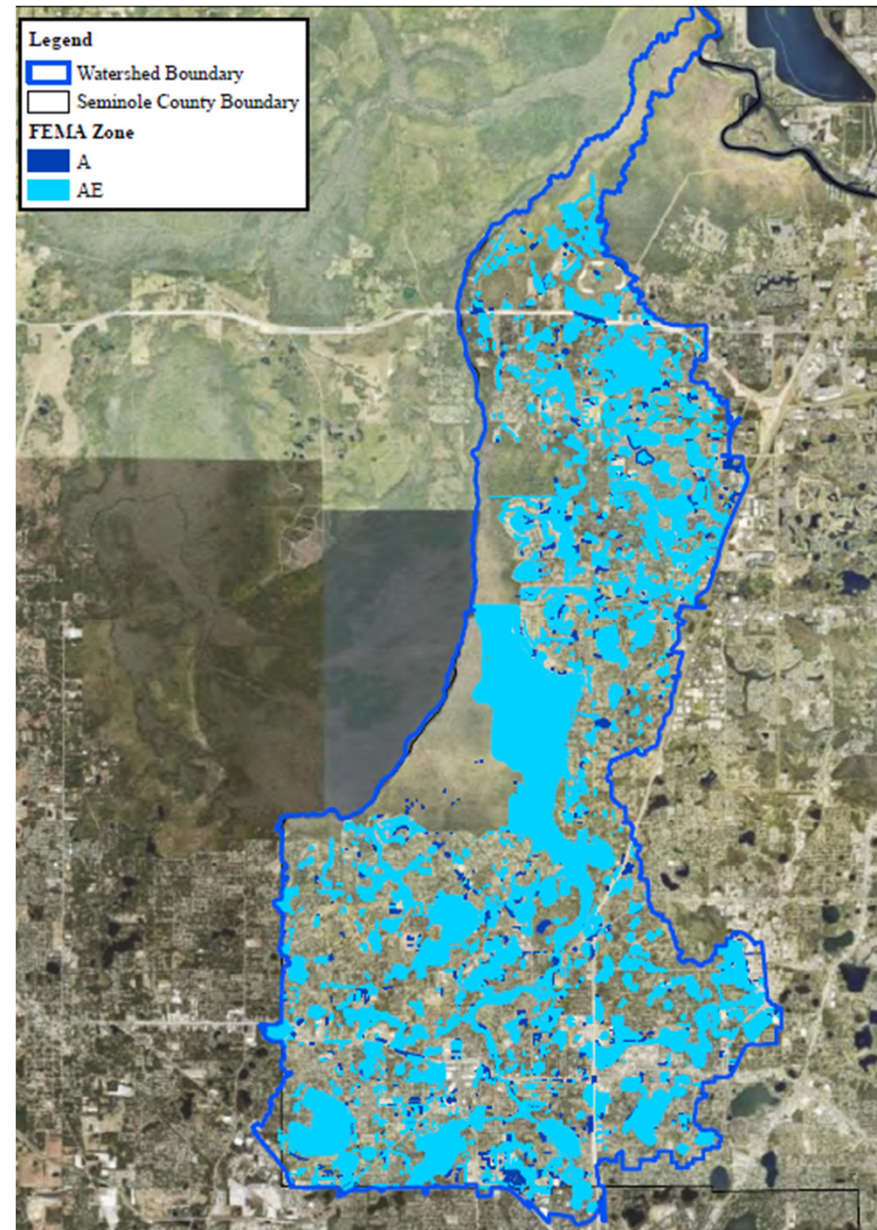
	Roadway LOS	Channel LOS	Pond LOS	Bridges LOS	Habitat/ Structures LOS	Overall Subbasin LOS
A	252	86	238	3	125	387
B	32	13	73	0	-	81
C	494	144	285	3	-	618
D	-	-	-	-	292	292

Note:
Only County maintained facilities were included in this assessment.



