

E. Coli Bacteria Monitoring in Cypress Creek to Assess Bat Colony Impacts to Water Quality

April 28, 2021

Sandra S. Arismendez, PhD
Water Quality Monitoring Coordinator



THE MEADOWS CENTER
FOR WATER AND THE ENVIRONMENT
TEXAS STATE UNIVERSITY

TEXAS STREAM TEAM

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)

Threats to and Benefits from Bats:

- Threats

- Habitat destruction
- Hunting
- Climate change
- Invasive species

- Ecosystem services

- Pest consumption
- Plant pollination
- Seed dispersal

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

Water Quality Monitoring Sites

- Texas Stream Team (monthly monitoring)
 - Old Kyle Rd.
 - RR12
 - Blanco River Confluence
- Clean Rivers Program (quarterly monitoring)
 - RR12 (GBRA)
 - Blanco River Confluence (MCWE)



E. Coli Bacteria Data Summary

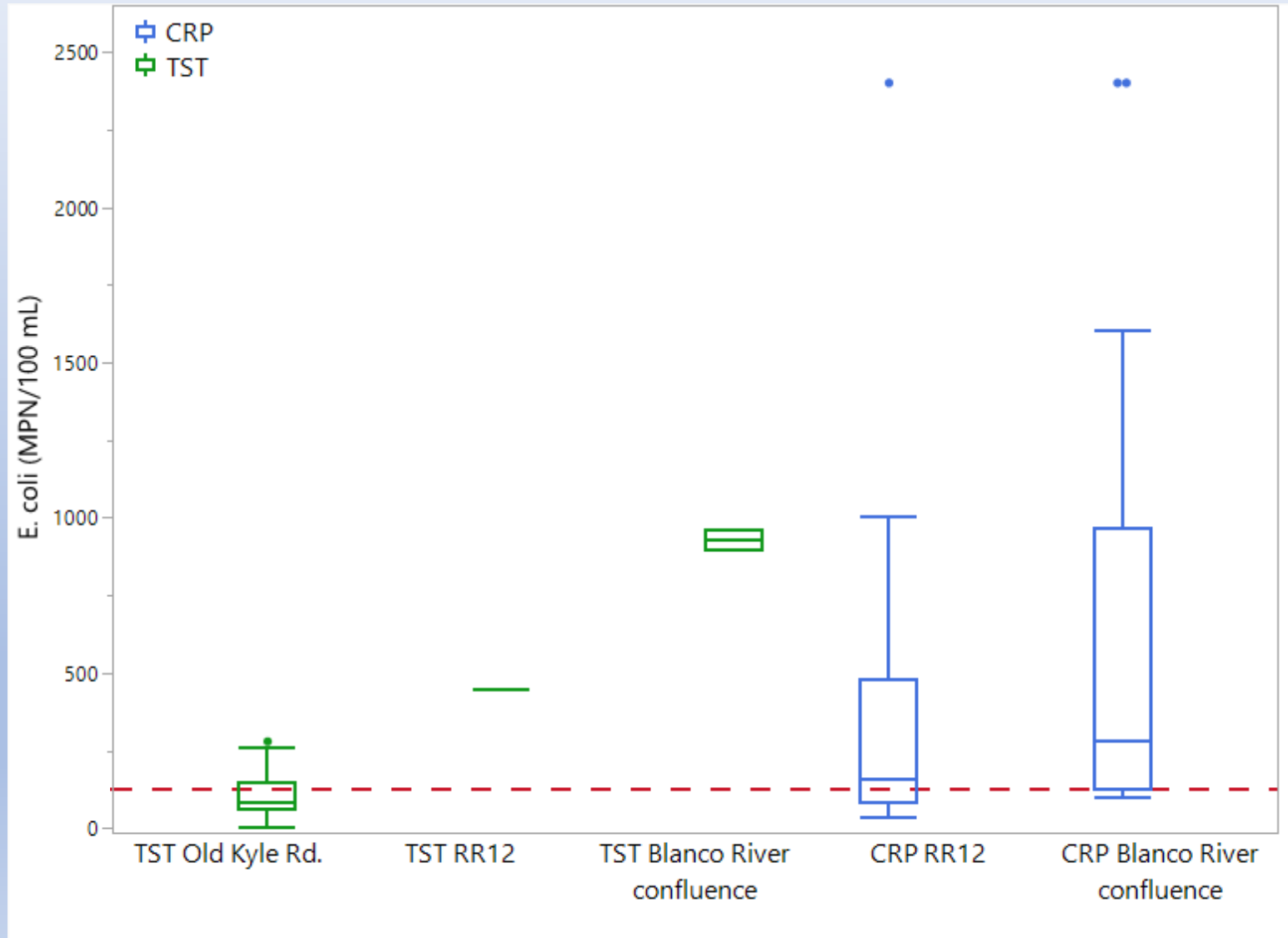
(Sep 2007-Feb 2021)

TCEQ Water Quality Standard for Primary Contact Recreation is 126 MPN/100mL over a 7-year assessment period.

