E. Coli and qPCR Results
North Branch Chippewa River
September 26, 2016
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Why We Monitor

• Protect the community

• Identify issues to improve human health

• Tribal programs are equal to the State through US EPA
What We Monitor

- Physical Parameters
- Nutrients
- BioAssessment
- Aquatic Insects
- Velocity
- Pathogen presence quantity

Chippewa River at Meridian Park
What is *E. coli*?

- *Escherichia coli (E. Coli)* is an indicator of fecal contamination (animal digestive bacteria)
- Fecal contamination contains harmful pathogens
What are the health effects of exposure to harmful fecal pathogens?

• Digestion of contaminated water
  – Intestinal illness
  – Cramps
  – Fever
  – Nausea
  – Diarrhea

• Contact with contaminated water
  – Infections of skin
  – Infection of ears
  – Respiratory illness
  – Eye infection
  – Neurologic impacts
  – Infection of wounds
Results Creating Concern

2015

Weekly Chippewa River E. coli Report
Sampled August 25th, Reported August 27th 2015

- School Rd: 24, 22
- Meridian Park: 91, 130, 194
- Chipp-A-Waters Park: 673, 397
- Chippewa Rd: 190

2016

Weekly Chippewa River E. coli Report
Sampled August 29, Reported August 30

- School Rd: 38, 21, 130
- Maches Landing: 35, 22
- Meridian Park: 87, 102
- Chipp-A-Waters Park: 539, 407
- Leston Rd: 428, 217
- Chippewa Rd: 173

If the green bar is above 300, E. coli levels are too high; full body contact is to be avoided.

If the blue bar is above 130, E. coli levels are too high; full body contact is to be avoided.

The Chippewa River flows to the east.
Need for Source Identification

• The Problem:
  – Consistent exceedance of Human Health, Water Quality Standards set by the State of Michigan
  – Human Health concerns over multiple years

Chippewa River sites largely exceed the State of Michigan reference standard of below 130 MPN/100ml, the threshold for the *E. coli* Daily Geometric Mean (monthly average) for full body contact in warm water streams.

• Identification of the source to determine solution(s)
How can fecal contamination get into our waterways?

• Animal fecal matter, including wildlife

• Runoff from agricultural fields

• Direct sewage discharges
Source Tracking Study

Objectives:

• Pathogen tracking in the North Branch of the Chippewa River Watershed
• Trace high levels of *E. coli*
• Determine whether sources of *E.coli* are human, bovine, or another source
• SVSU – DNA
• Environmental Canine Services (ECS) – sent tracking human waste
Source Tracking Study

Project Elements:

• Identified areas of elevated levels of *E.coli*
• Sent water samples for Ship and Sniff study
• Evaluated results of Ship and Sniff
• Conducted field investigations
• Determine the accuracy and reliability of positive canine alerts with *E.coli* and DNA analysis.
• The SCIT processed the *E.coli* samples using the Colilert-18 Method
• SVSU processed the DNA samples
Data and Results

- Most sample sites exceeded the Michigan Water Quality Standard of 300 MPN for the Daily Geometric Mean.

- E.coli levels were highest at the storm drain sites at the corner of Beal City and Winn Roads (BCD or BC) and Fitch Drive, reaching over 20,050 MPN.

- A creek that drained to the North Branch (CRNB2) also had noticeably elevated levels of E.coli.
Data and Results

• Both Fitch Drive and Beal City and Winn Roads storm drains (BCD or BC) tested positive for human waste utilizing canine investigation and qPCR, DNA analysis.

• The creek that drained into the North Branch (CRNB2) tested positive for bovine waste.
Conclusions

• Tribal studies have determined there is a human health threat risk.

• The elevated E. coli readings are primarily a direct result of human waste.

• Waterways impacted
  – North Branch Chippewa River
  – Main Branch of Chippewa River
  – Saginaw Bay