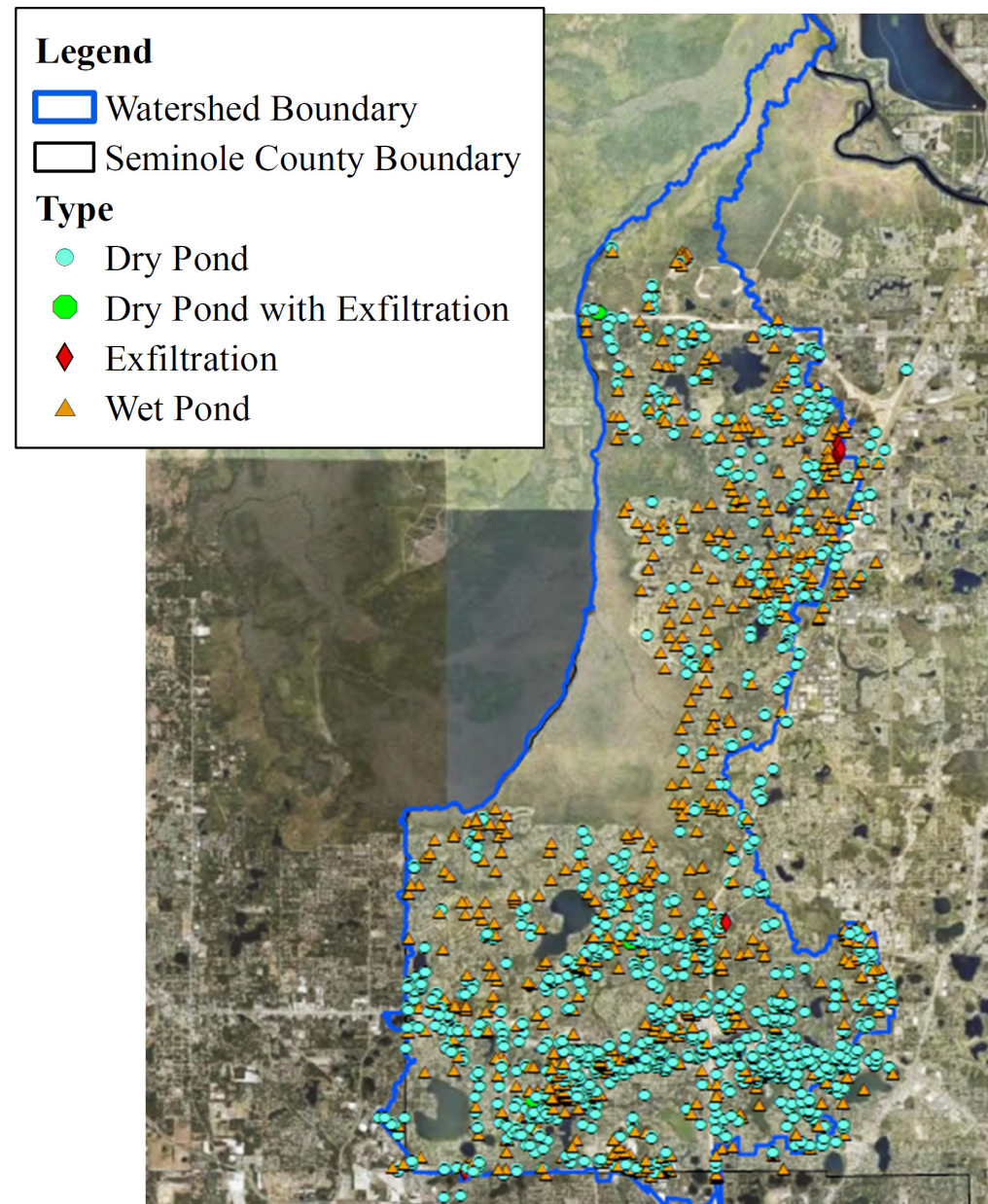
Floodplain Assessment Results

- Update based on more recent and detailed data
 - Topography
 - Survey Data
 - Detailed Modeling
 - New Development
- Existing Conditions Modeling Based on 100 Year Storm Event Simulation
- Determine base flood elevations
- Floodplain Area Comparison
 - Modeled 8,879 acres
 - Existing FEMA = 6,638 areas
 - 34% Increase
- Prepare data package for potential letters of map revision to FEMA



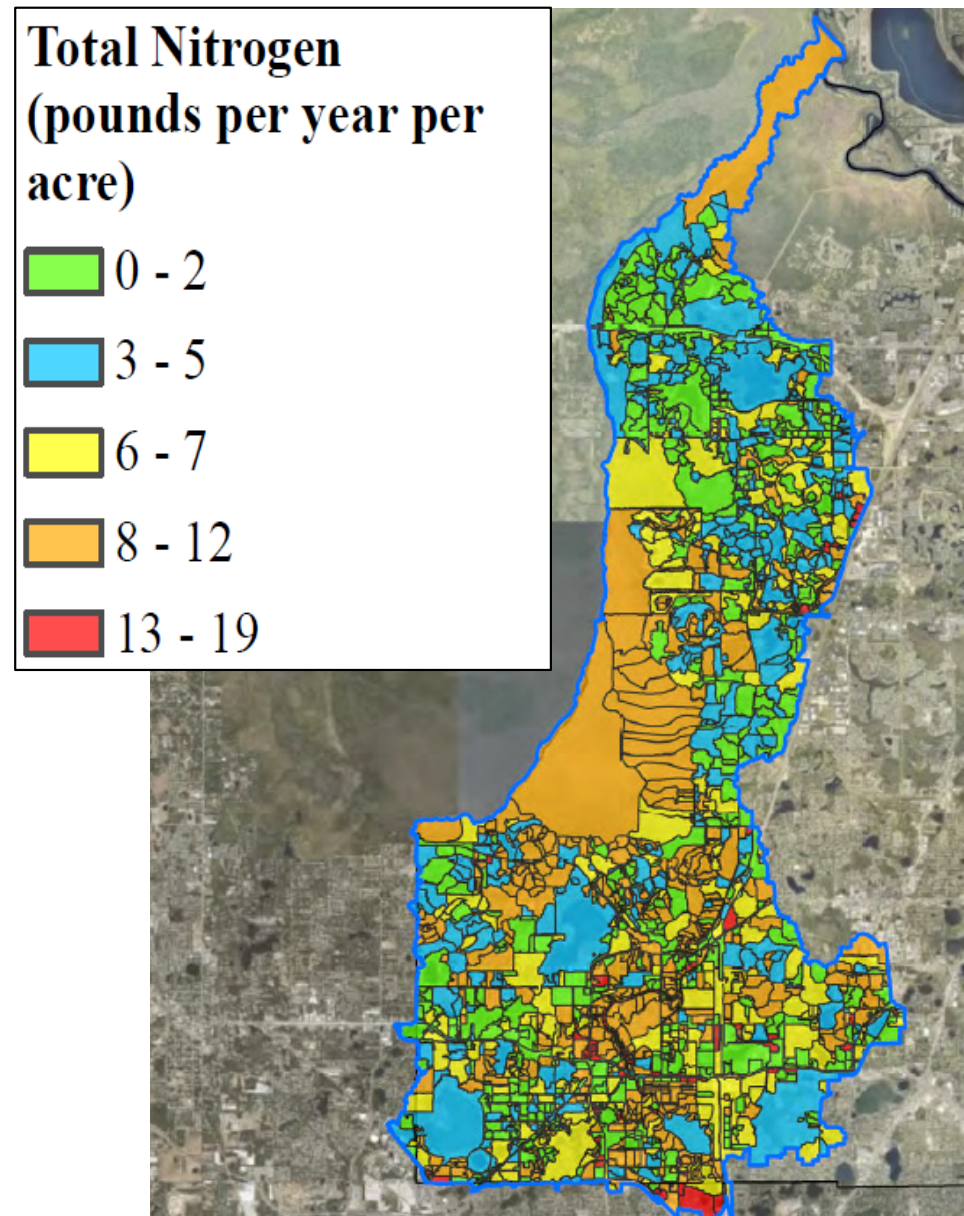
Pollutant Load Assessment

- Evaluate Pollutant Loadings from Stormwater Runoff
- Focused on Nutrients
 - *Total Nitrogen (TN)*
 - *Total Phosphorus (TP)*
- Take Into Account Existing Water Quality Best Management Practices (BMPs) in Watershed
 - *Wet Stormwater Ponds*
 - *Dry Stormwater Ponds*
 - *Exfiltration Systems*



