

Lower Cypress Creek Pilot Project: Concurrent Assessment of *E. coli* Bacteria and Optical Brighteners

Cypress Creek Stakeholder Meeting
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THE MEADOWS CENTER
FOR WATER AND THE ENVIRONMENT
TEXAS STATE UNIVERSITY

TEXAS STREAM TEAM

What are *E. coli* Bacteria and Optical Brighteners?

***E. coli* Bacteria:**

- originate in the digestive tract of endothermic organisms
- Found in feces of warm-blooded animals
- Freshwater indicator of potential pathogen contamination
- Water quality standard for contact recreation use

Optical Brighteners:

- Chemical compounds or dyes added to laundry detergents, cleaning agents, textiles, synthetic fibers and many kinds of paper including toilet paper
- Used as a surrogate of wastewater contamination from illicit discharges in storm drains and failing septic systems
- Adsorb to cotton
- Fluoresce under ultraviolet light
- Where fecal contamination is known to occur, optical brighteners can assist in pollution screening and source identification

Lower Cypress Creek Pilot Project: *E. coli* and Optical Brighteners

Objectives:

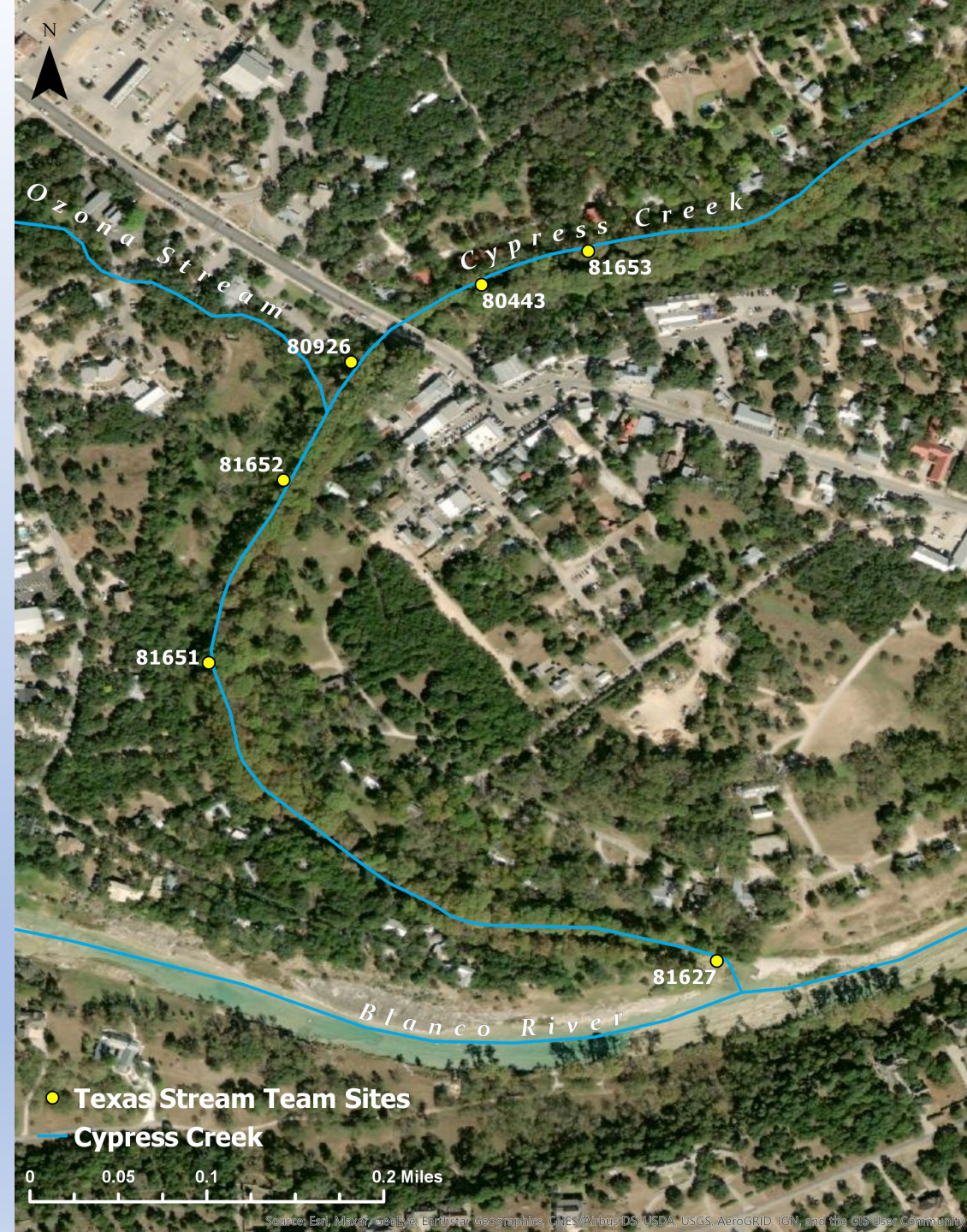
- Conduct intensive *E. coli* monitoring to discern potential sources of bacteria.
- Conduct bi-weekly (Sunday and Thursday) *E. coli* monitoring during different times of the week.
- Conduct optical brightener “tamplng” monitoring, concurrent with *E. coli* monitoring, as a pollution screening tool to detect presence/absence of optical brighteners associated with wastewater contamination.

