

Don't Get Bugged Down with Bacteria Impairments

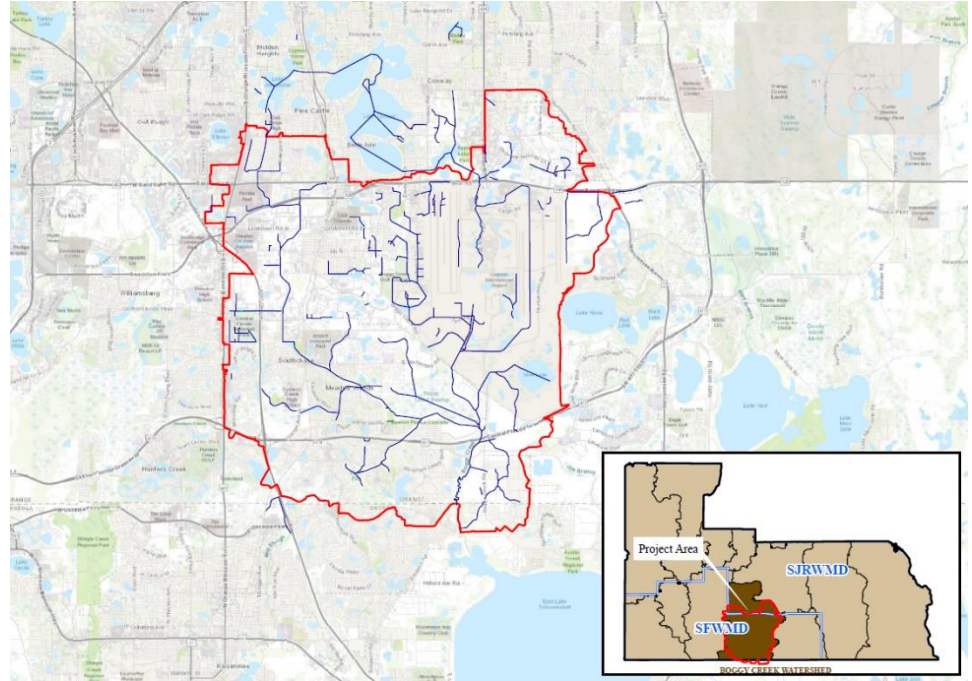
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Kevin Tyre, MS – Geosyntec Consultants, Inc.



FSA Annual Conference
June 14, 2024
Ft. Myers, Florida

Boggy Creek Description

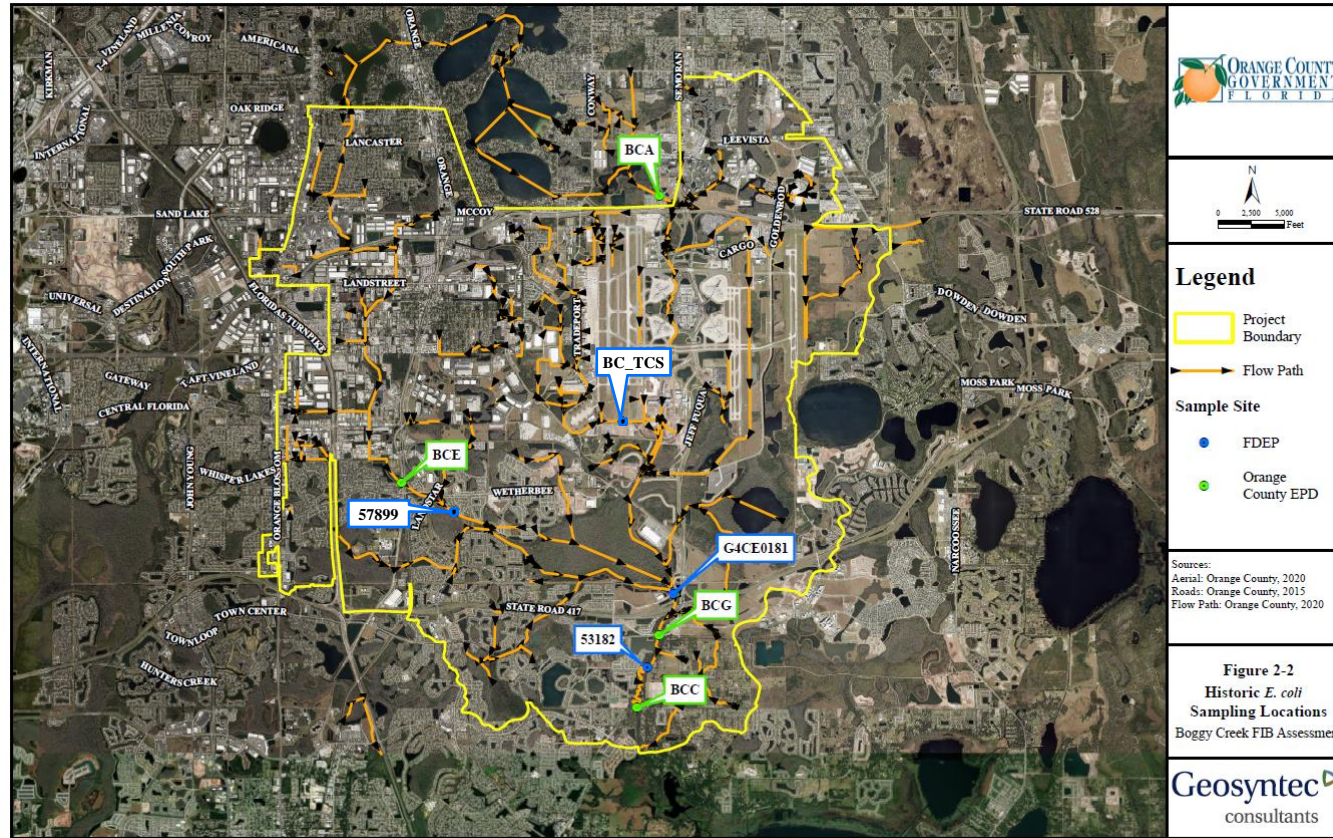
- A 19.6-mile stream located in the southern portion of Orange County
- Multiple head waters within the Boggy Creek Drainage Basin
- Flows south to East Lake Toho in Osceola County
- Waterbody Identification (WBID) 3168B
- Within in the Lake Okeechobee Basin Action Management Plan