Pollutant Load Assessment Results

- Annual Loading Model
- Identify Hot Spots of Pollutants
- Spatial Comparison to Impaired and Sensitive Waters
- Supports Identification of Target Locations for Improvement Project



Deficiency Area Prioritization

- **Flooding**
 - *County Staff Input*
 - *Public Input*
 - *Flood Assessment Model Results*
 - LOS Grade
 - Proximity to Floodplains
 - Apparent Structure Impacts
 - *Documented Problem Areas*
 - 2018 County Stormwater Master Plan
 - Identified Complaint
 - Reported Storm Impact (Fay, Irma, Ian)
- **Water Quality**
 - *Proximity to Impaired Waters or Sensitive Water Resources*
 - *Results of Pollutant Load Assessment*
 - *Areas without Current Water Quality Treatment*
 - *2018 County Stormwater Master Plan*

Improvement Project Prioritization

#	TOP PRIORITY FLOOD PROJECTS
1	SANLANDO SPRINGS - NORTH STREET TO LAKE FLORIDA
2	TRIBUTARY C - HUNT CLUB TO LAKE BRANTLEY
3	MOBILE MANOR
4	MARKHAM WOODS RD NEAR TIMBERBROOK & BRIDGEWATER
5	CECELIA DRIVE AT BEAR LAKE
6	MAGNOLIA STREET 427 TO LAKE FLORIDA
7	ROLLING HILLS
8	RIVERBEND BOULEVARD AND SWEETWATER BOULEVARD AREA
9	BANANA LAKE ROAD
10	CUTLER ROAD
11	BELL AIRE HILLS
12	BEAR LAKE WOODS
13	SPRING VALLEY LOOP
14	BILTMORE PT

ADDITIONAL PRIORITY FLOOD PROJECTS
MARKHAM RD AT LAKE MARKHAM RD
LAKE MARKHAM EVALUATION
LAKE SYLVAN EVALUATION

#	TOP PRIORITY WATER QUALITY PROJECT AREAS
1	SABAL POINT SUBDIVISION BMP
2	MOBILE MANOR BMP
3	NORTHWESTERN BMP 1
4	NORTHWESTERN BMP 2
5	NORTHWESTERN BMP 3
6	WEATHERSFIELD BMP
7	SPRING LAKE OUTFALL #12 BMP
8	SWEETWATER BMP
9	BASIN LW_Q00740_S
10	BASINS LW_A00270_S, LW_A00280_S, LW_A00290_S, LW_A00300_S
11	BASINS LW_M06490_S, LW_M06400_S
12	BASIN LW_M06350_S
13	BASINS BW_BW01310_S, BW_BW01370_S

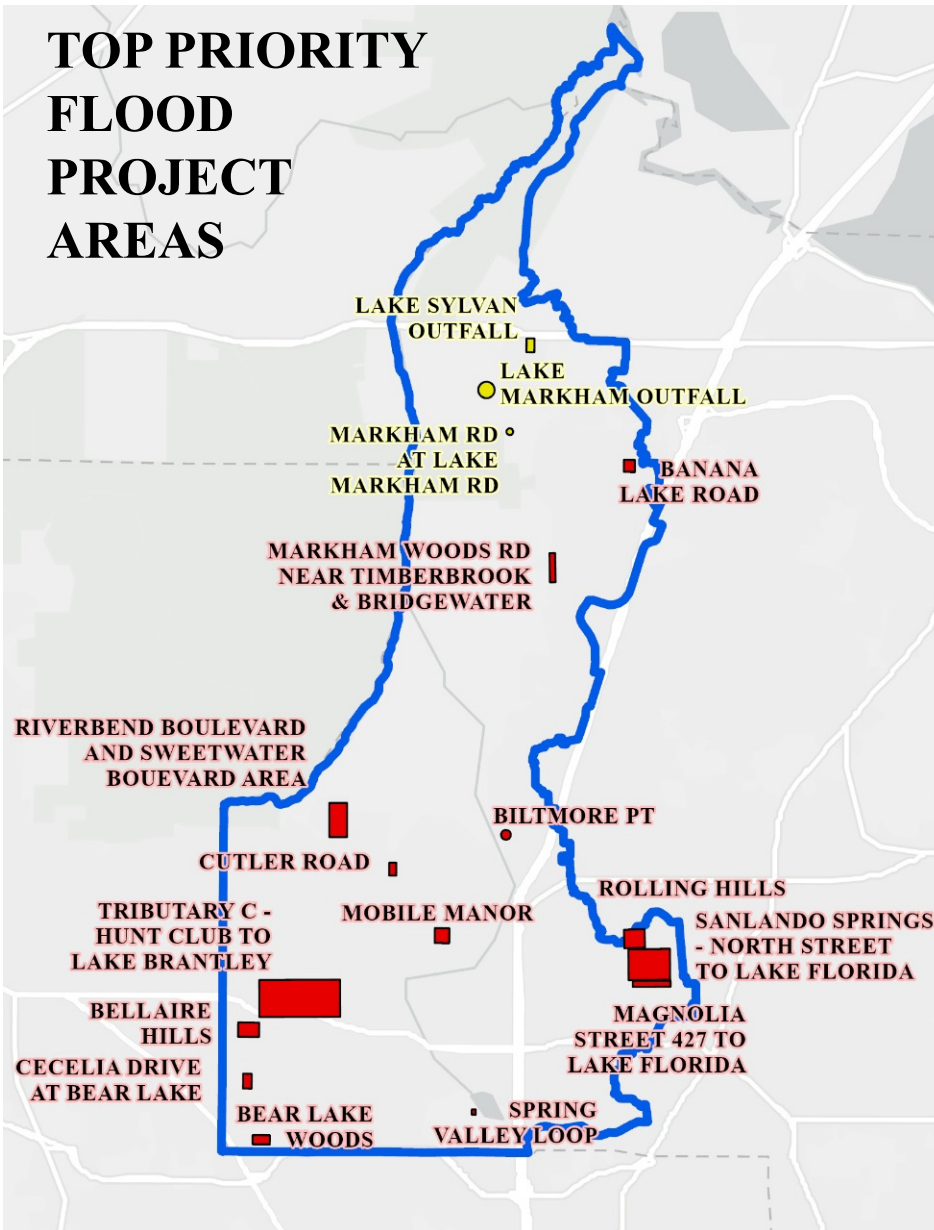
SPECIAL PROJECT
WEKIVA RIVER EROSION AND SEDIMENTATION IMPROVEMENT MEASURES - ASSESSMENT AND RECOMMENDATIONS

