Detroit River E. coli TMDL Public Notice Draft

Presented for: Detroit River Stakeholder Meeting July 15, 2008

Julianne Socha, U.S. EPA Christine Alexander, MDEQ Annette DeMaria, ECT

Marty Boote, ECT
Presentation Outline

• Water Quality Conditions
  – What is *E. coli*?
  – Extent of the 2007 monitoring
  – *E. coli* concentrations by weather condition and location
  – Conclusions of the monitoring

• Draft TMDL Report
  – Regulatory elements
  – TMDL components
What is *E. coli*?

Used as an indicator for the presence of fecal matter from warm blooded animals

- **Michigan**
  - Full body contact standards
    - 300 cfu/100 mL for one day
    - 130 cfu/100 mL over 30 days
  - Partial body standard
    - 1,000 cfu/100 mL for one day

- **Ontario/Canada**
  - Full body contact standards
    - 100 cfu/100 mL for one day
    - 200 cfu/100 mL over 30 days
Background

- Detroit River listed on the state’s impaired waters list in 1998 due impairment of the partial and total body contact designated uses.
Background

- Plume studies have shown that River *E. coli* levels d/s of Conner Creek can be as high as 130,000 cfu/100mL.
- Elevated *E. coli* levels can be seen as far d/s as Fort Wayne.
- The Detroit River received 9.9 billion gallons of CSO discharges in 2007 – 42% of this flow was partially treated sewage.
Watershed Boundaries

- Rouge River
- Ecorse Creek
- Combined Downriver
  - Frank & Poet Drain
  - Brownstown Creek
  - Direct drainage areas
- City of Detroit
Lower Detroit River Monitoring Locations

- 23 weeks of sampling from May – Oct ’07
  - 7 wet weather
  - 16 dry weather
- 1,300 *E. coli* samples collected
Upper Detroit River Monitoring Locations

- Outlet of Lake St. Clair
- u/s of Belle Isle
- Belle Isle
- Fort Wayne
- Ren Cen
- Rouge River
### Wet Weather Sampling Rainfall Amounts

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<tr>
<th>Sampling Date</th>
<th>Rainfall over previous 30 hours (inches)</th>
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<tr>
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<tr>
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Limitations of the 2007 Study

- Routine sampling was conducted
  - Wet weather was not targeted, therefore CSOs and SSOs were not targeted
- Sampling limited to one year
  - 2007 received less rain than normal
- Only the indicator organism - *E. coli* - was monitored
  - *E. coli* levels do not solely describe the impacts of CSO/SSO discharges
Comparison to Michigan WQSs

% of daily geometric means > 300 cfu/100 mL
Comparison to Ontario WQSs

% of daily geometric means > 100 cfu/100 mL
Comparison to Michigan WQSs

% of daily geometric means > 300 cfu/100 mL
Comparison to Ontario WQSs

% of daily geometric means > 100 cfu/100 mL
Dry Weather *E. coli* Distribution

Based on daily geometric mean values
Despite these values, water quality exceedences have been documented associated with CSOs.
Dry Weather

E. coli Distribution

Based on daily geometric mean values
Wet Weather

*E. coli* Distribution

Based on daily geometric mean values
Average Daily Geometric Means
All Weather (cfu/100 mL)

Based on daily geometric mean values
Average Daily Geometric Means All Weather (cfu/100 mL)

Based on daily geometric mean values
Spatial Variations

E. coli Concentrations (cfu/100mL)
- 0 - 100
- 101 - 1,000
- 1,001 - 10,000

Based on average values
Spatial Variations

Based on average values

E. coli Concentrations (cfu/100mL)
- 0 - 100
- 101 - 1,000
- 1,001 - 10,000
Bacterial Source Tracking: Wet Weather Results - Detroit River
Why didn’t we see CSO impacts u/s of the Rouge River?

1. Not the objective of the sampling
2. The timing of our sampling did not correspond to U.S. CSO events, except once
   - Sept 11, 2007 U.S. shoreline results:
     - DR2-u/s of Belle Isle: 470 cfu/100mL
     - DR3-at Belle Isle: 4,900 cfu/100mL
     - DR4-Ren Cen: 5,500 cfu/100mL
2007 Results Recap

• The Detroit River met WQSs with a few exceptions
  – 9% of the daily geometric means exceeded Michigan full body standard: 3% U.S. side and 6% CA side
• The highest concentrations of *E. coli* were found
  – U.S.: d/s of Ecorse River, Trenton Channel and u/s of Lake Erie
  – CA: across from Rouge River & d/s of Turkey Creek
• Human *E. coli* was found in two samples
  – CA: across from Ren Cen and d/s of Ambassador Bridge
What is a Total Maximum Daily Load (TMDL)?