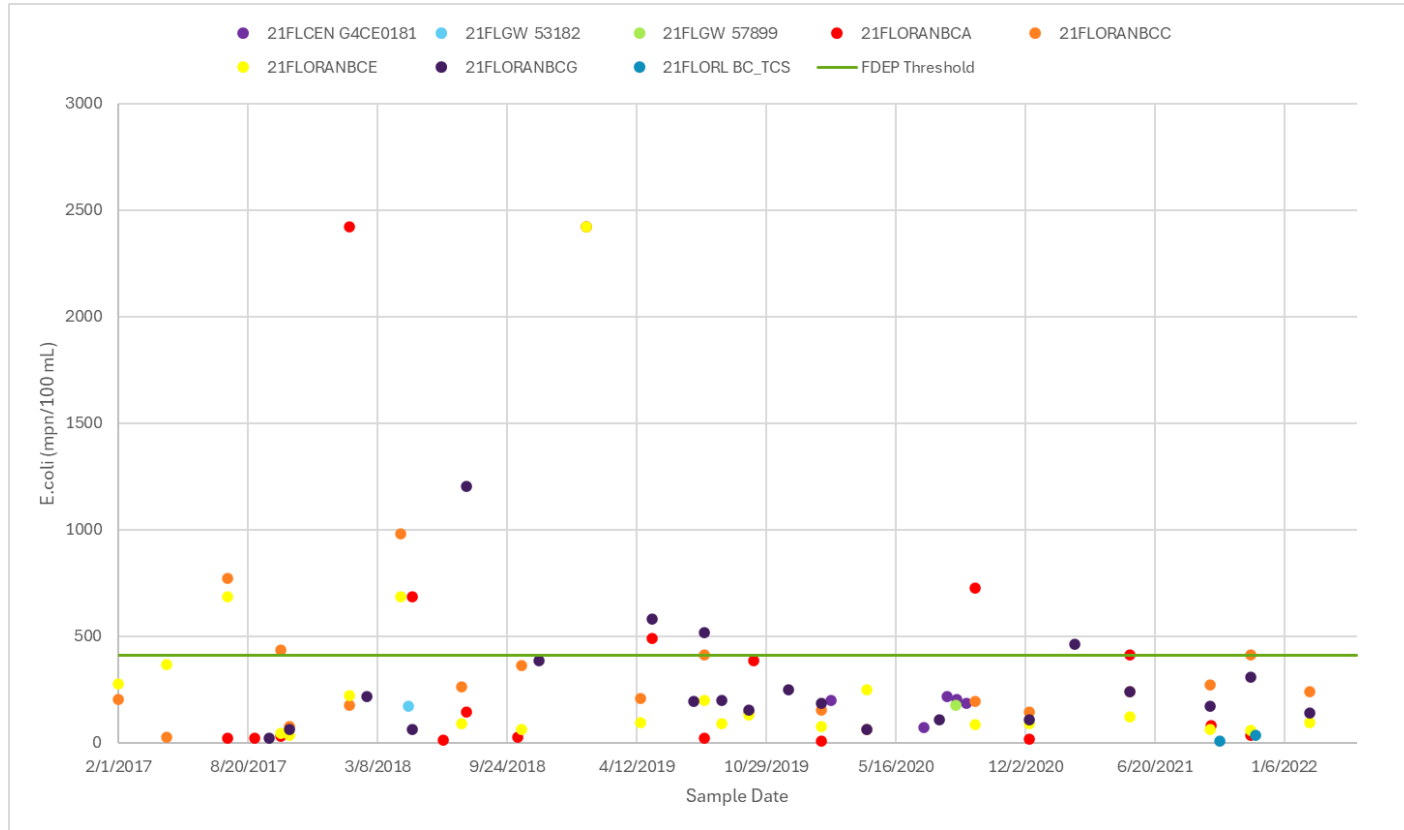
Florida Department of Protection (FDEP) Impairment

- Impaired for *Escherichia coli*
 - As of November 2022 list
- IWR 64 sample sites (2017-2022)
 - 4 Orange County sites (BCA, BCE, BCC, BCG)
 - 4 FDEP sites (21FLGW53182, 21FLCENG4CE0181, 21FLGW57899, 21FLORLBC_TCS)
- Sites exceeding DEP threshold
 - 4 Orange County sites (BCA, BCE, BCC, BCG)
 - Three DEP sites only 1-2 samples

FDEP Impairment Sites



FDEP Impairment Sites



Goal of our study

- Fill in data gaps within the WBID
- Determine location and extent of hotspots
- Investigate sources of hotspots through rapid response and Microbial Source Tracking (MST)
- Develop Fecal Indicator Bacteria (FIB) Management Plan which will prioritize management strategies and additional studies
- Follow Florida Department of Environmental Protection (FDEP) toolkit (FDEP (2018) Restoring Bacteria Impaired Waters: A Toolkit to Help Local Stakeholders Identify and Eliminate Potential Pathogen Problems. Version 3.)