Priority Projects Recently Completed or in Progress:

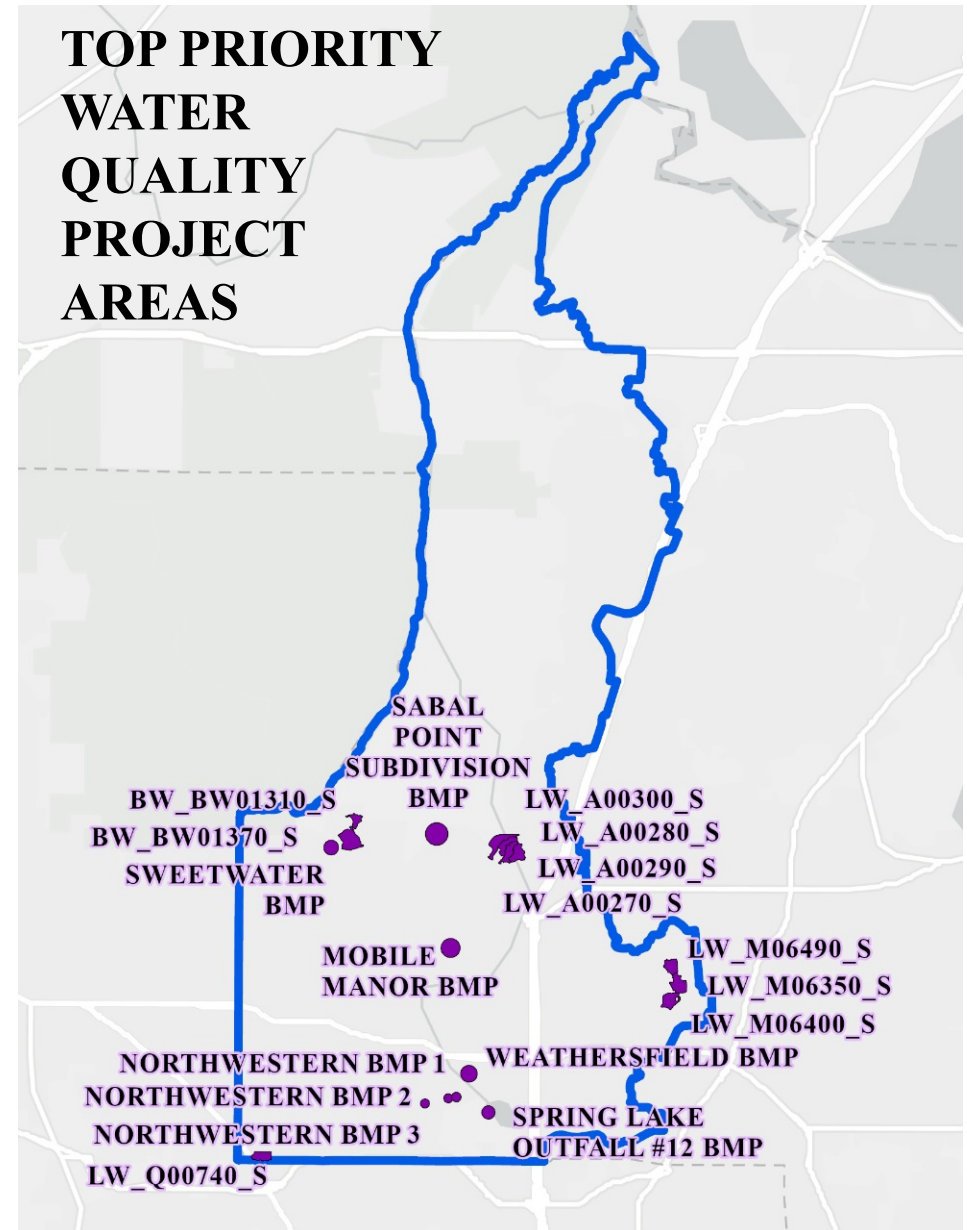
- *Flooding: Hillview Drive, Harriet Estates, Sanlando Springs, (Oliver, Baker, Arthur Streets)*
- *Water Quality: Spring Lake Outfall BMP, Hibiscus Lane BMP, Lake Brantley and Lake Sylvan Nutrient Studies*

