Mitchell Creek Source Tracking Project

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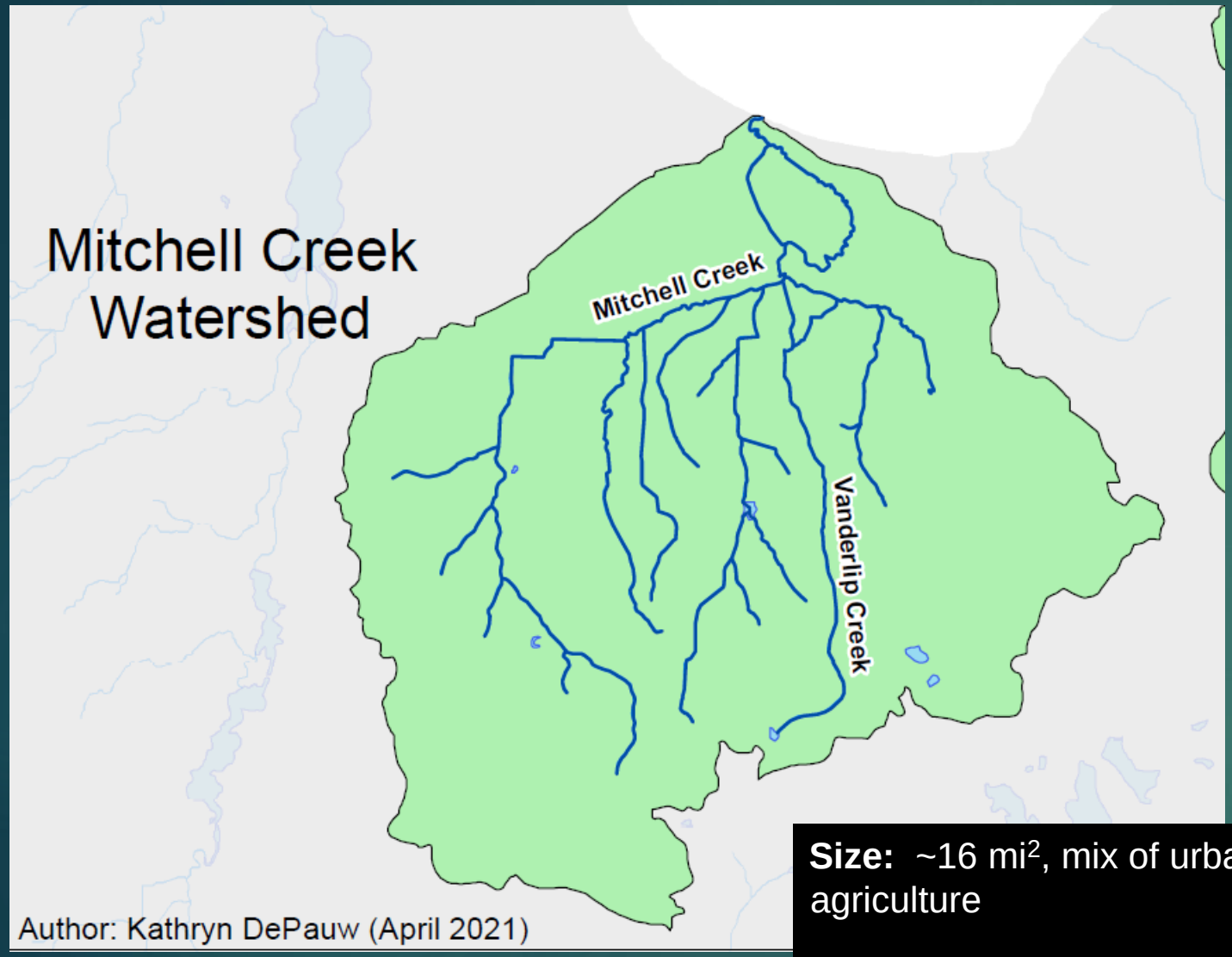
The Watershed Center

Mitchell Creek Impairment



On State Impaired Waters List (303(d) List) for:

Total Body Contact

Results of monitoring efforts by TWC in 2015
11 locations, weekly, 12 weeks

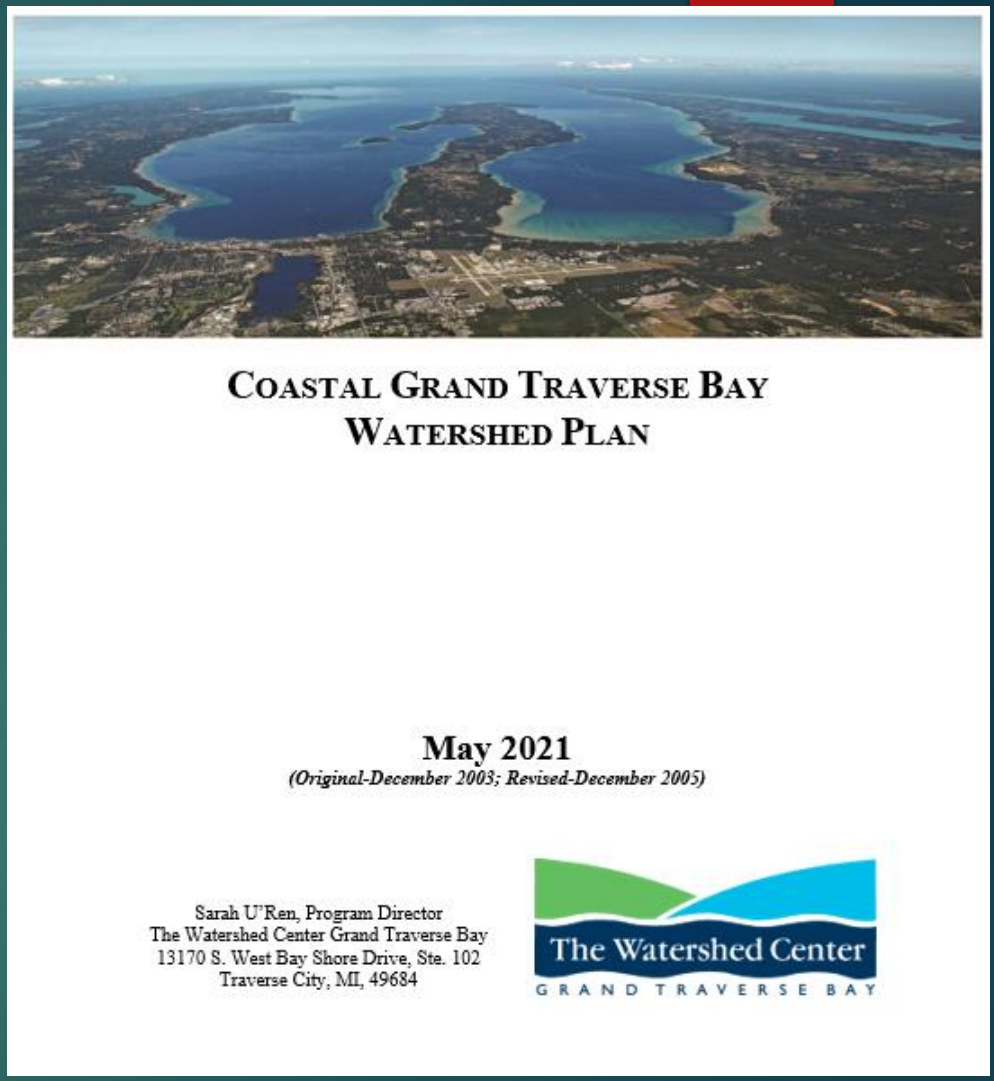
Size: ~16 mi^2, mix of urban and wetland land cover, with headwaters mostly agriculture

Issues:

- Elevated *E.coli* bacteria levels, not meeting State Water Quality Standards
- Potential public health issue, creek outlets next to State Park Beach

Watershed Plan Recommendations for Mitchell Creek

*** Noted as critical area in Coastal Grand Traverse Bay Watershed Plan ****



Recreation, Safety, and Human Health Tasks

- **#2 -** Mitchell Creek *E. coli* Impairment (GT County): Conduct source tracking study to determine sources of bacteria impairment and identify and prioritize steps that should be taken to reduce bacteria input to the creek.

- #3 - Mitchell Creek *E. coli* Impairment (GT County): Implement measures and Best Management Practices identified in above task to reduce bacteria inputs to Mitchell Creek, resulting in its removal from Impaired Waters List.

EGLE Grant

September 2020, awarded EGLE NPS grant to conduct microbial source tracking (MST) study to determine causes of elevated bacteria levels

Is it human or animal related? Are septic system contributing to problem? If animal, which one(s)?