Source Investigation & Sample Site Selection Process



DEVELOP GIS
DATABASE



MAPS ON THE
TABLE



POTENTIAL
SITE RECON



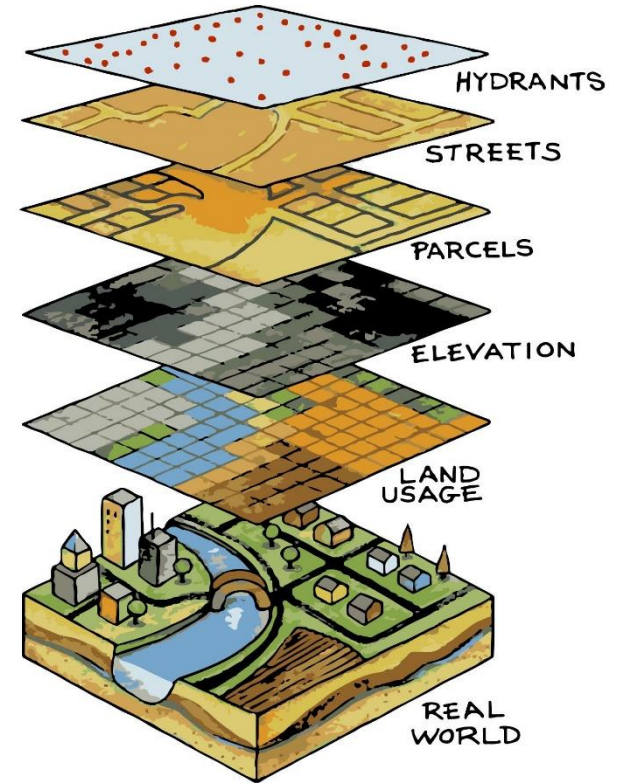
WALK THE
WBID



FINALIZE
SAMPLE SITES

Geodatabase

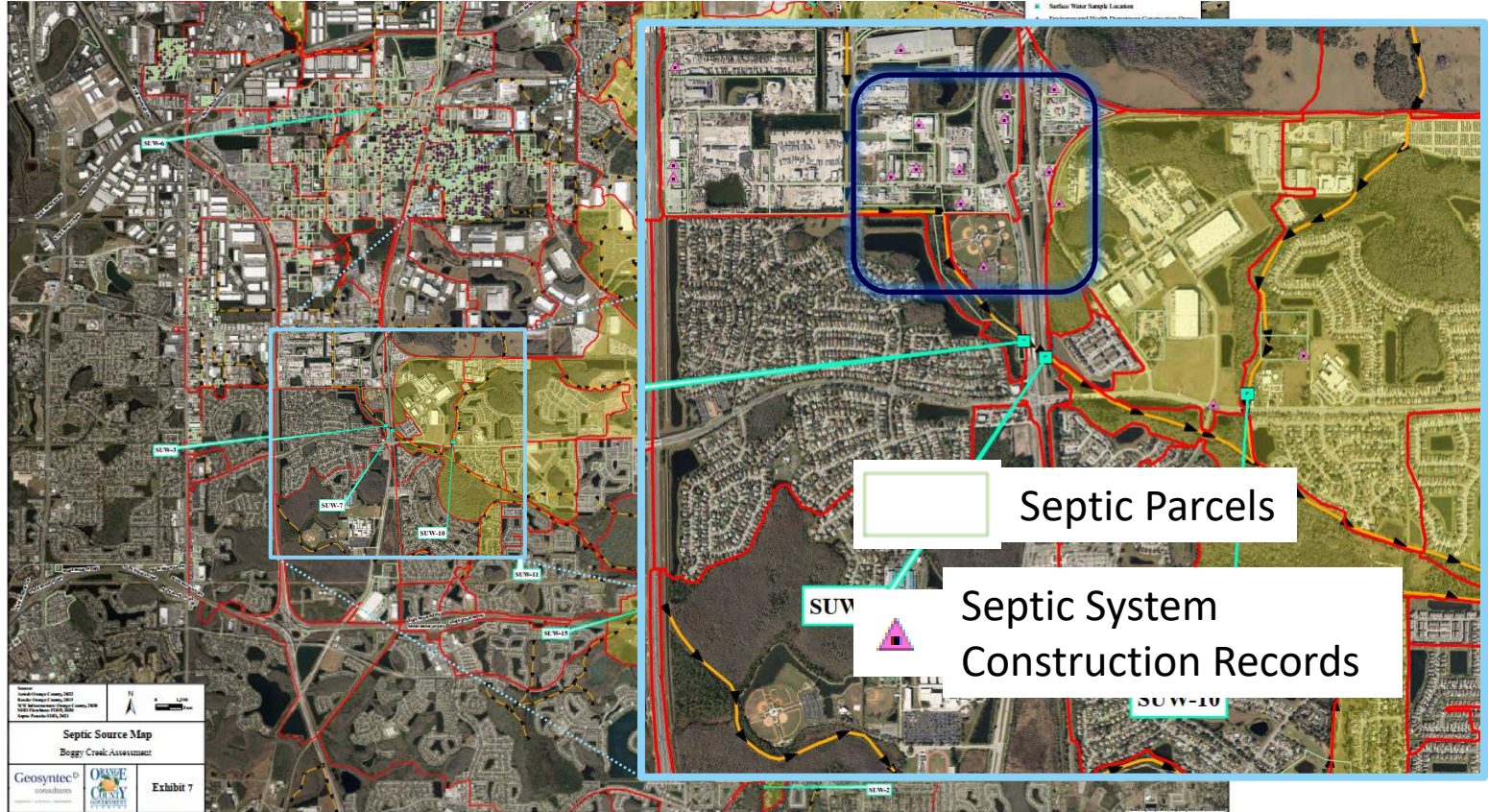
- Combined layers of interest to be viewed together
- Layers included:
 - Historical sample sites
 - Historical hotspots
 - Sanitary Infrastructure, Landfills, Septic Tanks
 - Stormwater Infrastructure
 - Agricultural Lands
 - Mobile homes
 - Dog Parks



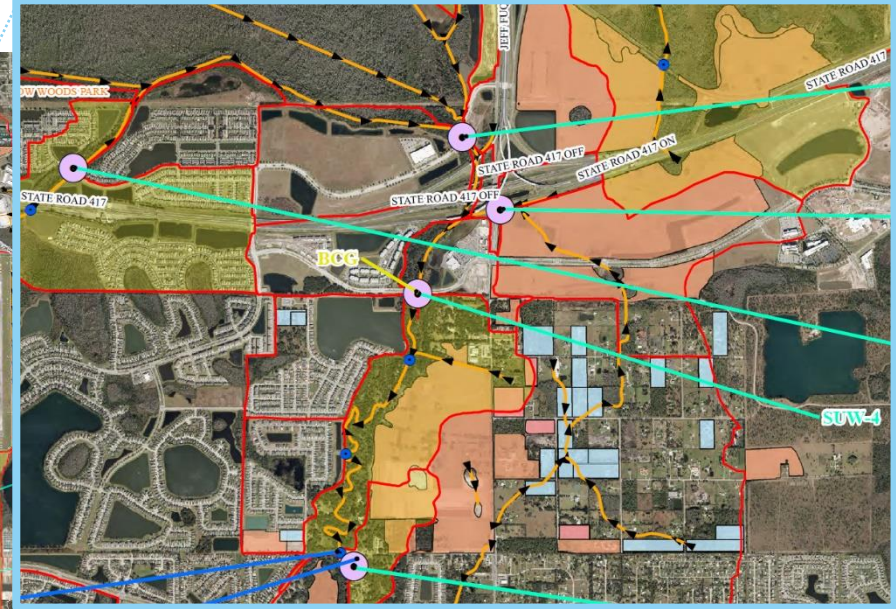
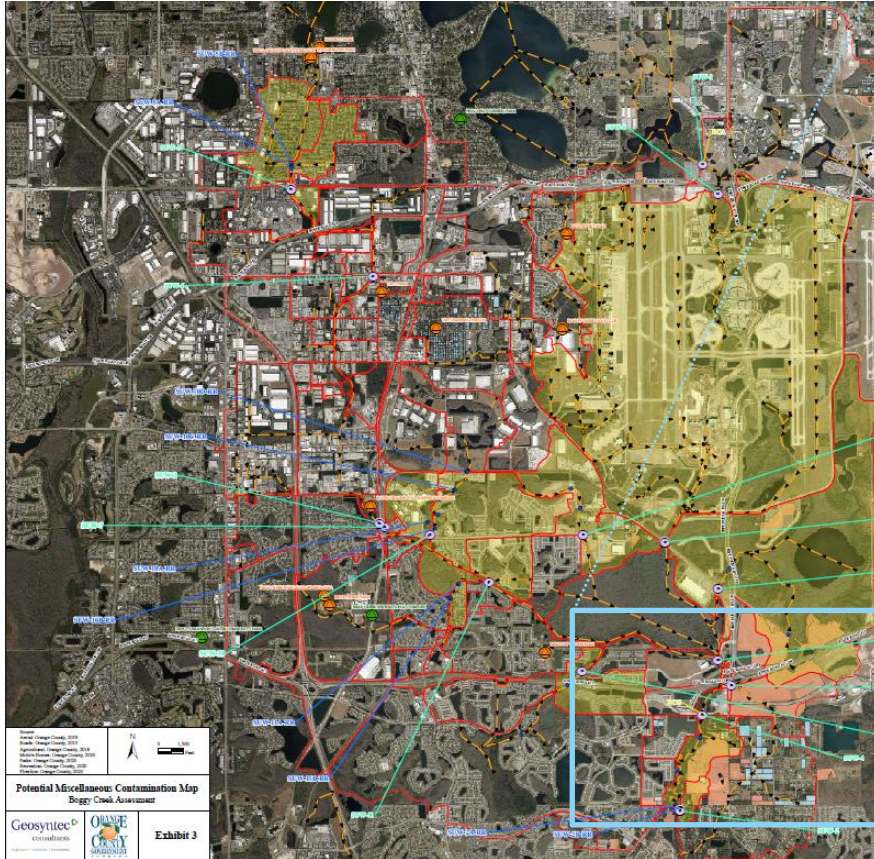
Maps on Table Meeting