Recommended Priority Deficiency Areas

TOP PRIORITY FLOOD PROJECT AREAS



TOP PRIORITY WATER QUALITY PROJECT AREAS



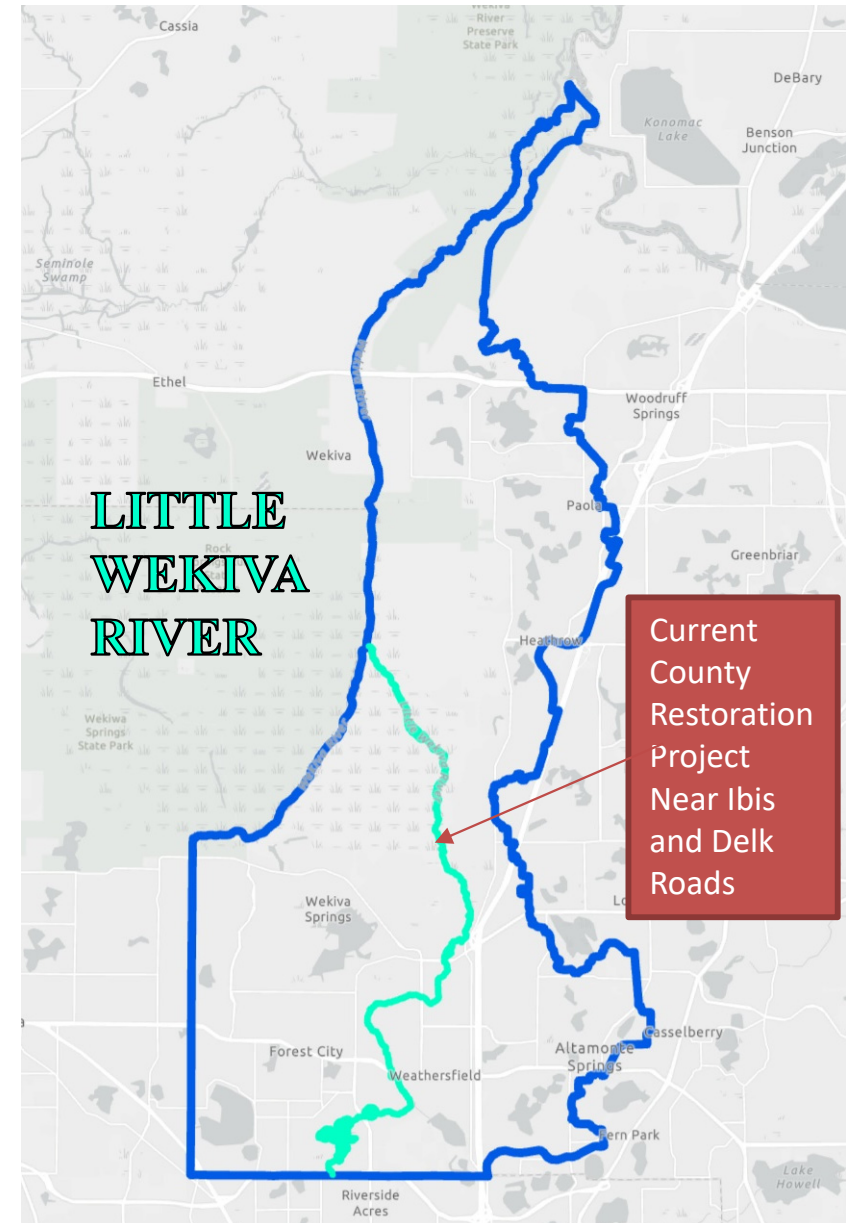
Improvement Project Alternatives Analysis

- Improvement Alternatives Analysis
 - *Prepare Improvement Concepts*
 - Model Evaluation for Flood Reduction and Water Quality Improvements
 - *Prepare Cost-Benefit Projections*
 - *Implementation Feasibility Considerations*
 - Permitting Considerations – Meet with SJRWMD to Determine Permitting Requirements
 - Constructability
 - Easements / Right-of-Way
 - Maintenance Burden
 - Water Quality Benefit
 - Public Acceptance
 - *Support Future Next Steps*
 - Seek Grant Funding
 - Final Design Permitting



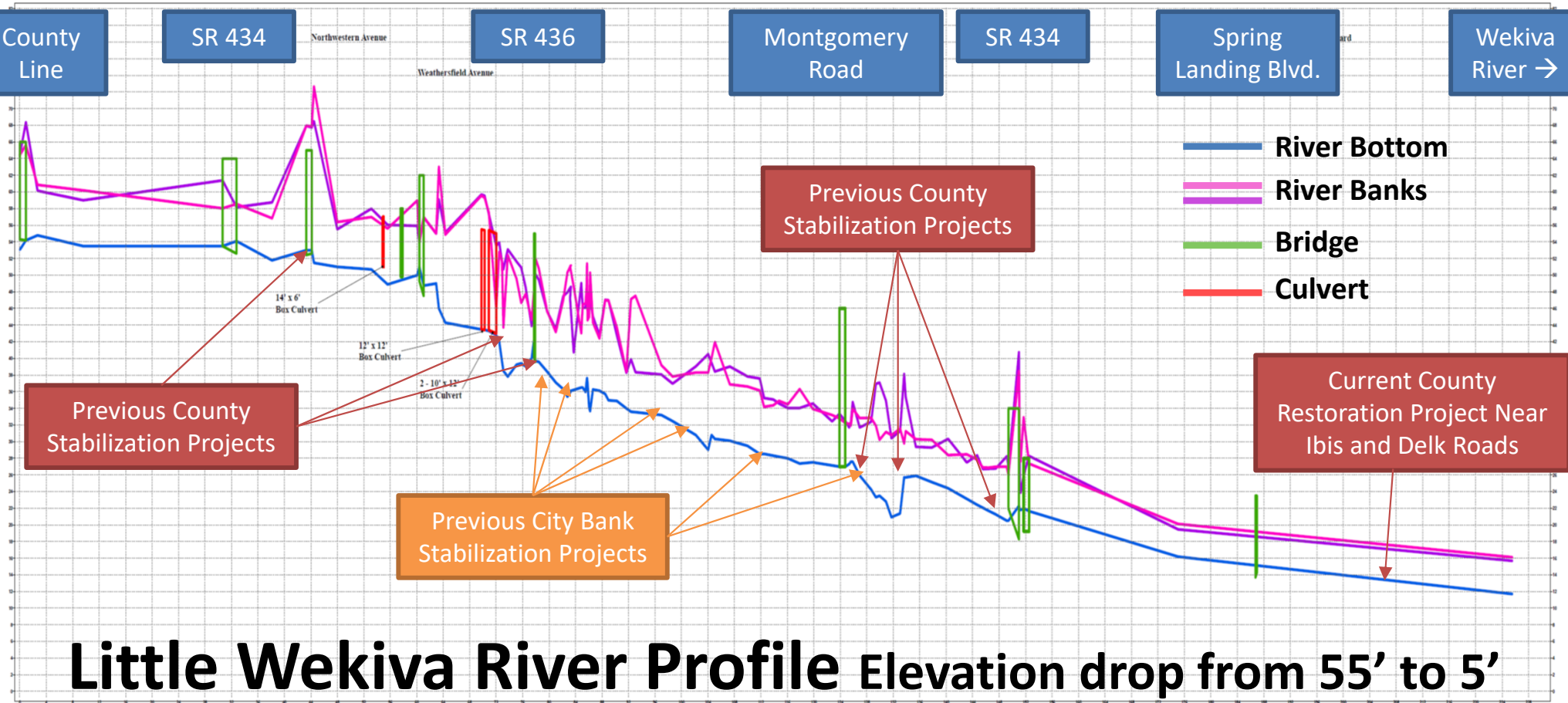
Little Wekiva River Evaluation

- Primary Drainage Feature in Southern Part of Watershed to the Wekiva River
- Flashy River Segments with High Velocities During Extreme Storms
- History of Erosion and Sedimentation
- Water Quality Concerns
- Large Contributing Area from Orange County
- Numerous Previous Erosion and Sedimentation Control Projects Implemented by the County and Others
- Current County Restoration Project Near Ibis and Delk Roads
- Source of Sediments – Erosion, Construction
- Senate Bill 976 Review