Site	No. samples	E. coli Geometric Mean (MPN/100mL)
TST Old Kyle Rd. - 80443	26	95.3
TST RR12 - 80926	1	446.5
TST Blanco River confluence - 81627	2	926.7
CRP RR12 (GBRA) - 12674	19	196.3
CRP Blanco River confluence (MCWE) - 12673	16	360.4

E. Coli Bacteria Data Summary

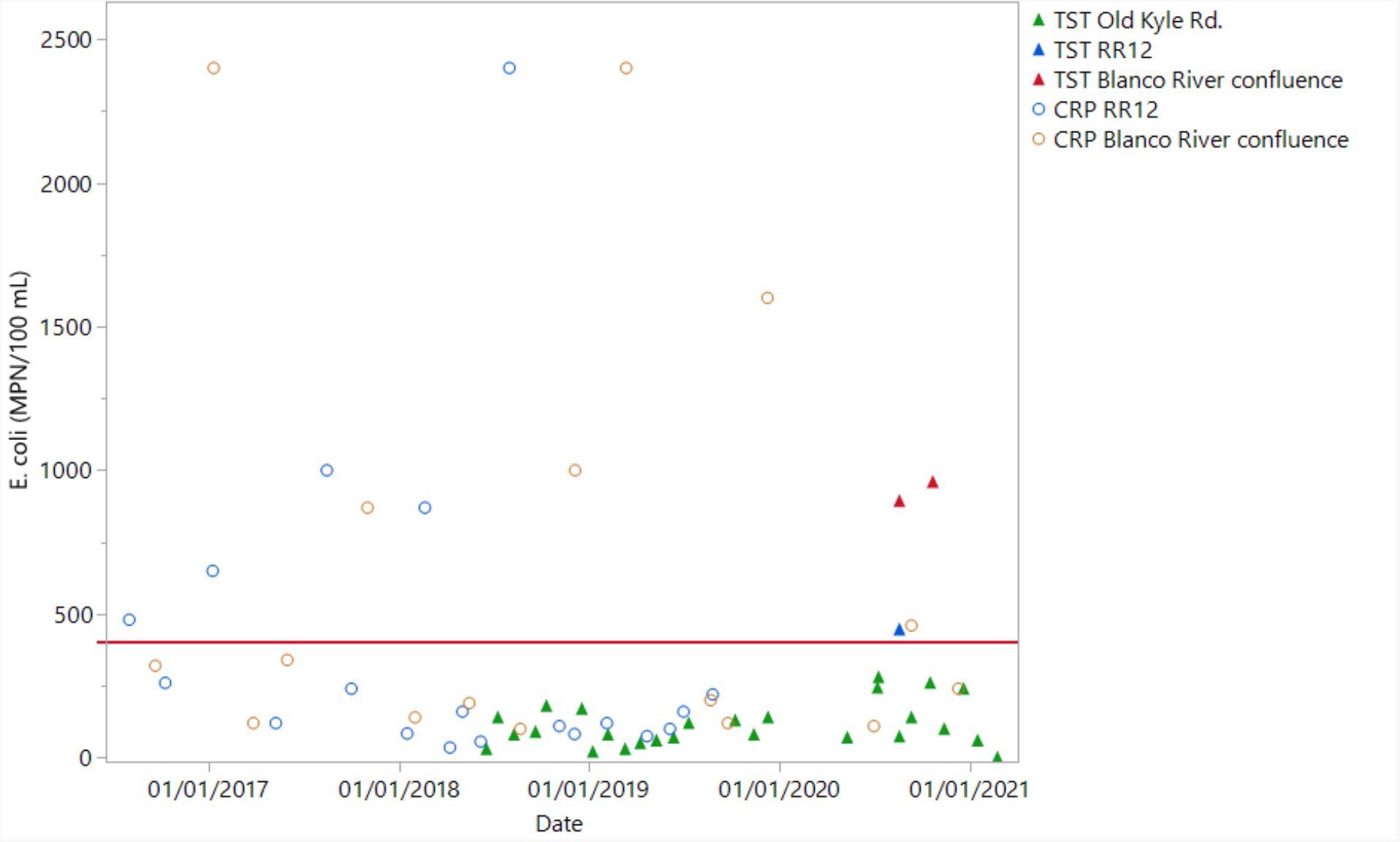
(Sep 2007-Feb 2021)