- Had two Maps on the Table Meetings
 1. After geodatabase created and historical data reviewed
 2. After initial rounds of surface and stormwater sampling

Maps on Table Meeting



Maps on Table Meeting

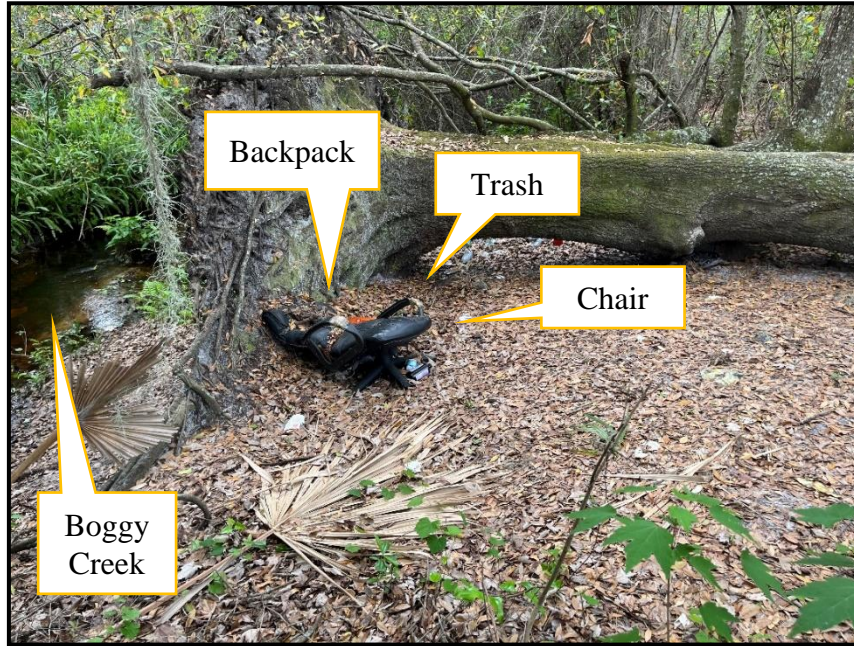


Walk The WBID (WTW) Field Recon

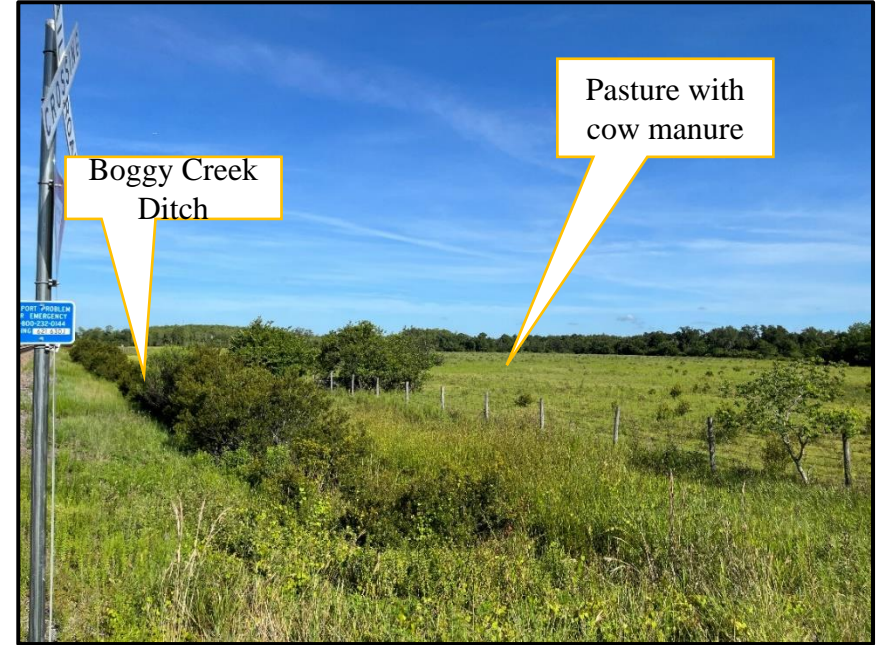
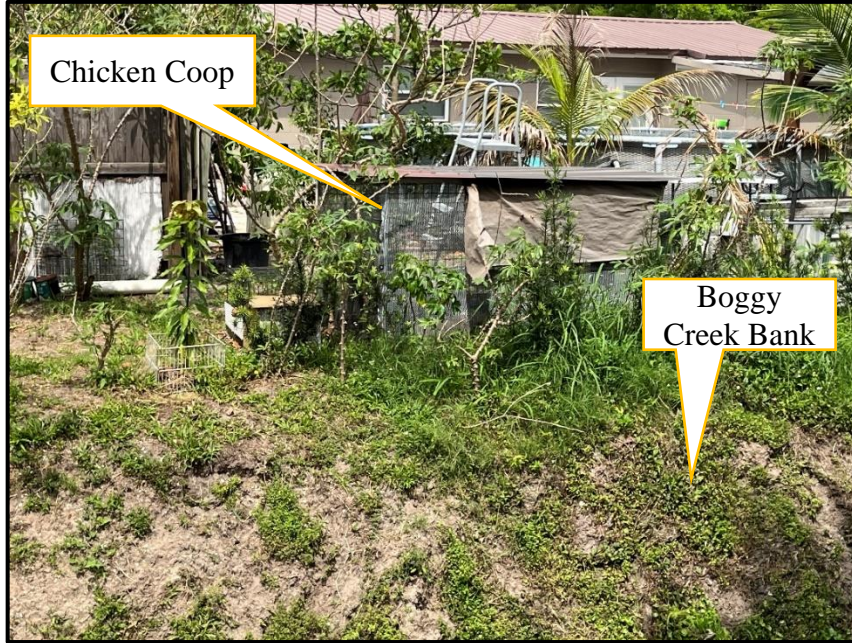
- Field Recon used to scope out surface and stormwater sites.
- WTW1: Drove and walked WBID. Further investigate areas of interest identified during the Maps-on-Table meeting.
- WTW2: Followed initial sampling. Focused on hotspots and exploring possible sources and DNA markers to target.



