Lower Cass River Watershed Source Tracking Project
Summary Report – July 2025

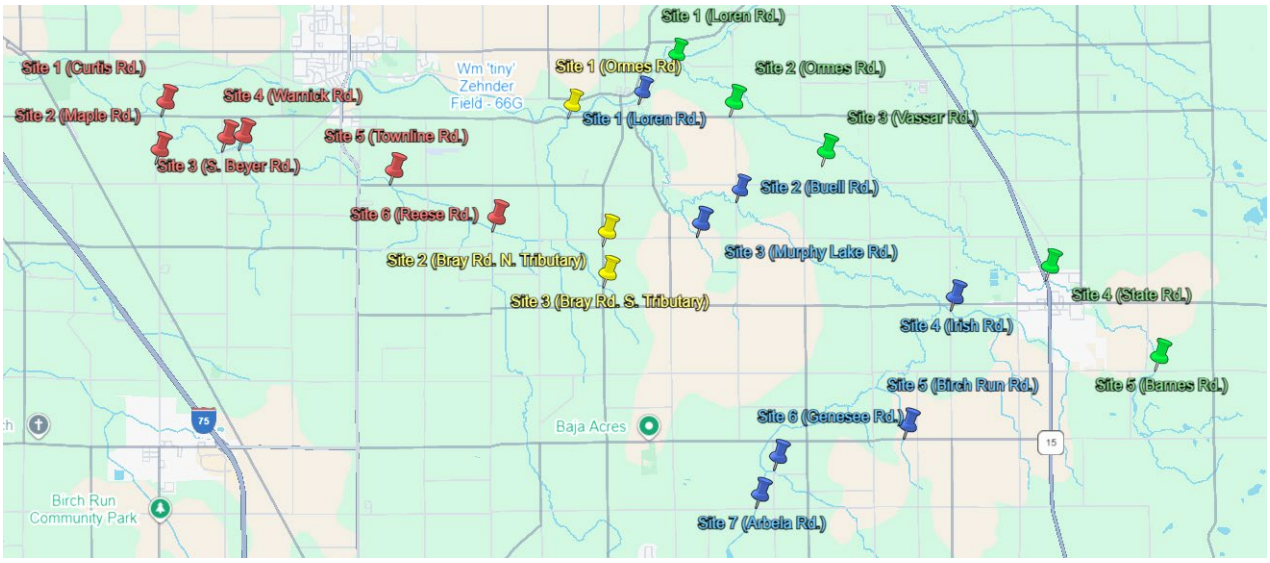
Background

The Lower Cass River includes areas of Vassar and downstream to the confluence with the Saginaw River in James Township, Saginaw County and includes the tributaries of Goodings Creek, Perry Creek, Millington Creek, Dead Creek and Cole Creek. The Lower Cass River is currently on the State of Michigan's Impaired Waters List due to elevated levels of E. coli bacteria that exceed Michigan water quality standards. The Michigan Department of Environmental Quality collected data in 2010 and 2012 to document exceedances of E. coli for total body contact use in the Lower Cass River. The Total Maximum Daily Load (TMDL) report shows that tributaries of the Cass River including Cole, Perry, Dead, and Millington exceed acceptable levels of E. coli for total body contact and occasionally exceed acceptable levels of E. coli for partial body contact.

The Saginaw Conservation District recently completed a Department of Environment, Great Lakes and Energy (EGLE) Nonpoint Source Program grant working in partnership with Independent Labs of Saginaw Valley State University and the Cass River Greenway to conduct E. coli bacteria monitoring and source tracking on water samples collected from 21 sites across Cole, Dead, Perry and Millington Creeks. The main objective was to determine whether the source of E. coli bacteria contributions is primarily human, bovine, ruminant, or a combination and which tributary is contributing the highest levels, through samples subjected to DNA analysis.

Sampling Program

Surface water samples were collected between July and September 2024 during both wet and dry weather and analyzed for E. coli. If a sample exceeded a certain threshold for E. coli, it was also analyzed for Microbial Source Tracking (MST) markers for human, bovine (cow), and ruminant (cow, deer, sheep) sources.



Sampling sites on Cole (yellow), Dead (red), Perry (blue) and Millington Creeks (green)

Results and Conclusions

This study found elevated levels of E. coli throughout the watershed during both wet and dry weather sampling events. These findings were expected as previous studies, referenced above, found similar results that led to the river being placed on the State's Impaired Water's List. Bacteria results don't appear to be exclusively rainfall driven as high levels were found during both wet and dry sampling events.

