Volunteer Monitoring of Emerging Contaminants in the Milwaukee River Basin

Zac Driscoll, Cheryl Nenn, Todd Miller, Tim Vargo, Joe Piatt, Val Klump, Jessica Orlando, Matt Hughes.

Citizens of the Lake and Rivers:
Milwaukee River Basin

Basin Characteristics

- 860 Square Miles
Milwaukee River Basin

Basin Characteristics

- 860 Square Miles
- 3 Major Watersheds
  - Milwaukee
Milwaukee River Basin

Basin Characteristics

- 860 Square Miles
- 3 Major Watersheds
  - Milwaukee
  - Menomonee
Milwaukee River Basin

Basin Characteristics

- 860 Square Miles
- 3 Major Watersheds
  - Milwaukee
  - Menomonee
  - Kinnickinnic
Milwaukee River Basin

Basin Characteristics
- 860 Square Miles
- 3 Major Watersheds
  - Milwaukee
  - Menomonee
  - Kinnickinnic
- Diverse Land use
  - 71% Agricultural / Natural
  - 29% Urban
Monitoring Programs

Water Quality  Stormwater  Bacterial Community

Native Mussels  Road Salt  Emerging Contaminants
Monitoring Programs

Emerging Contaminants
What is an Emerging Contaminant?

Any compound that we don’t typically look for in traditional water quality monitoring programs.
Categories of Emerging Contaminants

- Personal Care Product
- Pharmaceuticals
- Recreational Drugs
- Herbicides/Pesticides
Citizens of the Lakes and Rivers

Project Partners:

Project Goals:

- Monitor emerging contaminants in Southeastern Wisconsin Rivers and Lake Michigan.

- Educate the public on the presence and impacts of emerging contaminants in our waterways.
Sample Sites
Water Sampling

- **Time Series**
  - 2 Sites – Samples collected weekly

- **Sampling Events**
  - Spring, Summer, Fall
  - All Sites Sampled
  - Volunteer Based
Volunteer Recruitment

Thanksgiving Water Sampling Event
Volunteer Recruitment

Blue Friday Water Sampling Event

“Avoid the stores, get outdoors, and let’s turn this Black Friday Blue”
Volunteer Recruitment

2018 Emerging Eighteen Water Sampling Event Bracket

PROJECT PARTNERS:

12/26/2018
Volunteer Recruitment
Volunteer Recruitment

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Ready to sign up?
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Volunteer Recruitment

This event is full. Please try a different one.
Volunteer Sampling

Photo Credit: Chuck Quirmbach
Sample Processing

- UW-Milwaukee
  - Dr. Todd Miller
- Mass Spectrometer
  - Analyzed for 63 compounds
- Volunteers help process samples
Results

Most Commonly Observed Compounds

-compounds listed by frequency of detection (%)

-classes indicated by color:
  - Anti-Diabetic
  - Antibiotic
  - Antihistamine
  - Antimicrobial
  - Cardiovascular
  - Pesticide/Herbicide
  - Psychotropic
  - Recreational Drug
Results

Most Commonly Observed Compounds

Recreational Drugs

Class
- Anti-Diabetic
- Antibiotic
- Antihistamine
- Antimicrobial
- Cardiovascular
- Pesticide/Herbicide
- Psychotropic
- Recreational Drug

Frequency of Detection (%)
Results

Most Commonly Observed Compounds

Frequency of Detection (%)

Seizure Medication (Tegretol)
Results

Most Commonly Observed Compounds

Frequency of Detection (%)
Results

Most Commonly Observed Compounds

Frequency of Detection (%)

Herbicide
Results

Most Commonly Observed Compounds

- Antimicrobials (toothpaste)

Class:
- Anti-Diabetic
- Antibiotic
- Antihistamine
- Antimicrobial
- Cardiovascular
- Pesticide/Herbicide
- Psychotropic
- Recreational Drug

Frequency of Detection (%)
Results

Most Commonly Observed Compounds

Frequency of Detection (%)

Diabetes Medication

Class
- Anti-Diabetic
- Antibiotic
- Antihistamine
- Antimicrobial
- Cardiovascular
- Fungicide/Herbicide
- Psychotropic
- Recreational Drug

Compounds: Roxithromycin, Diltiazem, Clarithromycin, Ciprofloxacin, Metformin, Cocaine, Caffeine Metabolite, Thiabendazole, Triclosan, Triclocarban, Cocaine Metabolite, Trimethoprim, Atrazine, Sulfamethoxazole, Carbamazepine, Caffeine.
Results

Mean Caffeine Concentration by Site

Concentration (ng/L)

Site

Water Body
- Kinnickinnic River
- Lake Michigan
- Menomonee River
- Milwaukee River

4/26/2018
Results Summary

- Many Compounds Observed
  - Recreational Drugs
  - Antibiotics
  - Seizure Medication
  - Herbicides
- Compounds Found At All Sites
How do these compounds get there?
How do these compounds get there?
How do these compounds get there?
Wastewater Treatment Plants
How do these compounds get there?
How do these compounds get there?
How do these compounds get there?
Contaminated Outfalls

Menomonee River Watershed Stormwater Outfall Human Bacteriodes Results
2008 - 2016
Impacts
Impacts

- Antibiotic Resistance
Impacts

- Kills Algae and Bacteria
Impacts

- Effects on Aquatic Organisms
What Can We Do?

- Research

![Image of prescription with Opioids text]
What Can We Do?

- Research
What Can We Do?

- Education
What Can We Do?

- Education
What Can We Do?

- Advocate

Legend:
- Sanitary
- Stormwater
- Lateral Transfer
What Can We Do?

- Advocate