Little Wekiva River Improvements

- Evaluate Condition and Success of Recent Improvements
- Identify New Opportunities for Sediment Control and to Improve Water Quality
- Conceptualize Stabilization Improvements – Grade/Erosion Control
- Identify Partnering Opportunities

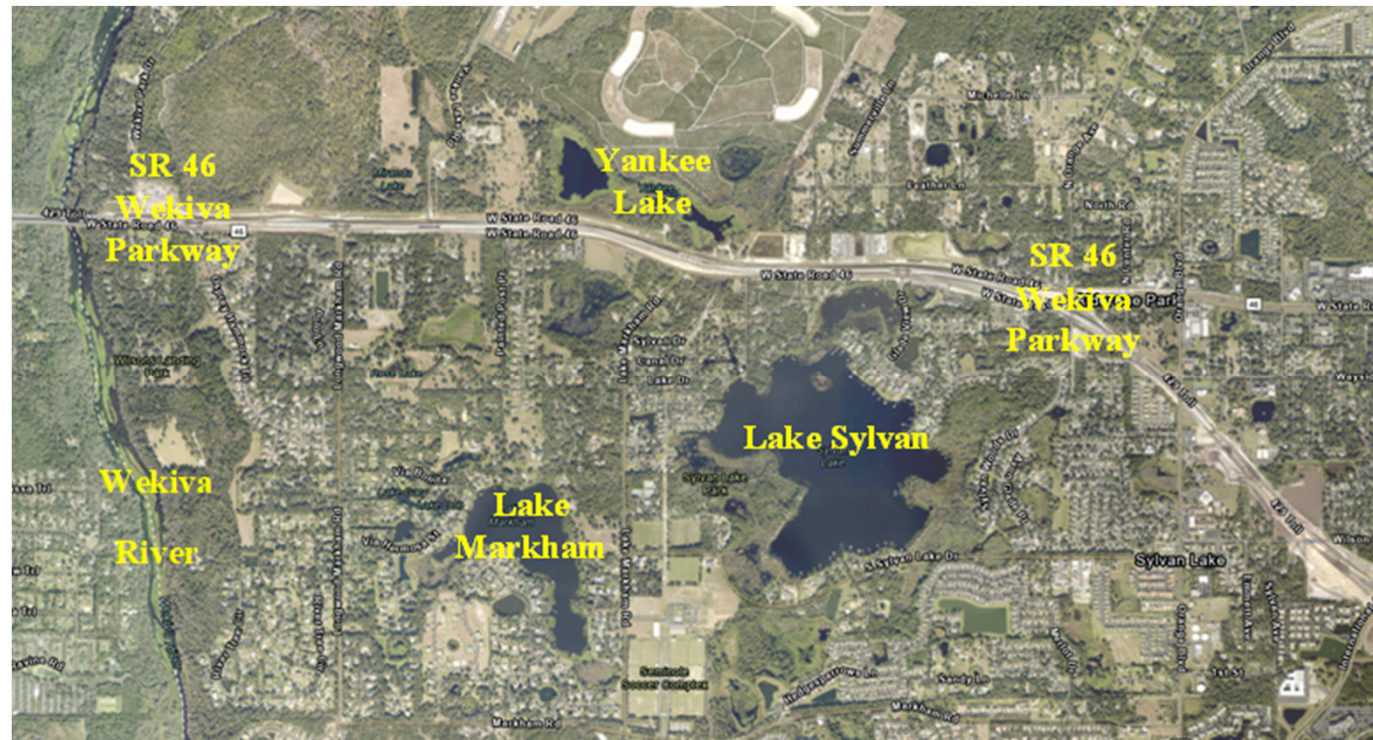


Lakes Markham & Sylvan Evaluation

- Trend of High Lake Levels in Recent Years
- Lake Markham is a Land-locked Lake – No Positive Outfall
- Lake Sylvan has Gravity Outfall to North
 - *Outfall to Depression Area then Under SR46 to Yankee Lake*
 - *Recent Temporary Emergency Actions Lowering Outfall Structure Discharge Elevation*