Cole Creek Colilert Geomean			
Date	**Site 1**	**Site 2**	**Site 3**
7/17 (Wet)	*452*	*366*	*566*
8/5 (Dry)	*755*	**2420**	*686*
8/7 (Wet)	**2420**	*982*	**2275**
8/13 (Dry)	*558*	*759*	*919*
8/22 (Dry)	*963*	*782*	**2275**
	Exceeds Daily Partial Body Contact Standard (1,000col/100mL)		
	Exceeds Daily Total Body Contact Standard (300col/100mL)		

Dead Creek Colilert Geomean						
Date	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**
7/17 (Wet)	*981*	**2420**	**1007**	**1125**	*460*	*506*
8/5 (Dry)	*896*	**2266**	**1388**	**2420**	**1186**	**1954**
8/7 (Wet)	**2420**	**2420**	**2420**	**2420**	**2266**	**2420**
8/13 (Dry)	*579*	**1361**	**1513**	**2121**	**1382**	**1760**
8/22 (Dry)	*649*	*982*	**1250**	**1553**	*868*	**2121**
	Exceeds Daily Partial Body Contact Standard (1,000col/100mL)					
	Exceeds Daily Total Body Contact Standard (300col/100mL)					

Millington Creek Colilert Geomean					
Date	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**
7/17(Wet)	*961*	*757*	*443*	*332*	116
8/13 (Dry)	*700*	*772*	--	*447*	**1350**
8/28 (Wet)	**1097**	**1715**	--	*692*	*590*
9/4(Dry)	*717*	**1295**	--	193	*802*
9/11 (Dry)	*907*	**1189**	--	*537*	**1418**
	Exceeds Daily Partial Body Contact Standard (1,000col/100mL)				
	Exceeds Daily Total Body Contact Standard (300col/100mL)				

Perry Creek Colilert Geomean							
Date	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**	**Site 7**
7/17 (Wet)	*579*	*602*	*602*	*536*	*443*	*460*	*974*
8/13 (Dry)	*328*	*537*	*742*	*625*	*387*	**1240**	215
8/28 (Wet)	*516*	**1898**	**1279**	**2165**	*649*	*714*	*971*
9/4 (Dry)	260	*819*	*590*	*700*	*323*	*460*	*850*
9/11 (Dry)	*517*	*834*	*802*	--	287	*613*	**1471**
	Exceeds Daily Partial Body Contact Standard (1,000col/100mL)						
	Exceeds Daily Total Body Contact Standard (300col/100mL)						

Specific MST results are as follows:

Microbial Source Tracking results for the human, bovine (cow), and ruminate (deer, sheep, cow) markers were reported by SVSU's lab as low, medium or high. According to the SVSU lab, the ruminant target, while not exclusive to bovine, is more sensitive to cow feces than the actual bovine marker, meaning positive ruminant readings are most likely cow, even if the bovine marker came back as non-detectable in the same sample.

Cole Creek- High levels of the human marker were detected throughout the sampling period. The consistent findings of the human marker point to leaking or failing septic systems along this creek causing widespread impairment of the watershed.
Low to moderate levels of the Ruminate marker were detected throughout the sampling period.

Dead Creek- Low to moderate levels of the human marker were detected throughout the sampling period with moderate readings at sampling site #6 and low readings at sites downstream. One very high reading occurred at sampling site #1 during a wet sampling event. The consistent findings of the human marker point to leaking or failing septic systems along this creek causing widespread impairment of the watershed.
The ruminate marker appeared at a low to moderate level in samples from all sites on this creek throughout the sampling period.
The bovine marker was present in one sample of site #2 in a wet event.

Millington Creek- The human marker was undetected in all samples subjected to MST.
Moderate levels of the ruminate marker were detected throughout the sampling period,

however the highest reading of the ruminate marker in the study was found during a wet event at sampling site #1.

Perry Creek- Low to high levels of the human marker were detected throughout the sampling period with high readings at sampling site #6 and sampling site #7 on separate occasions. Low to moderate levels of the ruminate markers were detected throughout the sampling period. The bovine marker was present in two of the twelve samples tested for MST.

Hotspots requiring further investigation and follow up:

Cole Creek – The data points to human contributions being made south of site #3 and between #3 and #2 due to consistently high E. coli levels during wet and dry condition sampling. MST testing showed high levels of the human marker at these sites, with sample site #3 sharing the highest human marker reading of the study with Dead Creek sample site #1.

Dead Creek – Sampling site #1 shares the highest human marker reading of the study with Cole Creek sampling site #3. Both samples were taken during a wet weather event.
The data shows high contributions of the human marker during dry weather upstream of sampling site #6.

Millington Creek – The ruminate marker shows at a moderate level in wet and dry conditions across all sampling sites except site #5. The highest reading of the ruminant marker in the study originating from this creeks sampling site #1.

Perry Creek - The data points to human contributions being made upstream of sampling sites #6 and #7 due to high levels of the marker in samples obtained at these sites in both wet and dry events.
The ruminate marker showed up at a low to moderate level at five of the seven sampling sites on this creek with the bovine marker appearing in samples from site #4 and #7.

Recommendations:

- Provide septic system education, including maintenance, right-sizing, replacing aged systems, and proper use to residential residents living on Cole, Dead and Perry Creeks.
- Ensure all farms are following Generally Accepted Agricultural Management Practices (GAMMPs) and implement new agricultural BMPs to reduce fecal input to creeks where needed.