TCEQ Geometric Mean WQ
Recreational Use Criterion:
126 MPN/100 ml

E. Coli Bacteria Data Summary

(Sep 2007-Feb 2021)



TCEQ Single Sample WQ
Recreational Use Criterion:
399 MPN/100 ml

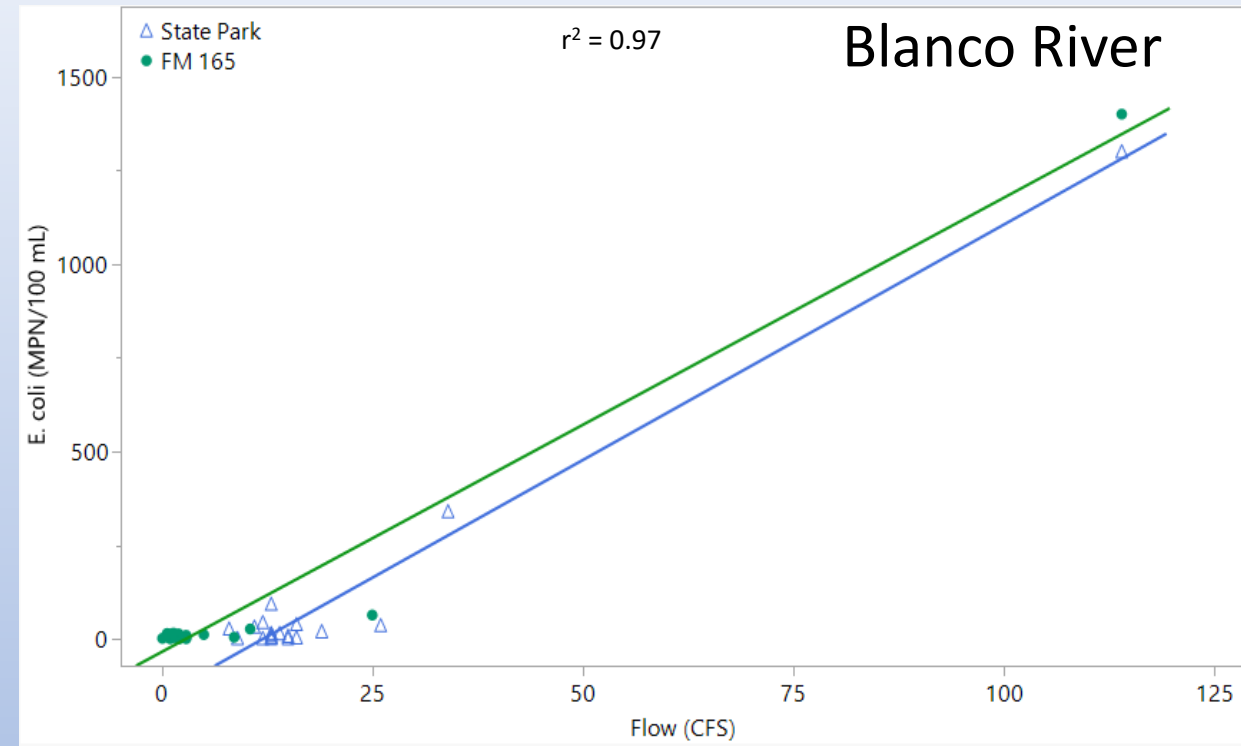
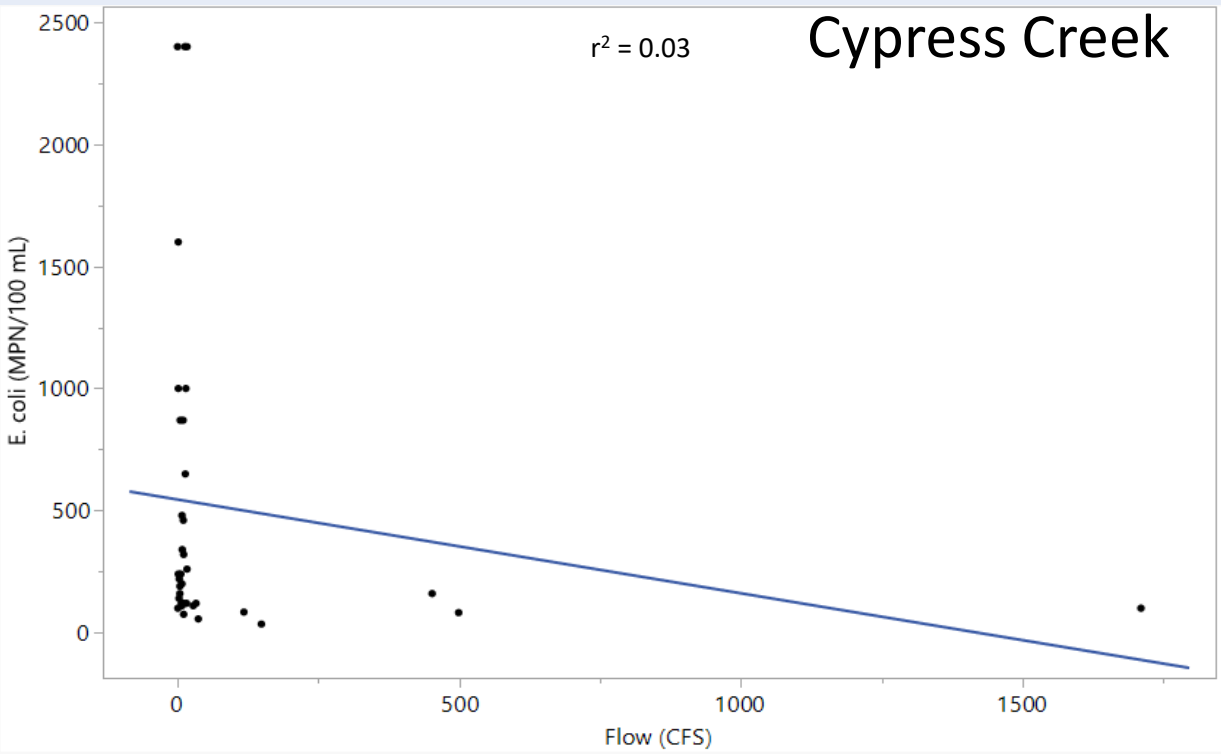
E. Coli Bacteria Data Summary