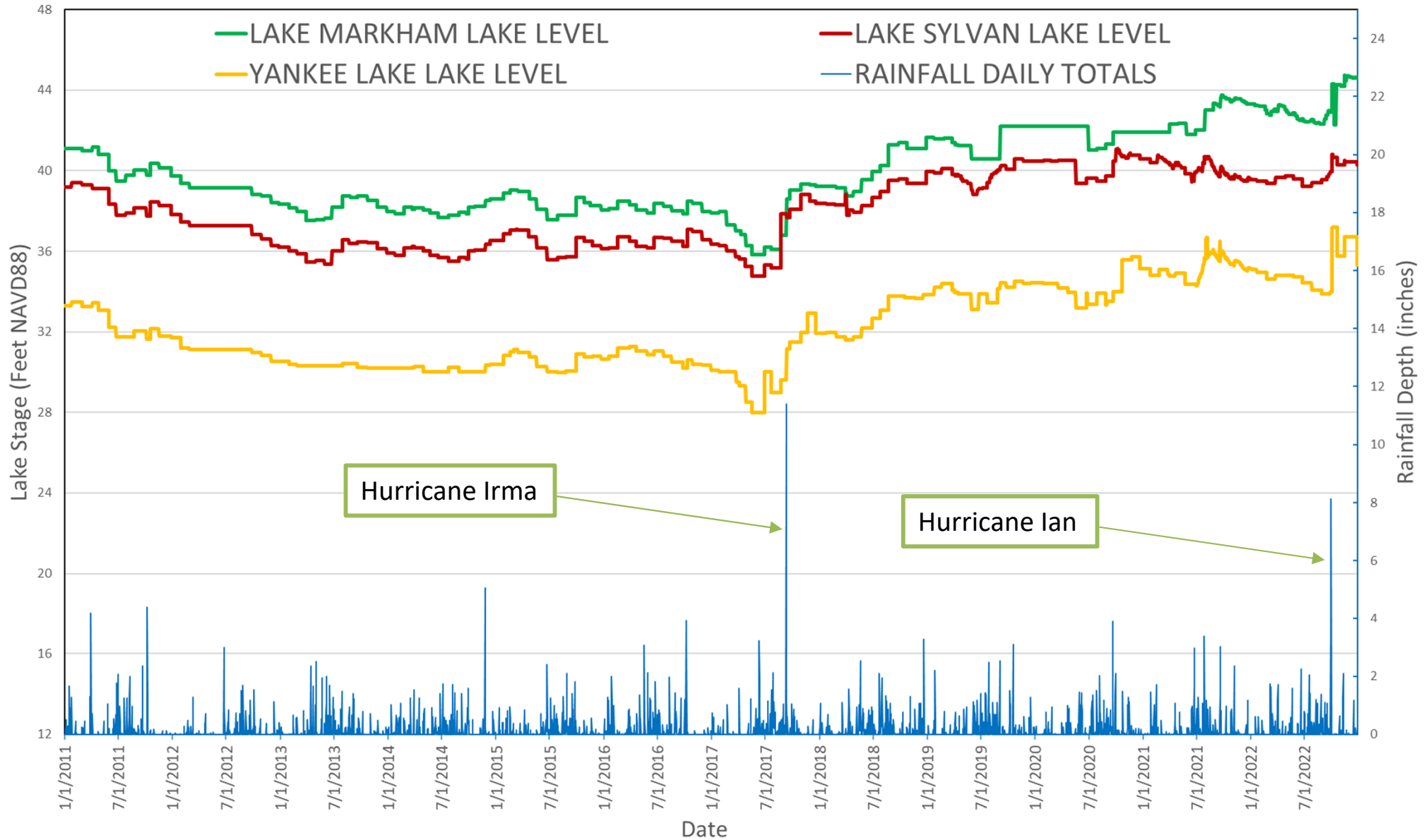
- Assessed Possible Contributors to High Lake Levels

- *Comparison to Other Lakes in Watershed*
- *Increased Rainfall*
- *Groundwater Trends*
- *SR46 Construction*
- *Nearby Development Impacts*
- *Modeled Comparison Simulations*



