

Water Quality Surveillance of the Lower Goose Creek Watershed in Loudoun County, Virginia

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July 20, 2021

APE December 14 2020 – January 22 2021

Virginia Cooperative Extension – Loudoun County

MPH Final Presentation

Committee and preceptor

◆ Justin Kastner, PhD, PgDip, MS

◆ James Hilleary, MMAS, MExtEd

◆ Charles Dodd, DVM, MS, PhD, DACVPM

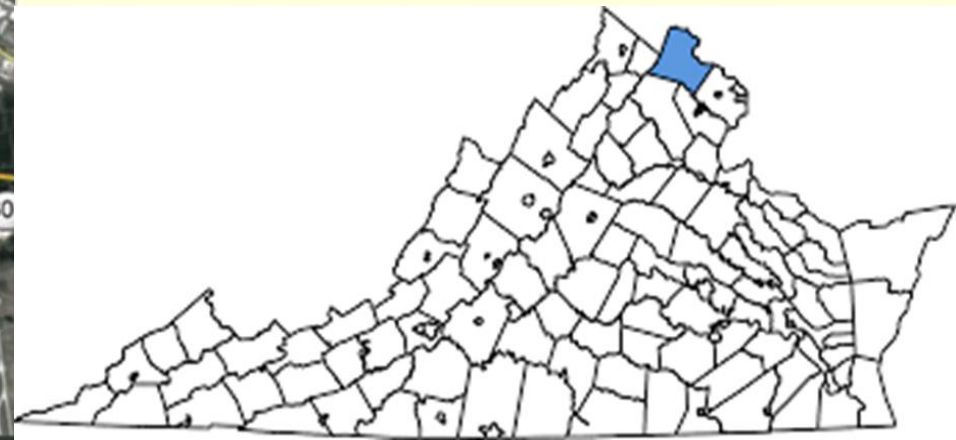
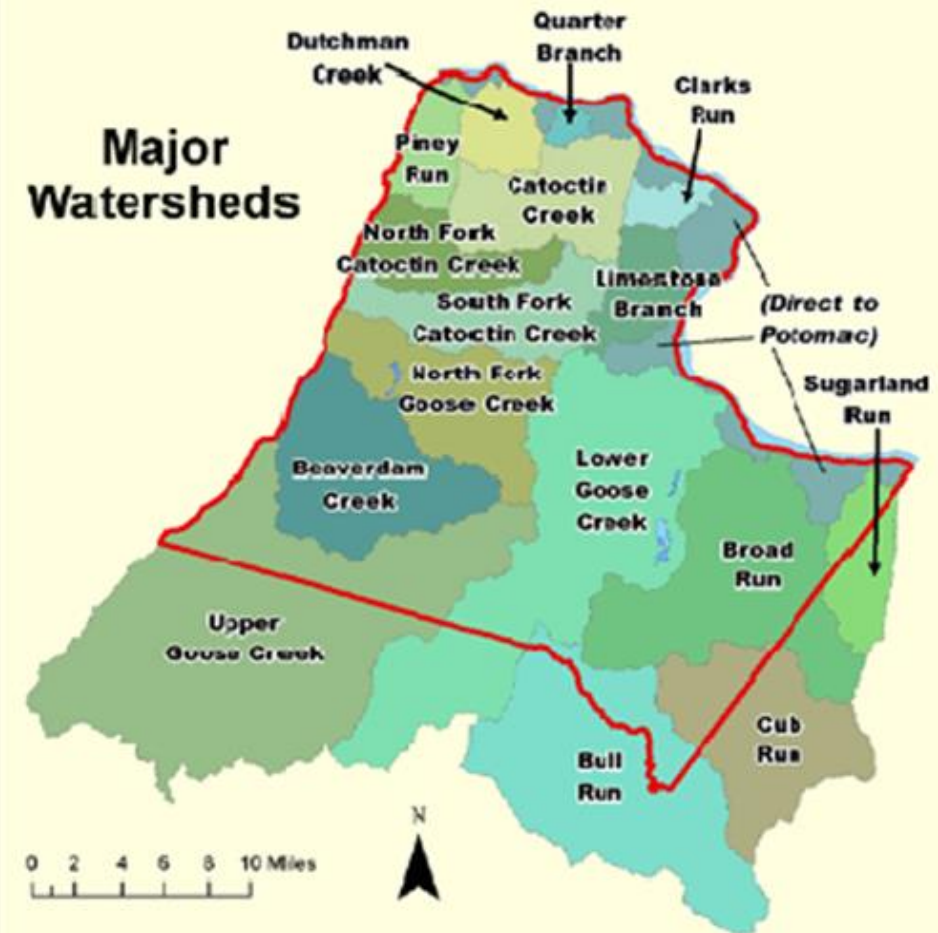
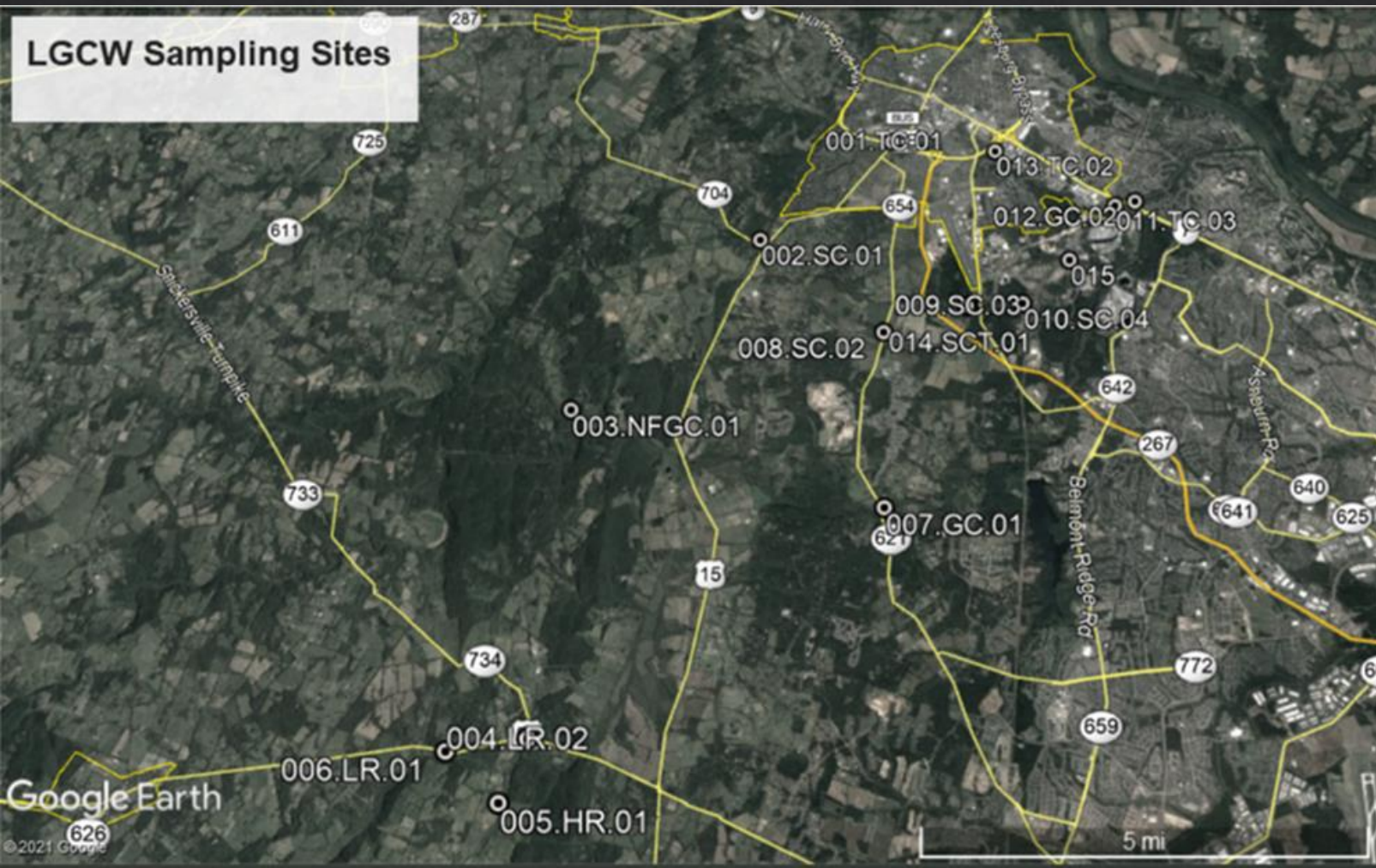
◆ Robert Larson, DVM, PhD, DACT, DACVPM, ACAN