(Sep 2007-Feb 2021)

- Bat Migration
 - Absent Nov-Feb
 - Present Mar-Oct
- Geometric means slightly higher when bats are present both upstream and downstream of RR12 bridge
- Geometric mean higher when bats are absent at CRP Blanco River Confl. downstream of RR12 bridge
- Other factors besides bats may be influencing E. coli bacteria concentrations downstream of RR12 bridge

Site	Bats Absent - Geometric Mean (MPN/100 ml)	Bats Present - Geometric Mean (MPN/100 ml)
TST Old Kyle Rd.	90.2	97.8
TST RR12	ND	446.5
TST Blanco River Confl.	ND	925.7
CRP RR12	192.8	197.9
CRP Blanco River Confl.	694.5	243.2

E. Coli Bacteria vs. Flow Data Comparison



- Cypress Creek (Aug 2016 – Mar 2021)
 - Low correlation coefficient (r^2)
 - E. coli bacteria not correlated with flow

- Blanco River (Sep 2019 – Apr 2021)
 - Strong correlation coefficient (r^2)
 - E. coli bacteria positively correlated with flow at two sites

Planned E. coli Bacteria Monitoring

Aja Martin:

- Trained Citizen Scientist
 - Standard Core
 - E. coli Bacteria
 - Riparian Evaluation
- Monthly sampling beginning April/May 2021
- Wildlife Biology Student at TST
- Works full-time in Austin

Sandra:

- Will assist Aja as needed
- Project could be used as a class project and/or for publication
- Informed Aja that funding was available for project supplies



Conclusion

- E. coli bacteria not correlated with flow
 - Reflects direct source of e. coli bacteria to Cypress Creek
- Factors that may be influencing E. coli bacteria in Cypress Creek:
 - Bats
 - OSSFs
 - Domestic pets
 - Other wildlife
- Recommend more frequent E. coli bacteria, field parameters and flow monitoring for both Texas Stream Team and Clean Rivers Program:
 - to capture temporal variability at a finer scale (e.g. weekly, biweekly, monthly), and
 - to assess correlation with bat migrations