Potential Sources of Bacteria

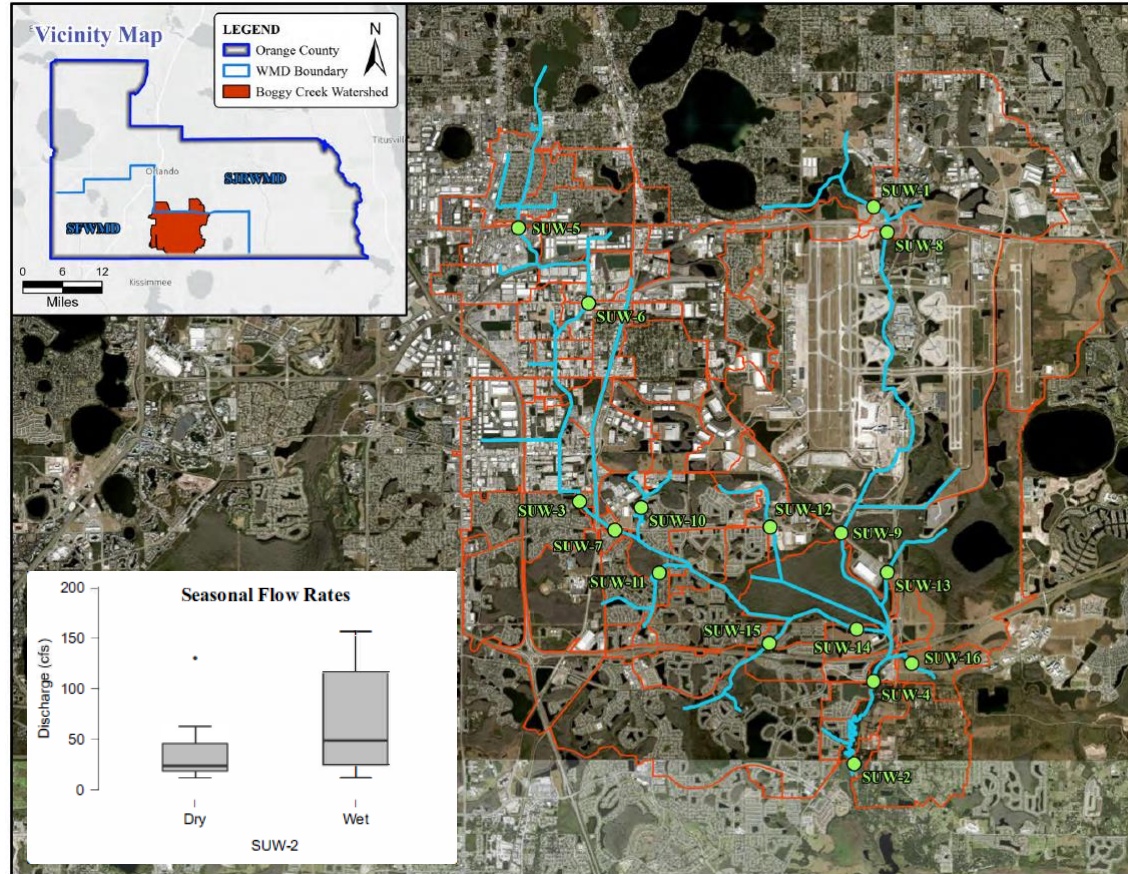


Potential Sources of Bacteria

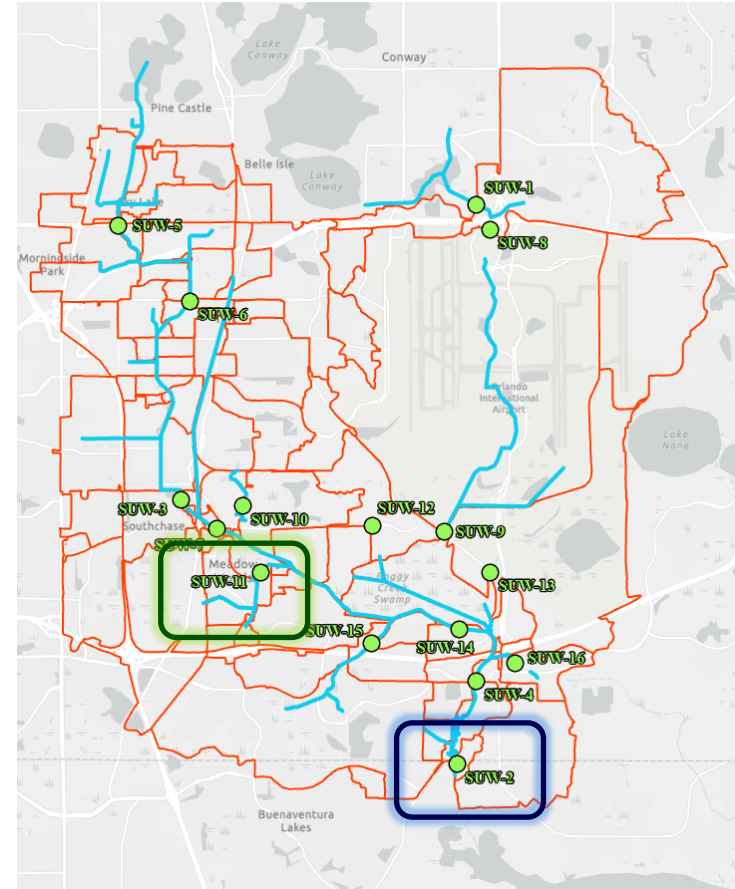
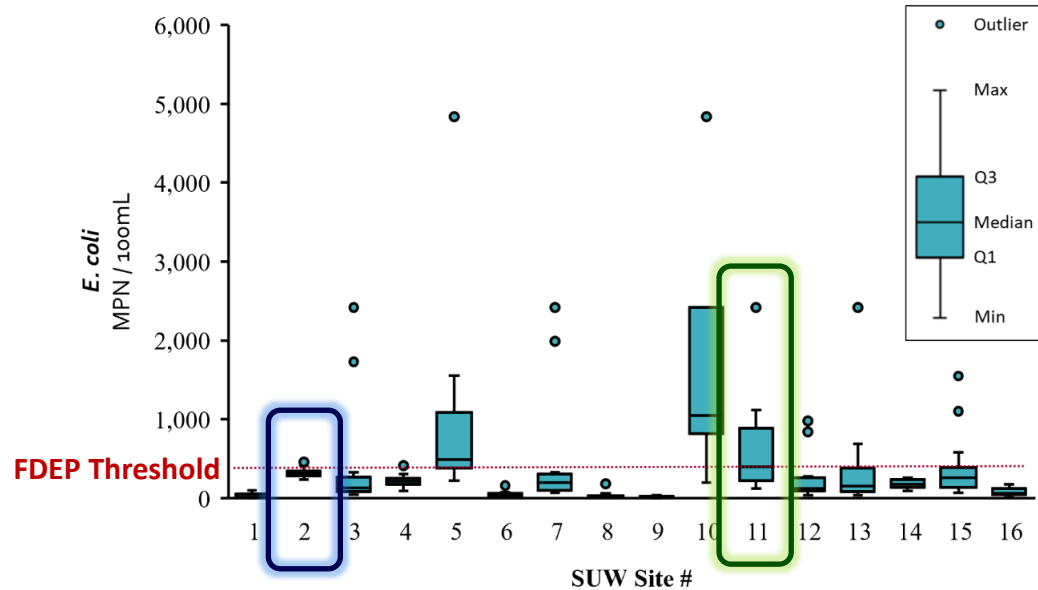