Partners:

MICHIGAN STATE UNIVERSITY

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

CITY OF TRAVERSE CITY

EAST BAY CHARTER TOWNSHIP

SOS ANALYTICAL

GRAND TRAVERSE COUNTY Health Department

The CHARTER TOWNSHIP of GARFIELD
Grand Traverse County, Michigan

Project Tasks

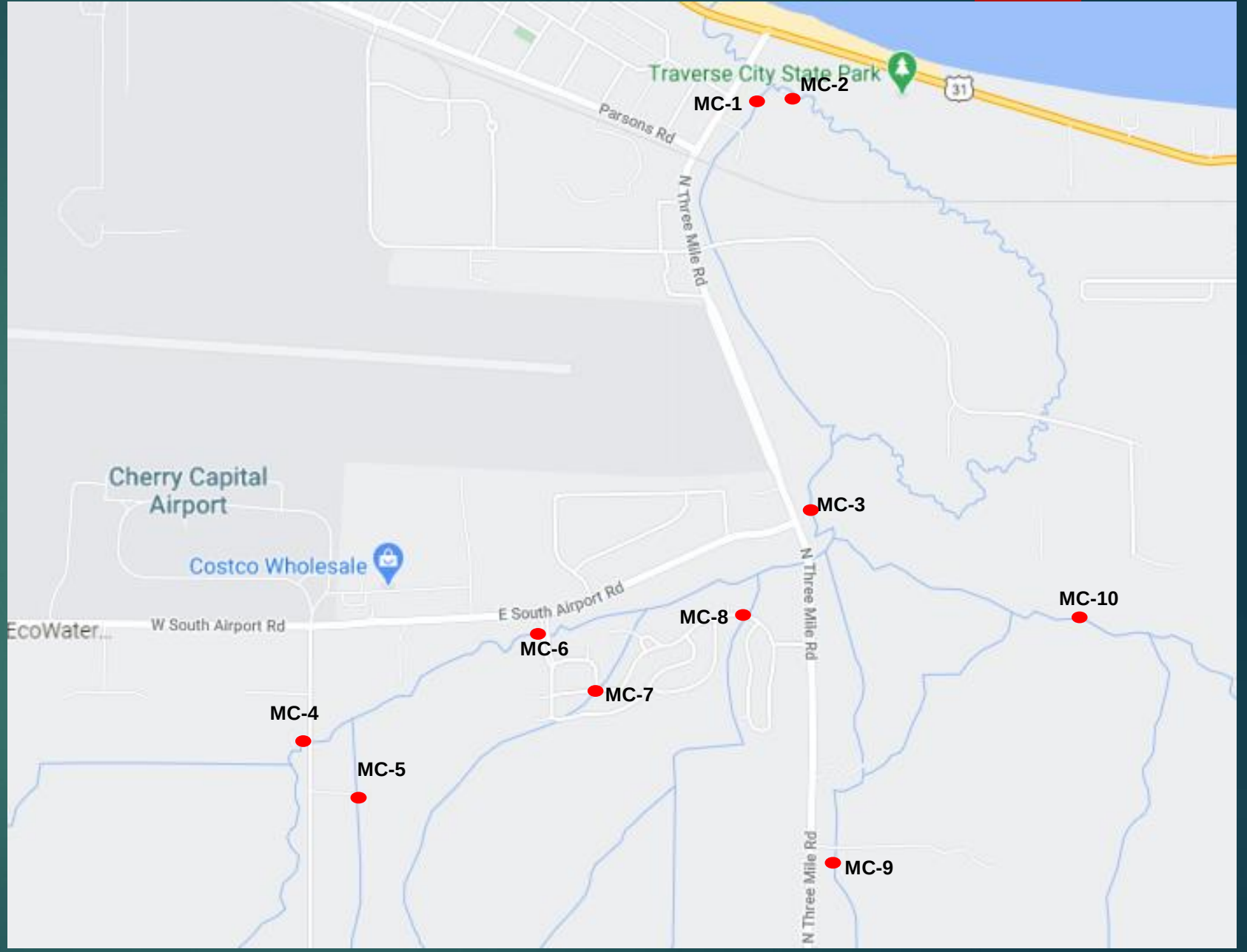
Surface Water Sampling 2021-2022

TEN Locations

FOUR Dry Weather events
- 7/12/21
- 8/4/21
- 9/20/21
- 10/18/21

TWO Wet Weather events
- 10/4/21
- 6/7/22

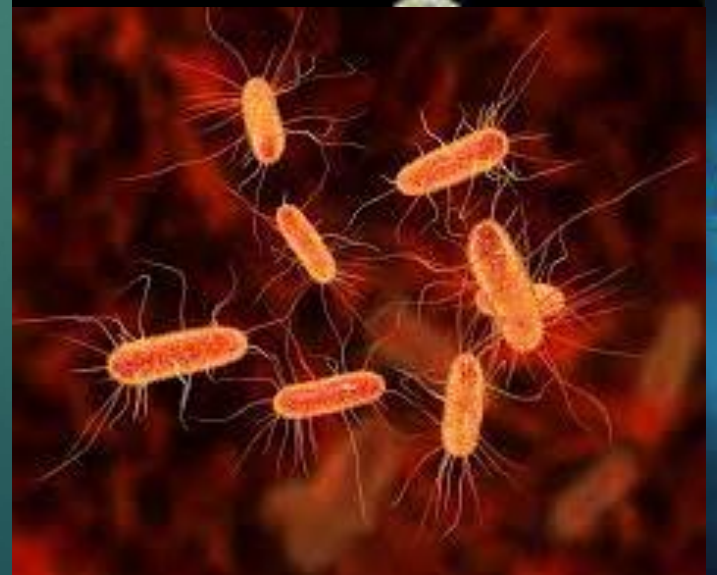
Parameters run on ALL samples – markers for fecal contamination
- *E.coli*
- Somatic coliphage indicator virus
- F-specific coliphage indicator virus
- *Clostridium perfringens*



- ***E.coli*:** A bacteria that is the State of MI standard for recreational and impaired waters associated with fecal contamination. (this is what we use for beach testing)

Other indicators

- ***Clostridium perfringens:*** Bacteria, anaerobe, spore former, often used to indicate “older pollution” and materials resuspended from sediments
- **F-Specific and Somatic Coliphage:** Both are viruses found on *E.coli*. Somatic usually persists longer. Both may be indicative of recent fecal pollution because neither regrows in the environment.



Microbial Source Tracking Analysis – 2022

Run on all *E.coli* samples >300 col/100mL

Completed by MSU lab using ddPCR (digital droplet)

MST Markers* Tested:

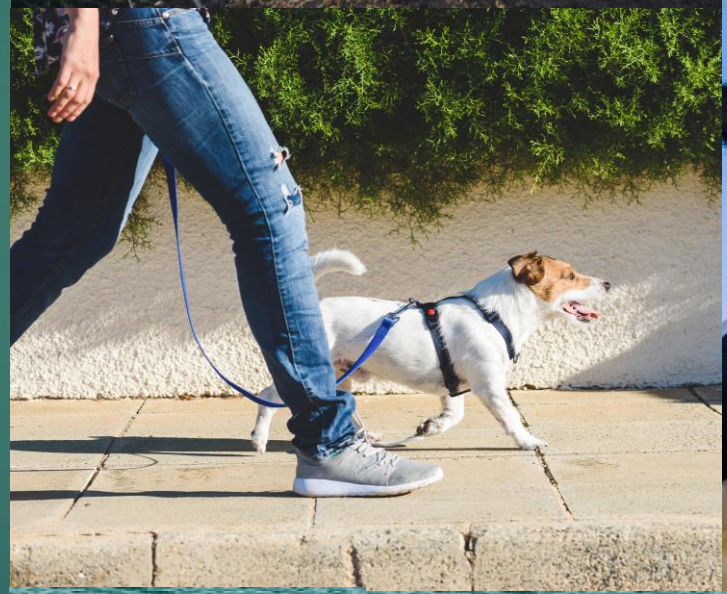
- Human
- Cow
- Pig
- Dog
- Gull

**MST Markers:*

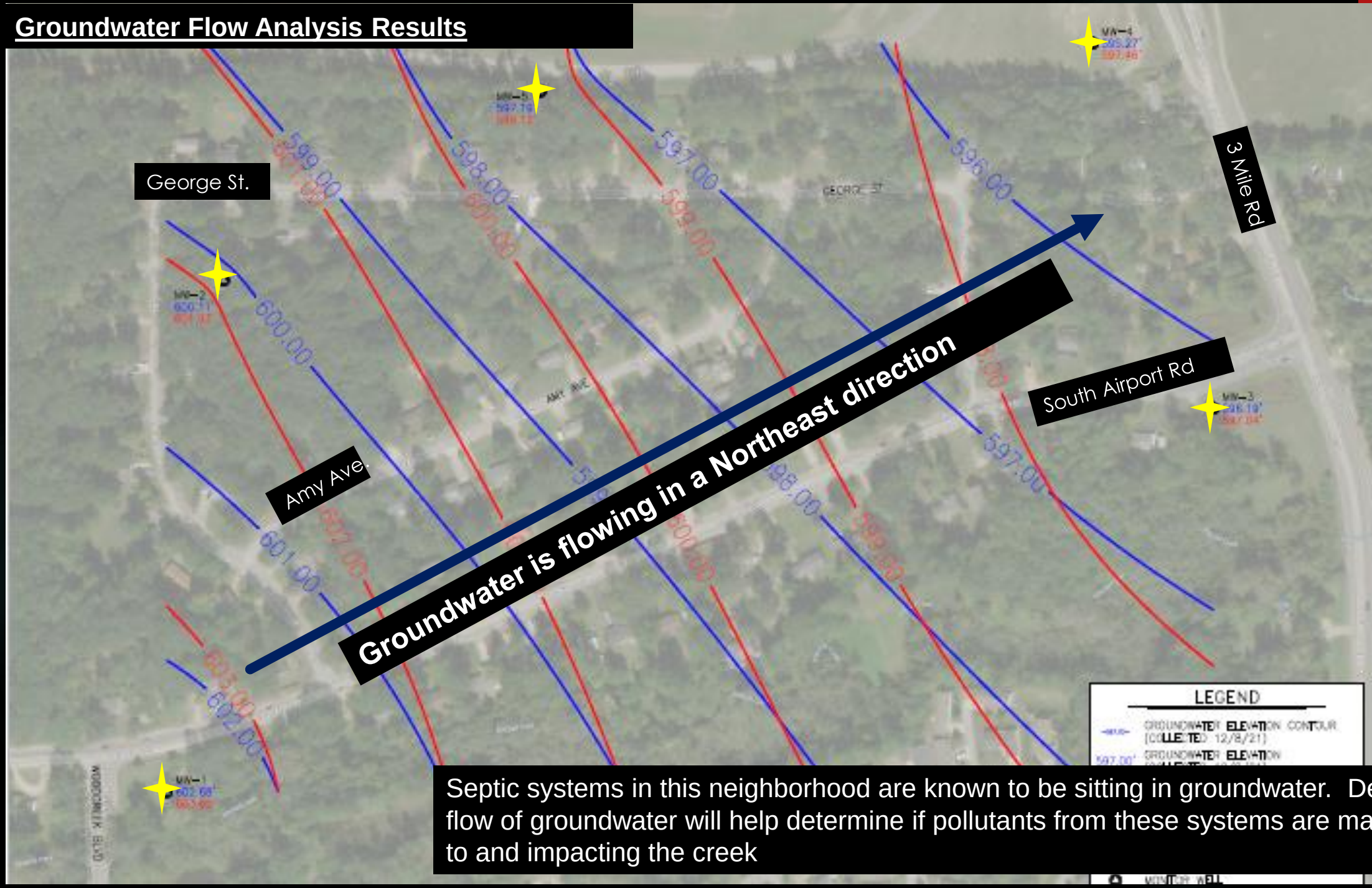
Molecular genes which are detected primarily in the fecal bacteria group the Bacteroides

Specific to animal hosts including humans, cows, pigs, bird, and dog

Each have different persistence



Groundwater Flow Analysis Results



Septic systems in this neighborhood are known to be sitting in groundwater. Determining the flow of groundwater will help determine if pollutants from these systems are making their way to and impacting the creek

ECT Consulting & Technology, Inc.