◆ Ellyn Mulcahy, PhD, MPH

Stakeholders

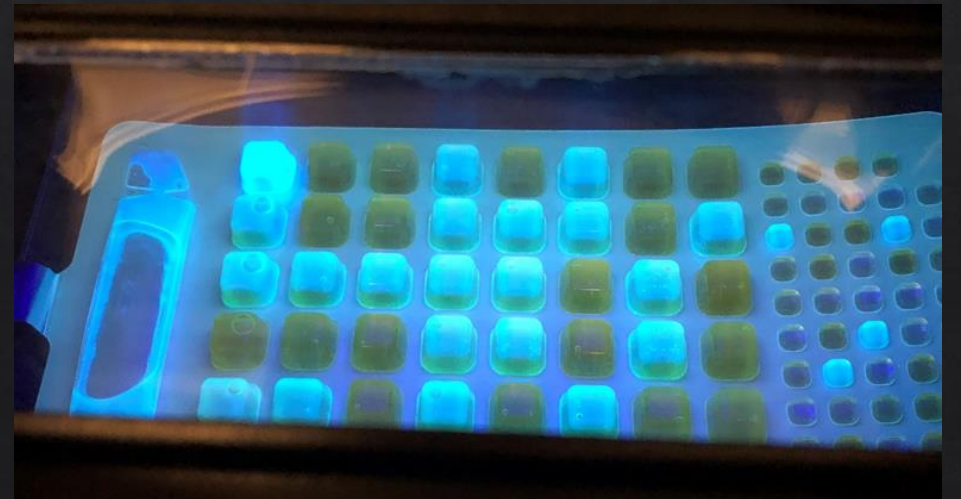


Location



Timeline

- ◆ Spent six weeks in Loudoun County
 - ◆ Surveyed potential sites for monitoring
 - ◆ Accessibility, safety, etc.
 - ◆ Read, read, read...
 - ◆ Sampled thirteen sites four times for water quality parameters
 - ◆ IDEXX Colilert-18 and Quanti-Tray Test Method



Obstacles



Deliverables

- ◆ Presented results to the LSWCD
- ◆ Submitted data to Virginia DEQ and Loudoun County Dept. of Building and Development
- ◆ Created a handout on agencies involved with water quality

Impairment

- ◆ Does not meet water quality standards for a certain pollutant
- ◆ Does not support designated uses:
 - ◆ Aquatic life
 - ◆ Fish consumption
 - ◆ Public water supply
 - ◆ Recreation (swimming)
 - ◆ Shellfishing
 - ◆ Wildlife
- ◆ Result in the development of a cleanup plan – Total Maximum Daily Load (TMDL)
 - ◆ Mandated by state and federal laws
 - ◆ Goal: pollutant reduction

Legislation for *E. coli* impairment: 9VAC25-260-170

Prior to May 27, 2021:

- Monthly geometric mean ($n \geq 4$) of 126 CFU/100 mL

OR

- Sample maximum ($n \geq 2$) of 235 CFU/100mL

As of May 27, 2021:

- Assessment period of up to 90 days ($n \geq 10$)
 - Geometric mean of 126 CFU/100mL

AND

- “Greater than 10% excursion frequency of a statistical threshold value of 410 CFU/100mL”