Project duration:

- 13 weeks, June 24, 2021 – September 19, 2021

Sampling frequency:

- Six sites – from downstream to upstream
- Twice a week (Sunday and Thursday)



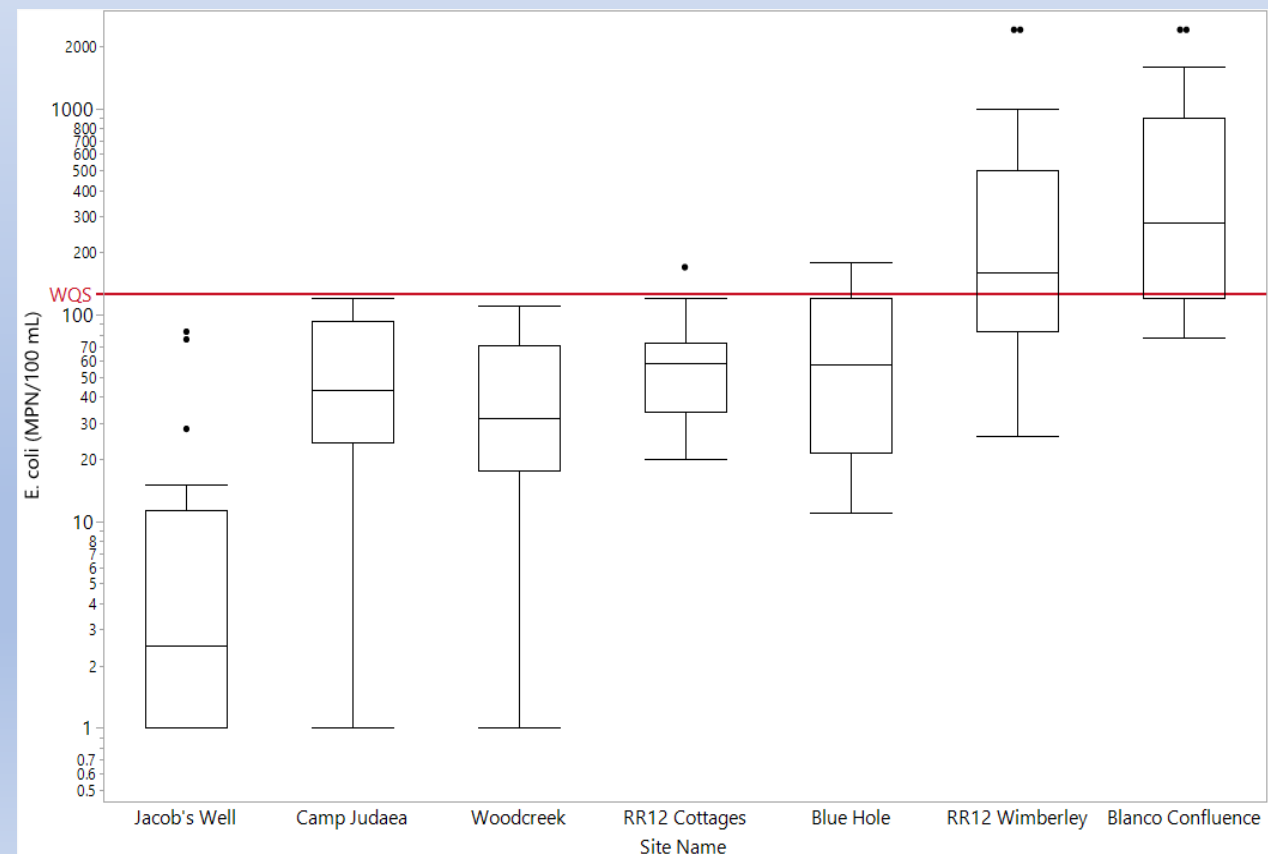
Cypress Creek Clean Rivers Program

Quarterly Monitoring Results
(Sep. 2016 - Jun 2021)

E. coli (MPN/100 mL)

- WQS is 126 MPN/100 mL
- Geometric mean for all sites combined is 55.2 MPN/100 mL
- Geometric mean above WQS at two sites
 - RR12 Wimberley
 - Blanco River Confluence

Station Name	No. Samples	Geometric Mean (MPN/100 mL)
Jacob's Well	18	3.7
Camp Judea	10	34.6
Woodcreek Dr.	10	23.6
RR12 Cottages	18	52.9
Blue Hole	18	52.5
RR12 Wimberley	25	194.9
Blanco Confluence	18	330.0





Mexican Free-tailed Bats in Texas

- Texas is home to the world's largest bat colony – up to 20 million!