Sampling Plan

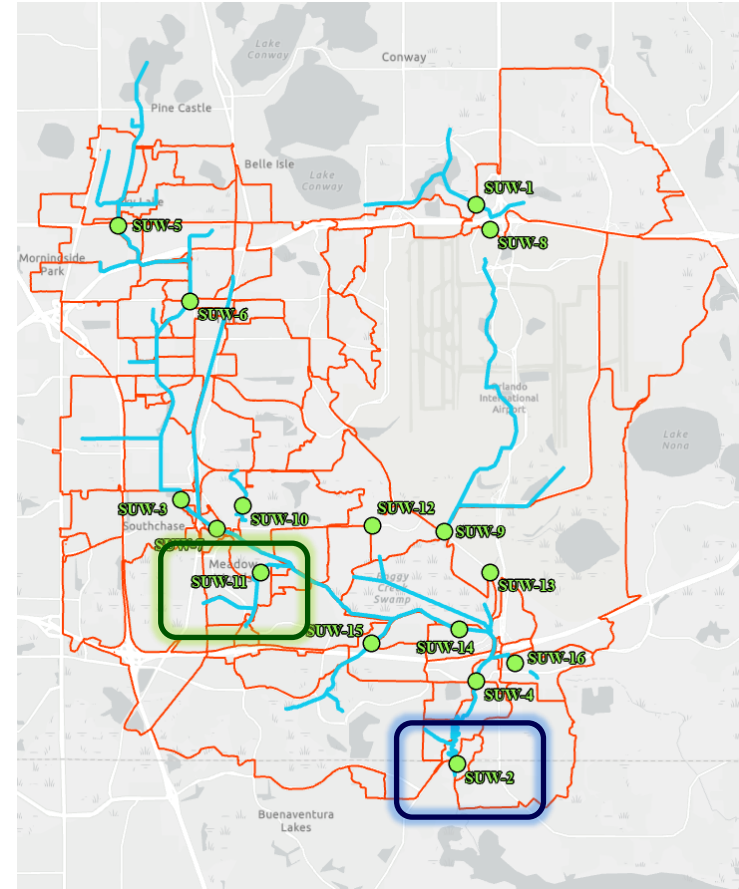
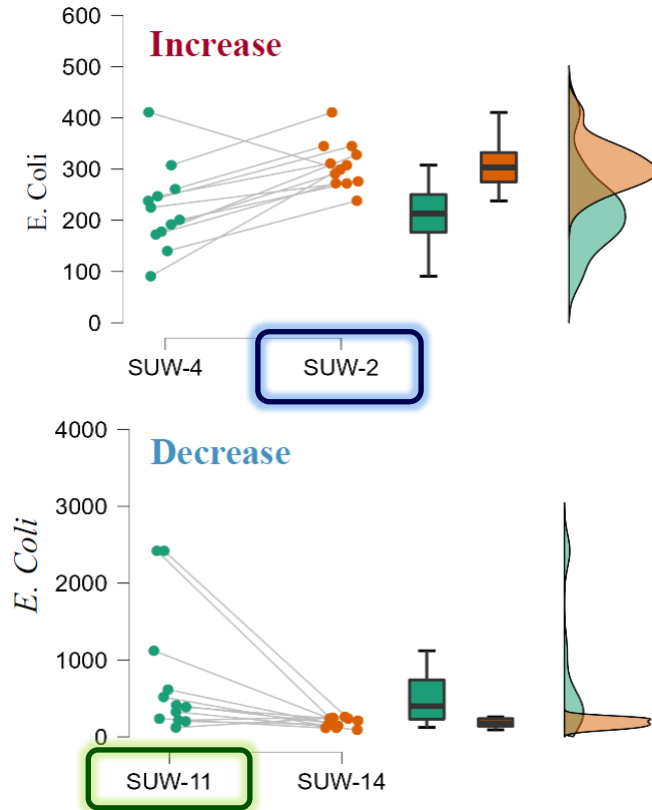
- 16 sites
- Sampled monthly for 1 year
- Analytes
 - *E. coli*
 - Flow rates
 - MST markers
- Rapid Response
 - 5 events
 - 32 locations