Selected observations and findings

- ◆ Temperature, nutrients, dissolved oxygen, pH were acceptable for water quality
- ◆ Turbidity and conductivity are not included in water quality criteria
- ◆ *E. coli* (CFU/100mL)
 - ◆ Range: 24.1 – 1,299.70
 - ◆ Tuscarora Creek ($\bar{x}$): 83.80
 - ◆ Sycolin Creek ($\bar{x}$): 316.97
 - ◆ Little River ($\bar{x}$): 148.3
 - ◆ Goose Creek ($\bar{x}$): 228.1

Reflections (ILE, pp. 25-29)

◆ Organizational categorization and nomenclature

◆ Sample identification and coordinates

1	Site ID	Waterway	Road	Latitude	Longitude	DEQ/Loudoun ID	Latitude (DEQ)	Longitude (DEQ)
2	LGCW.001.TC.01	Tuscarora Creek	Rt. 15	39.101276	-77.573666	LOGC-205-H-2009	39.11	-77.56
3	LGCW.002.SC.01	Sycolin Creek	Rt. 797/Mt. Gilead	39.077005	-77.606916	1ASYC007.43	39.076944	-77.6075
4	LGCW.003.NFGC.01	N. Fork Goose Creek	Rt. 733/ Goose Creek Ln.	39.038922	-77.64979	NA	NA	NA
5	LGCW.004.LR.02	Little River	Rt. 632/ Aldie Dam Rd.	38.976216	-77.65105	1ALIV-17-SOS	38.97558	-77.6512
6	LGCW.005.HR.01	Hungry Run	Rt. 632 / Aldie Dam Park Rd.	38.965486	-77.6555707	1AHUN-17a-SOS	38.96556	-77.65556
7	LGCW.006.LR.01	Little River	Rt. 629/ Champe Ford Rd.	38.974186	-77.668135	1ALIV006.92	38.97436	-77.66717
8	LGCW.007.GC.01	Goose Creek	Rt. 621/ Evergreen Mills Rd.	39.018333	-77.575299	NA	NA	NA
9	LGCW.007B.GC.01	Goose Creek	Rt. 621/ Evergreen Mills Rd.	39.018809	-77.577688	1AGOO011.23	39.01786667	-77.57606667
10	LGCW.008.SC.02	Sycolin Creek	Rt. 649/Rt. 621 Dunlin Rd.	39.05538	-77.575631	1ASYC004.93	39.05558	-77.57656
11	LGCW.009.SC.03	Sycolin Creek	Rt. 653/ Shreve Mill Rd.	39.061224	-77.555282	NA	NA	NA
12	LGCW.010.SC.04	Sycolin Creek	Rt. 652/ Gant Ln.	39.061668	-77.541413	1ASYC002.03	39.0619444	-77.54166667
13	LGCW.011.TC.03	Tuscarora Creek	Rt. 653/ Cochran Mill Rd.	39.084672	-77.516675	1ATUS000.37	39.08417	-77.5169
14	LGCW.012.GC.02	Goose Creek	Rt. 653/ Golf Club Rd.	39.085703	-77.511499	1AGOO002.38	39.08555555	-77.51138889
15	LGCW.013.TC.02	Tuscarora Creek	Rt. 654/ Lawson Rd.	39.098589	-77.546785	LOGC-207-H-2009	39.1	-77.55

Reflections (ILE, pp. 25-29)

- ◆ Threat of urbanization
 - ◆ Reduces access to historical sampling sites
 - ◆ Compromises safety
 - ◆ Contributes to pollutant contamination
- ◆ Historical Connections
 - ◆ The “Starving Time” (1609-1610)
 - ◆ Death from waterborne illnesses



Reflections (ILE, pp. 25-29)

◆ *E. coli*

- ◆ Data analysis complications
 - ◆ Small sample size
 - ◆ Difficulty in accessing government data
 - ◆ How to interpret reports where the criteria are now out of date?