• Requirement of the Clean Water Act for impaired waters that are not meeting water quality standards (WQSs)

• Impaired waters are listed on the Section 303(d) list

• The maximum amount (load) of a pollutant that can be discharged to a water body while still meeting WQSs
Area Considered

- TMDL will apply to U.S. waters only
- Canadian contributions will be considered background

Ambassador Bridge
What a TMDL can do.....

- Exercise regulatory authority over point source discharges (WLAs)
- Require permit limits to achieve same result as the TMDL
  - These limits do not have to be identical
What a TMDL can’t do.....

- Exercise authority over non-point sources (LAs)
  - Cooperation is the goal
TMDL Components

- Seven elements
  - Problem Identification
  - Numeric Target & Indicator
  - Source Assessment
  - Linkage Between Sources & Target
  - Load Allocation
  - Reasonable Assurance
  - Public participation
TMDL Components

• Problem Identification
  – Impaired recreational use of the Detroit River due to elevated levels of *E. coli*

• Numeric Target & Indicator
  – *E. coli* – indicator of human pathogens
  – State’s full body contact standards
    • April – October: 300 & 130 cfu/100 mL
  – Additionally, State’s partial body standard
    • Year round: 1,000 cfu/100 mL
TMDL Components

• Source Assessment
  – What are the sources of *E. coli* to the Detroit River?
  – Wet and dry weather
  – Point and Non-point
Source Assessment

• Likely Sources
  – Wet weather exceedances of criteria
    • Combined sewer overflows (CSOs)
    • Sanitary sewer overflows (SSOs)
    • Stormwater runoff
Source Assessment

• Unlikely Sources
  – Septic Systems
    • Present in the watershed in low numbers, concentrated areas
  – Nonpoint
    • Very little agricultural area not under Phase I or II MS4 permits
Source Assessment

• Tributary Impacts
  – Ecorse and Rouge Rivers are major sources of *E. coli* to the Detroit River
    • Rouge *E. coli* TMDL - developed
    • Ecorse *E. coli* TMDL - underdevelopment

*Ecorse Creek Wet Weather Plume June 10, 2008*
TMDL Components

• Linkage Between Sources & Target
  – Cause-effect relationship
  – Estimation of loading capacity

Conner Creek outlet
• Loading capacity (LC)
  – The amount of pollutant that can be discharged to a water body while still meeting WQSs expressed as a daily load (cfu/day)

LC = Criteria x Flow x CF
  – Criteria = 300 cfu/100 mL (total body contact)
  – Flow = mean daily flow
  – CF = units conversion factor, instantaneous to daily load
TMDL Components

• TMDL (LC) = WLA + LA + MOS

• Allocation of Loads
  – Waste Load Allocations (WLA)
    • Point sources
    • Industrial and municipal NPDES permitted stormwater discharges
    • NPDES permitted sanitary discharges
  – Load Allocations (LA)
  – Margin of Safety (MOS)
Tributary Load

- Ecorse and Rouge Rivers
  - Based on previously prepared TMDLs

Rouge River
Wet Weather Plume
June 10, 2008

Moderate Flow Category
Waste Load Allocations (WLA)

- Industrial Stormwater Allocation
  - Pollutant runoff model – LTHIA
  - Watershed specific inputs

Moderate Flow Category
Waste Load Allocation (WLA)

- **Sanitary Wastewater**
  - WWTP effluent
    - Wayne County Downriver
    - Trenton
    - Detroit
    - Huron Valley UA
    - Grosse Ile Twp
  - CSO effluent
    - Detroit
    - Southgate/Wyandotte
Waste Load Allocation (WLA)

- Municipal Stormwater (including all MS4 areas and MDOT)
  - Remainder of available loading capacity

Moderate Flow Category
Load Allocation (LA)

- Nonpoint Sources
  - Very little agricultural area
  - Draining to MS4s
  - No load allocated
Margin of Safety (MOS)

• Accounts for the uncertainty
  – flow estimation
  – load calculations and
  – fate and transport of *E. coli*

• MOS = median load – minimum load for each flow category

• 4% – 24% of the loading capacity
Reasonable Assurance Activities

• City of Detroit CSO Plan
• City of Detroit WWTP Improvements
• Various on-going Phase I & II MS4 activities
• MDEQ’s permitting authority for industrial NPDES dischargers
Public Participate Process and TMDL Timeline

• Pre data collection meeting – March 2007
• Post data collection meeting – Jan. 2008
• Draft TMDL meeting - today
• End of public comment period – July 23rd
• Submittal to EPA for review – end of August
Questions

Christine Alexander
Michigan Department of Environmental Quality
517-373-6794
alexanderc2@michigan.gov

Link to Draft TMDL:
www.michigan.gov/deq, then click on
Water
Water Quality Monitoring
Assessment of Michigan Waters

Or, the direct link is
http://www.michigan.gov/deq/0,1607,7-135-3313_3686_3728---,00.html

Aerial photos courteous of Detroit Riverkeepers