 - Bracken Cave near San Antonio
 - MFBs spend the summer raising pups – maternity colony
 - Arrive in late Feb/Mar and stay until Fall (Oct/Nov)
 - Migrate to caves in Mexico
- MFBs are the fastest bats in the world
 - Reach speeds up to 100 mph

(Bat Conservation International: [Mexican Free-tailed Bat - Bat Conservation International](#) accessed 4/25/2021)

Monitoring and Analysis

E. Coli bacteria:

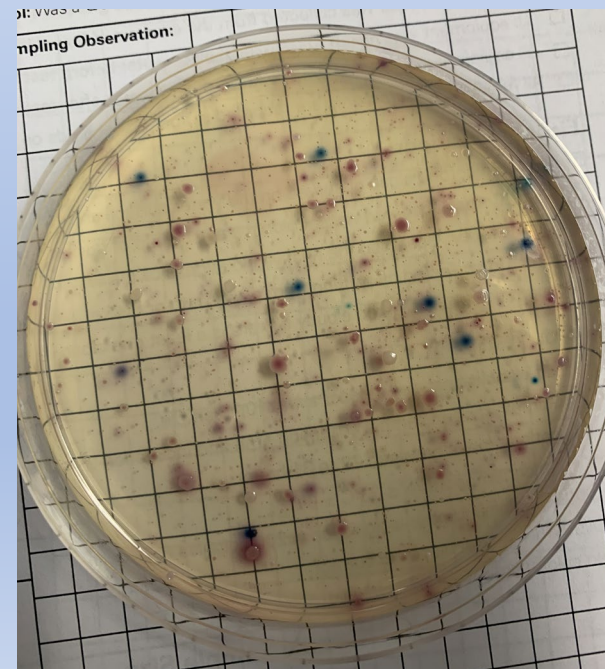
- Collect water sample (THU and SUN)
- Prepare sample, plate, and incubate
- Count bacteria colonies

Optical Brightener:

- Deploy organic tampon suspended in modified recycled water bottle
- Retrieve tampon and analyze wet/dry material under UV light to determine presence/absence

Core Water Quality Parameters:

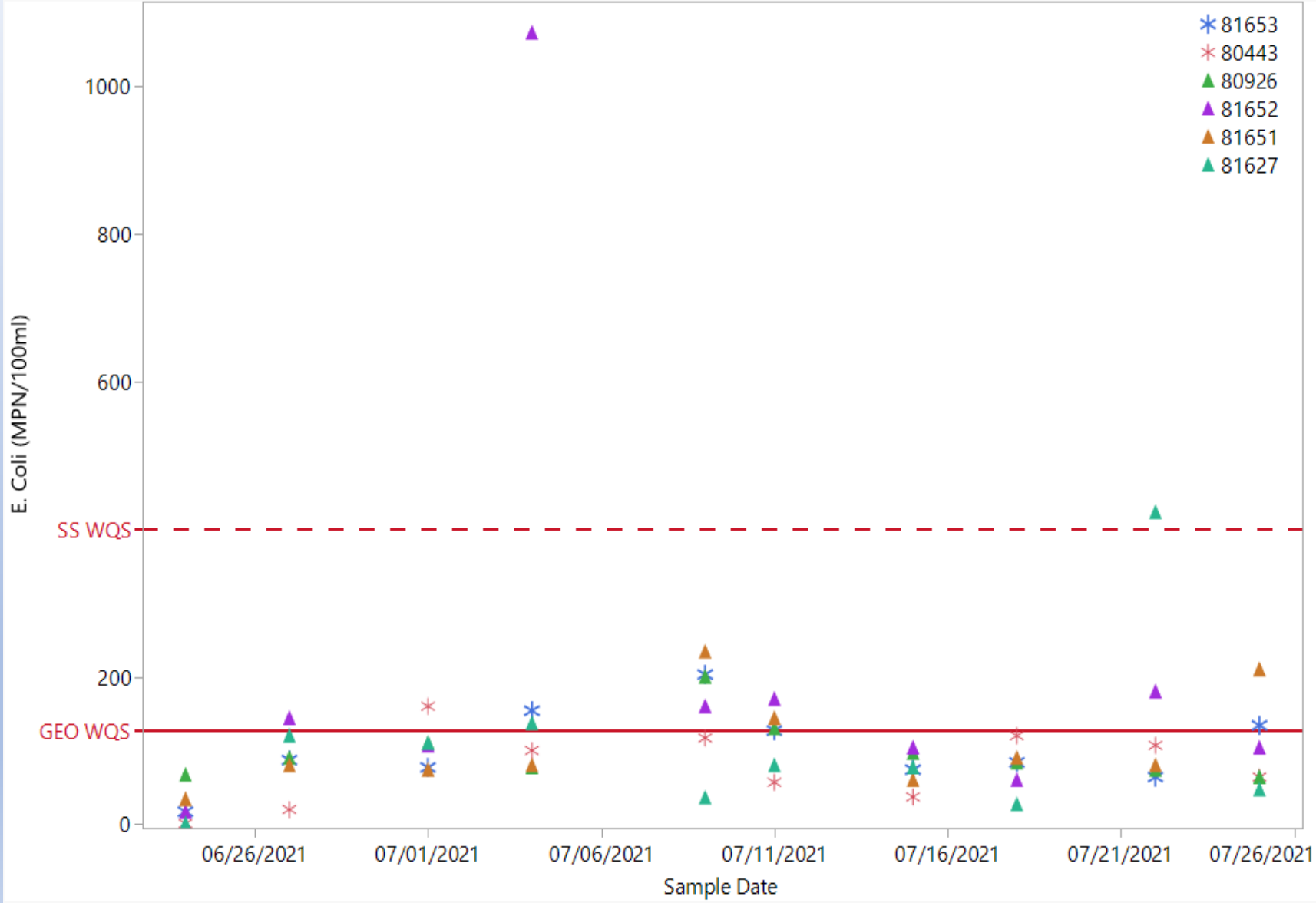
- Texas Stream Team Probe Core kit (water temperature, dissolved oxygen, pH, conductivity)
- Field observations