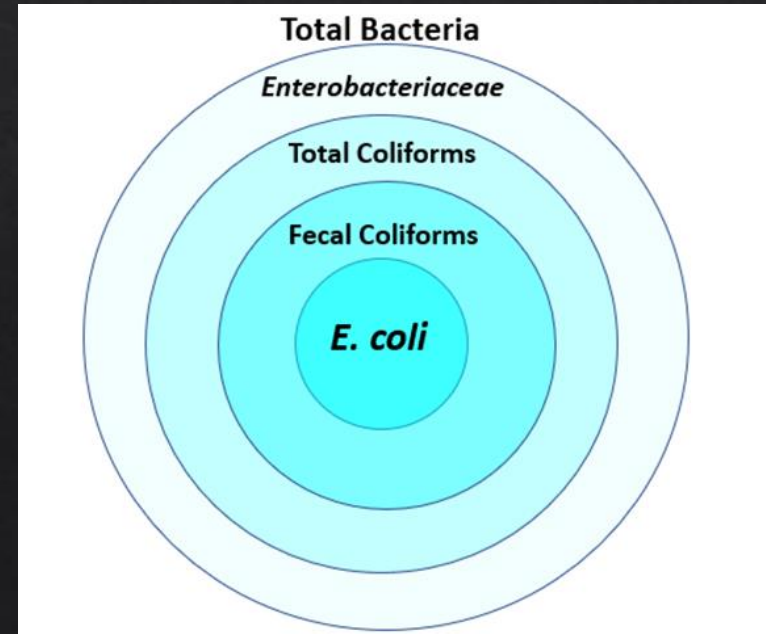


Future Applications

- ◆ Microbial Source Tracking
- ◆ Seasonal analysis of *E. coli* concentrations

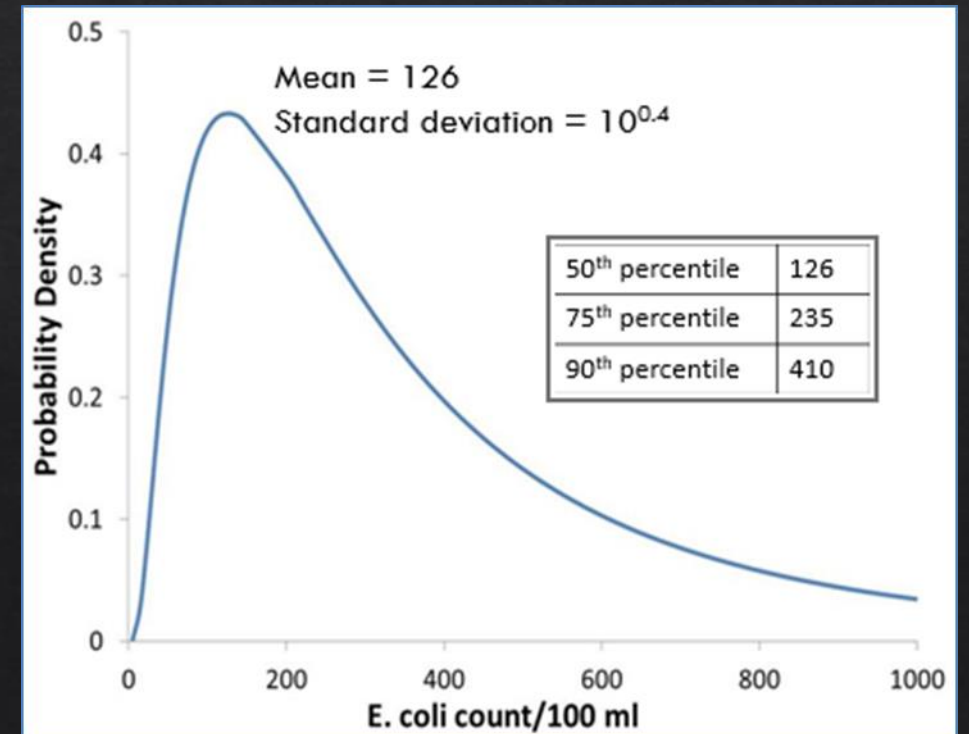
Most relevant coursework

- ◇ Veterinary Bacteriology and Mycology
- ◇ Multidisciplinary Thought and Presentation
 - ◇ Value of citizen science and communication



Most relevant coursework

- ◆ Biostatistics
- ◆ Introduction to Epidemiology





Questions?