MITCHELL CREEK SOURCE TRACKING PROJECT

EGLE GRANT #2020-0006

21-0494
ECT PROJECT NUMBER

DESIGNED BY | CHECKED BY

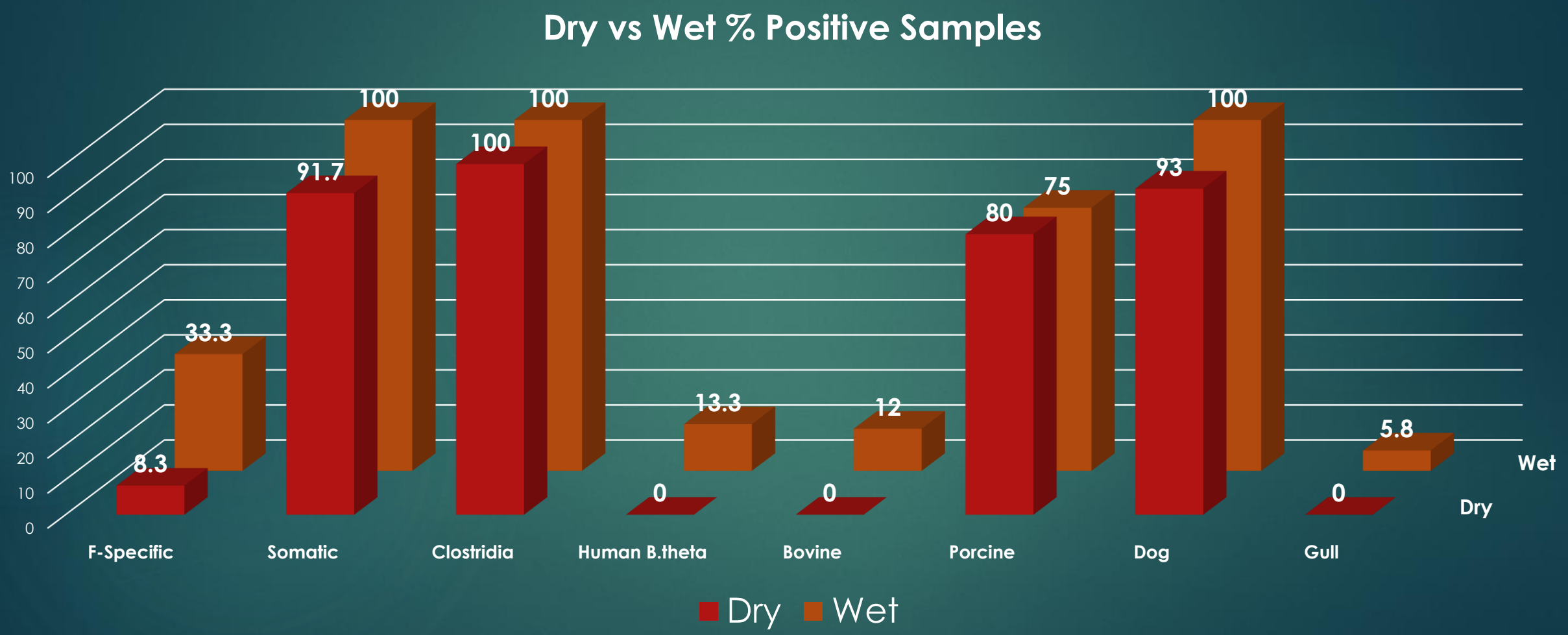
BJB DRAWN BY | JSL APPROVED BY

SHEET TITLE

GROUNDWATER FLOW DIAGRAM

SCALE: 1" = 200' @ 11x17

Source Tracking Results



***Takeaway – more indicators found during wet weather sampling*

Emerging Patterns and Initial Findings

- Clear temporal pattern, rainfall driven
- Sites MC 3 and 6 - higher during rain for coliphages and human marker, indicates fresh source
- Potential pig sources in western tributaries, perhaps land applications
- Pig and canine markers found everywhere… but not paired with increases in indicator coliphages, which suggests release from environmental reservoirs, such as the sediments, from older contamination events
- Canine marker could also indicate coyote and fox inputs and not necessarily dogs

SUMMARY

IT'S COMPLICATED!!

Many different ways to look at data, not enough time to discuss details here

Some additional things to look into further:

- are contaminants being released during wet events
- potential human impacts
- some potential hotspots for human and pig contamination

Next Steps

- Identify Potential Human Input
  - MSU To Run More MST Analysis
    - Human Marker - HF183
    - All wet weather samples and all samples from MC3 and MC6
  - Groundwater Well Water Quality Monitoring
    - Collect samples from all 5 wells
    - Fall 2022 and Spring 2023
    - Test for: E.coli, Human Markers BTheta and HF183, Clostridium, Coliphages
  - Septic Tank Sites
    - Health Department to identify all parcels with septic systems on south side of South Airport Road along Mitchell Creek between Townline and 3 Mile roads, as well as those on west side of 3 Mile Road north of intersection with South Airport
- Identify Potential Pig Input
  - TWC and Health Department to look at all potential pig farms in Mitchell Creek Watershed (location and numbers of pigs)
  - Research potential locations of land application of pig manure (not regulated)

Thank you!
And
STAY TUNED FOR MORE!!

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