Preliminary Results

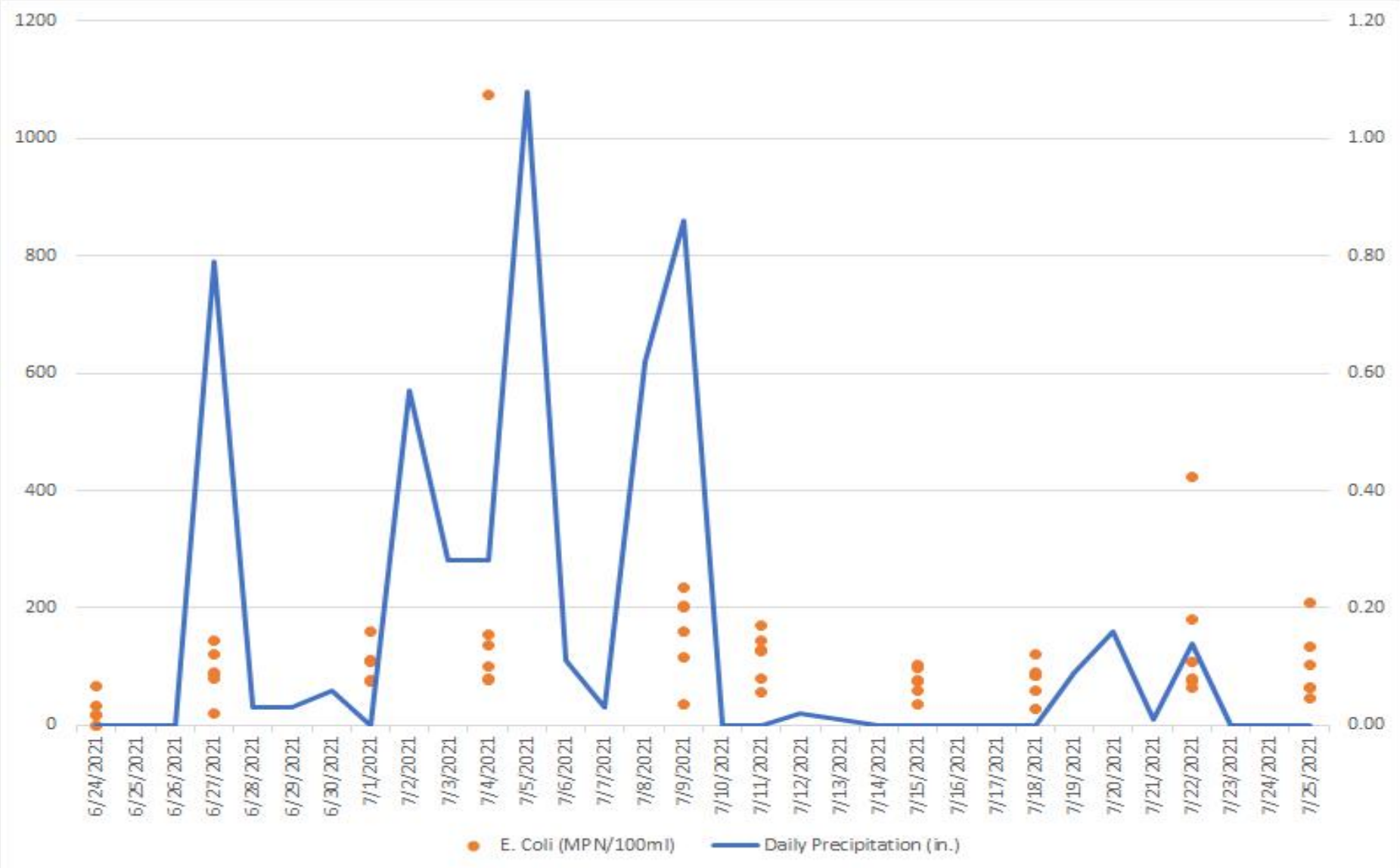
(June 24 – July 25)

Site (n=10)	E. Coli (MPN/100 ml) Geometric Mean
81653	87
80443	48
80926	94
81652	124
81651	93
81627	54



Preliminary Results

(June 24 – July 25)



Preliminary Results

- Higher geometric mean on Sunday than Thursday (Table 1)
- Higher geometric mean downstream of RR12 than upstream of RR12 (Table 2)