Sampling Results



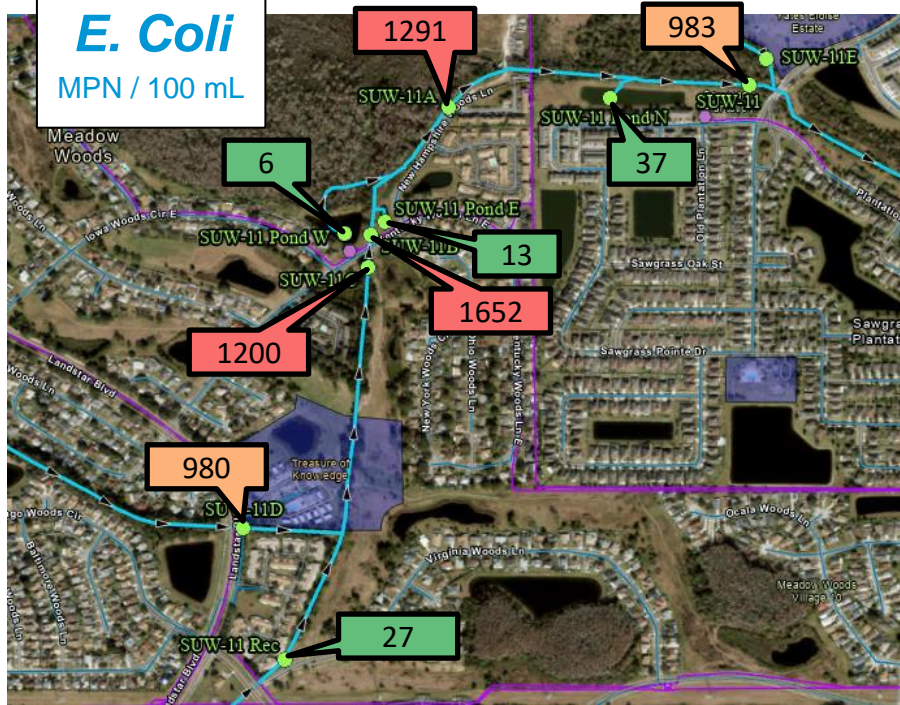
Sampling Results



Sampling Results

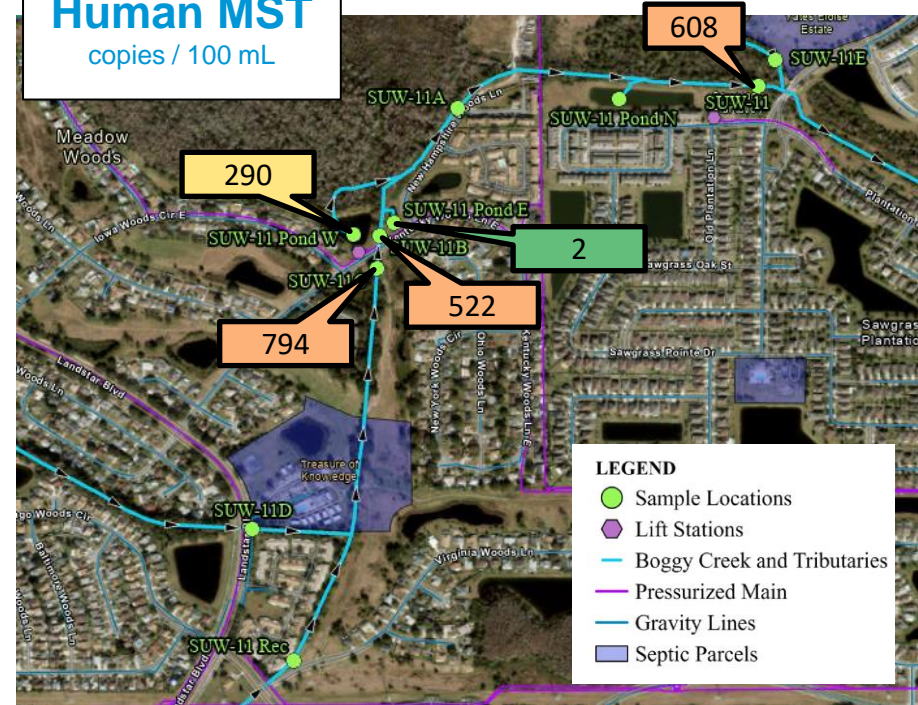
E. Coli

MPN / 100 mL



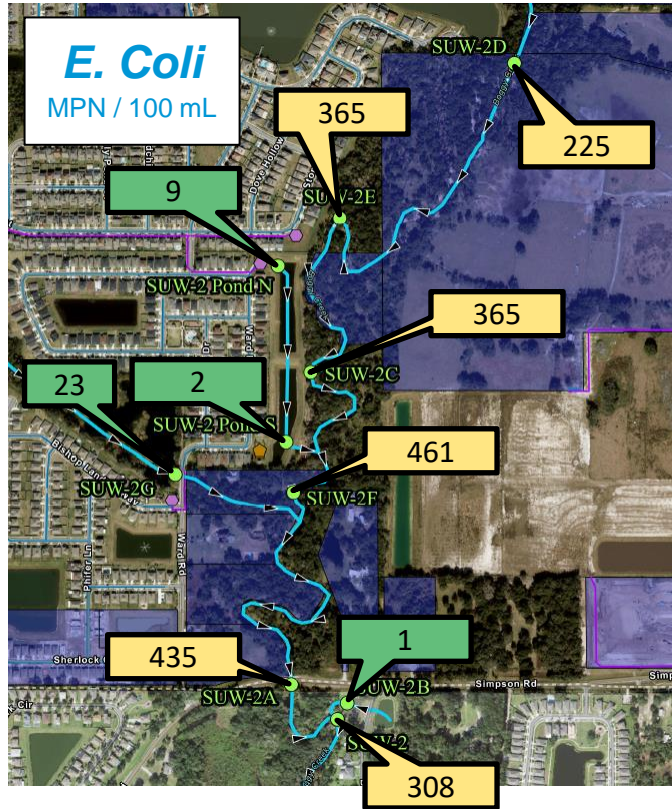
Human MST

copies / 100 mL

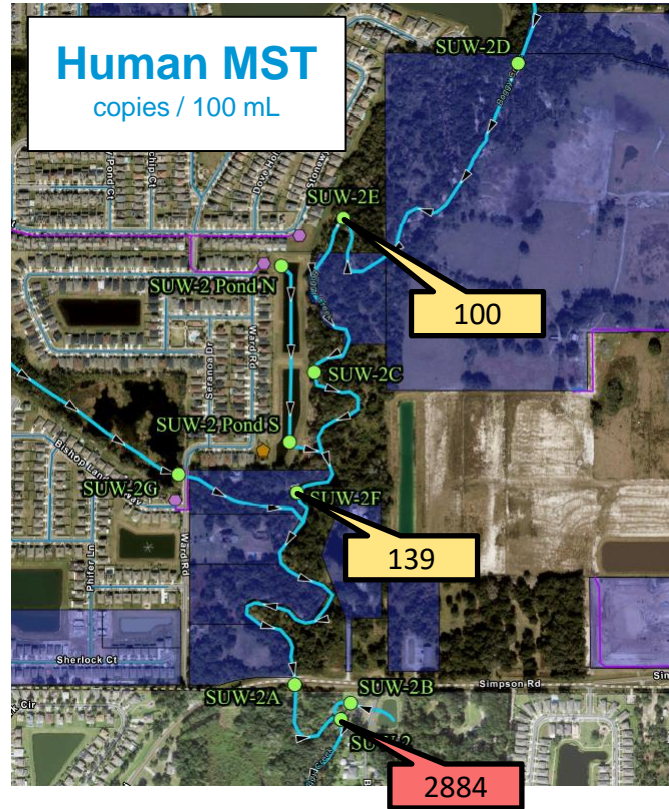


Human and Dog fecal pollution identified

Sampling Results



Human and Cow fecal pollution identified



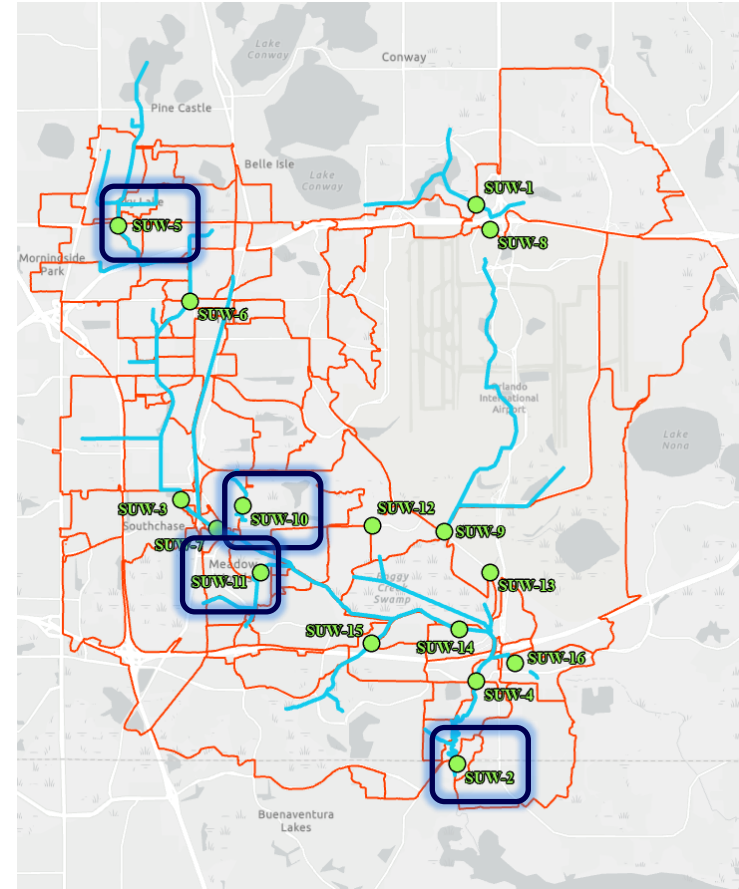
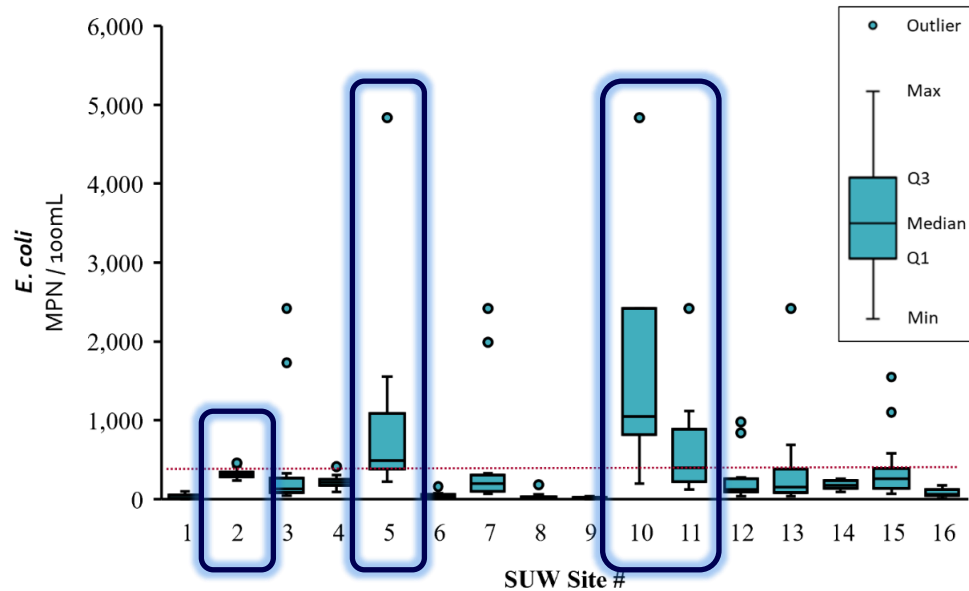
LEGEND