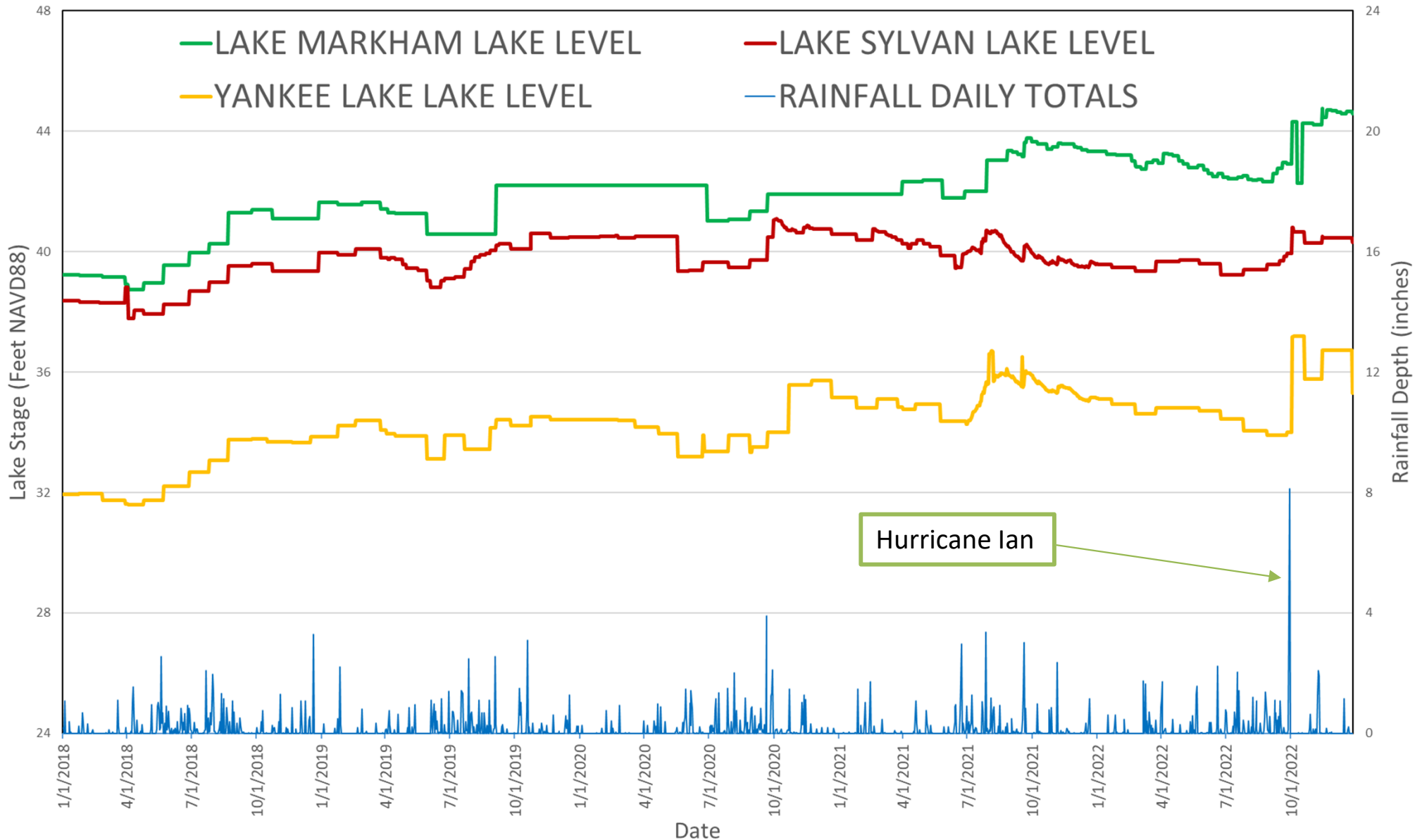
Lakes Markham & Sylvan Evaluation

Comparison of Lake Stage to Rainfall Data - 2011 to 2023



Lakes Markham & Sylvan Evaluation

Comparison of Lake Stage to Rainfall Data - 2018 to 2023



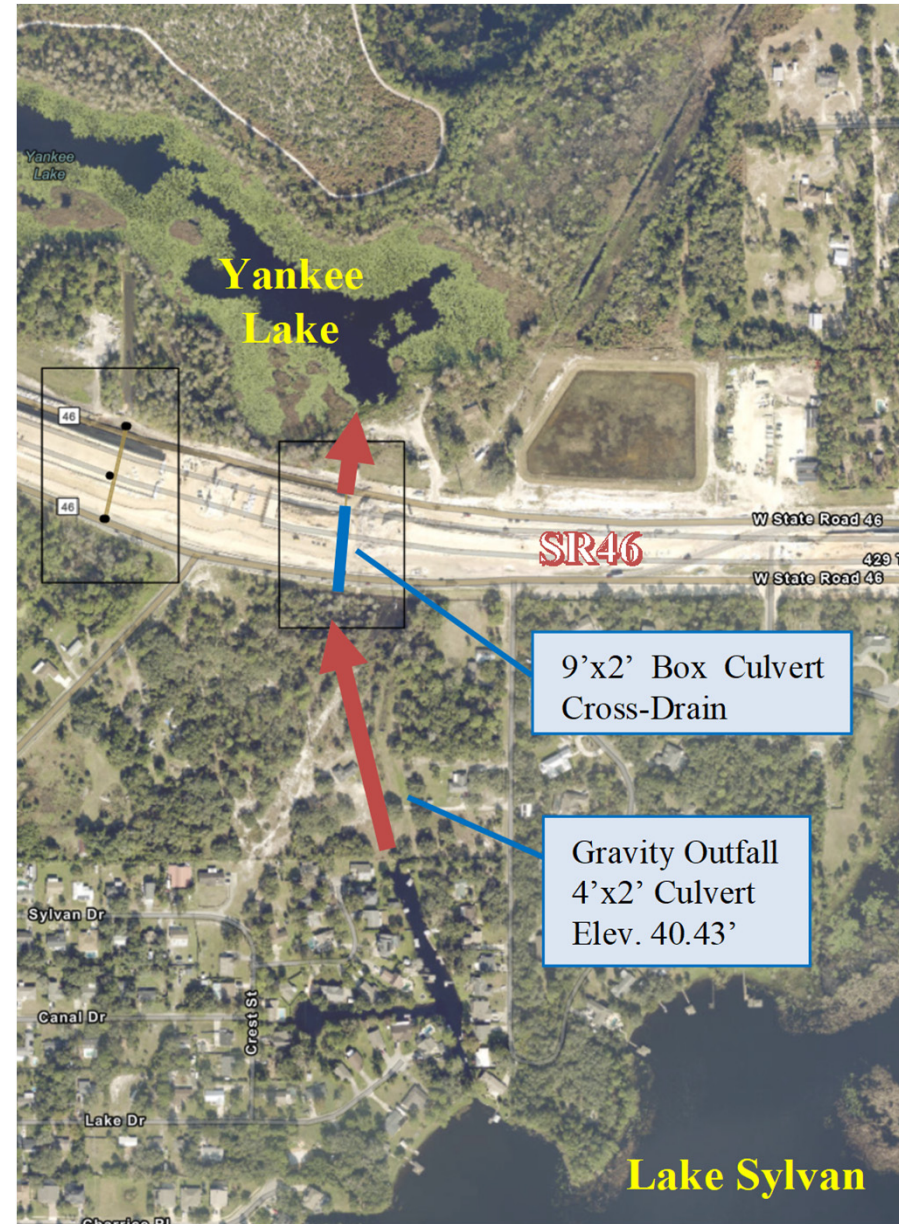
Lake Markham Alternatives

- Identify Feasibility for Providing Engineered Positive Outfall
 - Gravity Pipe Outfall
 - Pumped Outfall
 - Combination
 - Wekiva River or Yankee Lake
- Design Constraints
 - Right of Way / Easements
 - Utility Impacts
- Permitting Impacts
 - Downstream Flooding
 - Water Quality
- Cost Benefit Analysis
 - Project Costs versus Benefit to Number of Properties versus Frequency of Need



Lake Sylvan Alternatives

- Evaluate More Active Operation Schedule for Outfall Structure
 - *Within Elevation Range of Current Outfall Structure (40.43' to 39.57')*
 - *Conditions to Allow Further Lowering or Increased Capacity*
- Design Constraints
- Permitting Impacts
 - *Downstream Flooding*
 - *Water Quality*
- Cost Benefit Analysis
 - *Project Costs versus Benefit to Number of Properties versus Frequency of Need*



Public Meetings

- Public Presentations
 - Initial Meeting May 3, 2022
 - Introduce Project to Citizens
 - Present Scope
 - Solicit Input on Flooding and Water Quality Issues
 - Final Meeting (March 2023)
 - Present Final Results and Proposed Improvement Projects
 - Solicit Final Input



Next Steps

- Complete Improvement Concept Alternatives
- Final Public Meeting and Input (tentative March 9)
- Draft Final Report for Staff Review
- Final Report
- Optional FEMA Map Revision Submittal

Project Schedule

Study Task	2022												2023					
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
Inventory and Problem Identification		█	█	█	█													
Engineering Drainage Assessment				█	█	█	█	█	█									
Water Quality Assessment				█	█	█	█	█	█									
Initial Public Meeting					█													
Draft Existing Conditions Report									█	█	█							
Improvement Project Area Prioritization											█	█	█					
County Comissioner Workshop														█★				
Improvement Alternative Analysis														█	█	█		
Final Public Meeting															█			
Final Reports																█	█	
Final Commissioner Presentation																	█	
Project Closeout																		█

Acknowledgments & Contacts

Seminole County Staff

Jean Jreij, PE – Public Works Director

Shannon Wetzel – Project Manager – Watershed Management Division Manager

Kim Ornberg, PE – Director Environmental Services

Tony Nelson, PE, CFM – Public Works – Deputy Public Works Director

Dino Lucarelli, PE – Chief Design Engineer - Public Works

Jeff Sloman, PE – Professional Engineer - Public Works

Owen Reagan, PE – Professional Engineer - Public Works – Roads / Stormwater

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Wekiva Watershed Management Plan

Commission Workshop February 14, 2023