Table 1

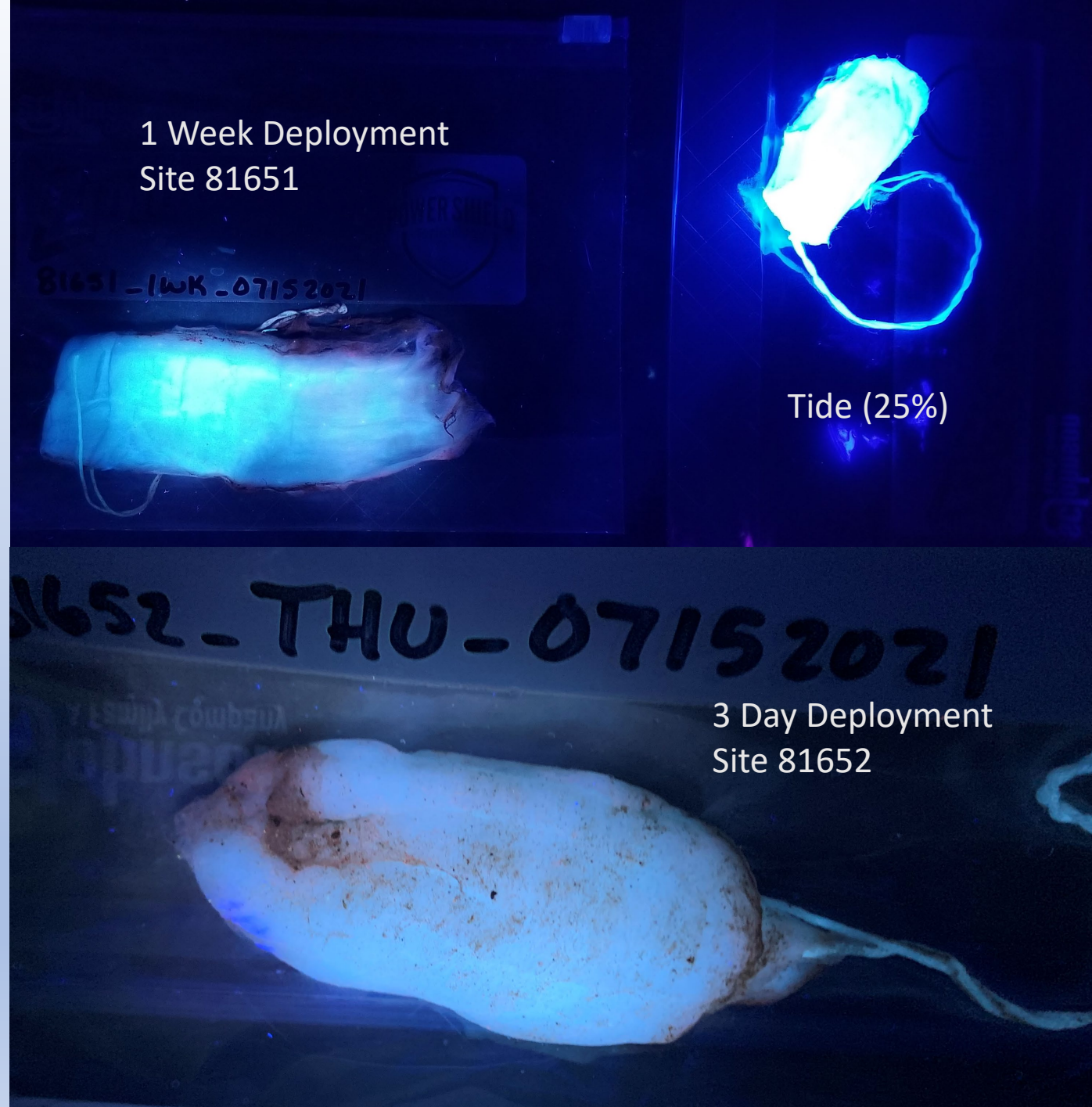
E. coli	High Activity - Sunday	Low Activity – Thursday
Geometric Mean	96	65
Minimum	20	1
Maximum	426	1,073
N	31	29

Table 2

E. coli	Upstream of RR12	Downstream of RR12
Geometric Mean	65	88
Minimum	1	1
Maximum	203	1,073
N	20	40

Optical Brightener 'Tamplimg' Sampling

- Four deployment/retrieval treatments:
 - 3-day (Thu-Sun)
 - 4-day (Sun-Thu)
 - 1 week
 - 2 week
- Fluorescence observed at all sites, for all events and treatments



Preliminary Observations

Bacteria geometric means were:

- Higher downstream of RR12 bridge than upstream
- Higher on Sundays than Thursdays
- Highest values at 81652 – downstream of Ozona Creek
- Lowest values at 80443 – Old Kyle Rd., with a close second at 81627 – Blanco River confluence

Bacteria spikes resulted at:

- Below Ozona Creek on 7/4/2021 likely a result of first flush runoff
- Blanco River confluence on 7/22/2021 after a rainfall event
- Positive results for all the optical brightener samples for all events/sites

Next Steps

- Continue sampling through September 19th
- Sample Spring Lake in San Marcos for comparison
- Literature review underway
- Land use analysis underway
- Consider extending project duration after bats migrate

Photo taken July 6, 2021