- Sample Locations
- Lift Stations
- Boggy Creek and Tributaries
- Pressurized Main
- Gravity Lines
- Septic Parcels

Summary and Next Steps

- Identified hot spots and possible sources using the combination of *E.coli* results, rapid response sampling, MST results and WTW notes.
- Identified three “Hot Spots”
 - Consistent *E.coli* results over FDEP threshold
 - Two sites high human MST (known septic and sanitary line crosses)
 - One site low human MST but dog marker detected (WTW spotted dog walking area and bags of feces)
- Identified one site of concern
 - *E.coli* results consistently close to threshold and at county border
 - High human MST at original site (known septic and sanitary line crosses upstream)

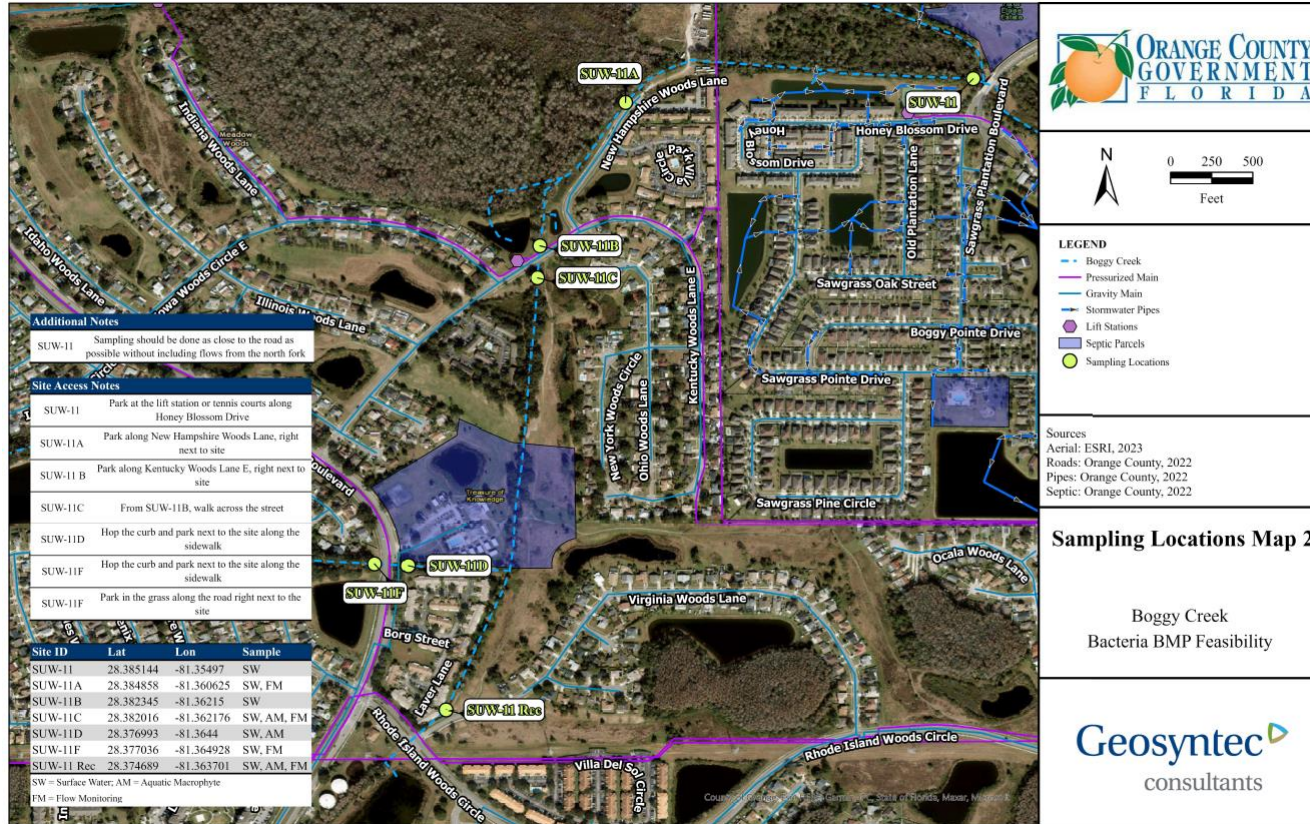
Identified Hot Spots



Phase 2 Septic and Sanitary Monitoring Projects

- Septic or sanitary lines suspected as source for three sites (SUW-2,10,11)
- Fourth site we are ruling out sanitary lines (SUW-5)
- Sampling Plan
 - 4 sampling events (2 wet season and 2 dry season)
 - Sampling upstream and downstream on identified possible sources
 - Septic Analysis: *E.coli*, ammonium, NO_x, Human MST, caffeine, sucralose, aquatic macrophyte stable nitrogen isotopes
 - Sanitary Analysis: *E.coli* and Human MST

Phase 2 Sample Plan Site 11





Environmental Protection Division



With Gratitude...

- Geosyntec Consultants
 - Mark Ellard
 - Mike Hardin
 - Kenneth Hamilton
 - Karli Mahoney
 - Teresa Hudgens
- Orange County
 - Board of County Commissioners
 - EPD Field Team
- Barnes, Ferland and Associates
 - John Watson
 - Patrick Barnes Jr.
- Southern Research Laboratories
 - Sherri Payne
- University of Central Florida
 - Melanie Beazley
- University of South Florida
 - Anthony Menicucci



Questions?



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