Bacteria TMDLs in the Lake Anna and Upper Rappahannock Watersheds

July 8, 2004

DEQ

305(b) Assessment and 303(d) Listing Processes

- Monitor and assess water quality for 305(b) Report
- Place waters exceeding water quality standards on 303(d) List
- Develop Total Maximum Daily Load (TMDL) for each listed water
- Develop TMDL Implementation Plan (IP)
- Implement TMDL in stages and monitor to detect resulting improvements in water quality

Water Quality Standards

- Water Quality Standards (WQS) are regulations based on federal and state law that:
  - set **numeric** and **narrative** limits on pollutants
  - consist of **designated use(s)** and water quality **criteria**
- Purpose of WQS:
  - **protection** of 5 designated uses (aquatic life, fishing, shellfish, swimming, drinking water)
  - **restoration** of state waters (TMDLs)
- Listing of impaired waters and TMDL development are based on WQS

Old Bacteria Standard

- Indicator species: **fecal coliform**
- **Instantaneous max**: **1,000 cfu/100 mL**
  - Applicable for data sets with 1 or fewer samples in 30 days
  - Used in **water quality assessment** because monitoring is usually conducted bimonthly
- **Geometric mean: 200 cfu/100 mL**
  - Applicable for data sets with 2 or more samples in 30 days
  - Used in **TMDL development** because model output is usually daily

Interim Bacteria Standard

- New **fecal coliform** criteria:
  - necessary for transition from fecal coliform to *E. coli*
  - will be phased out when 12 *E. coli* observations available or after June 30, 2008
- **Instantaneous max**: **400 cfu/100 mL**
  - Applicable for all data sets; no more than 10% of samples in a calendar month may exceed the maximum
- **Geometric mean: 200 cfu/100 mL**
  - Applicable for data sets with 2 or more samples in a calendar month

Applicable Bacteria Standard

- Change in indicator species from fecal coliform to ***E. coli*** (fresh water) and **enterococci** (salt water)
  - better correlation with swimming-associated illness
- New indicator species: ***E. coli***
- **Instantaneous max**: **235 cfu/100 mL**
  - Applicable for all data sets; no samples may exceed the maximum
- **Geometric mean: 126 cfu/100 mL**
  - Applicable for data sets with 2 or more samples in a calendar month

How Do the Old and New Bacteria Standards Compare?

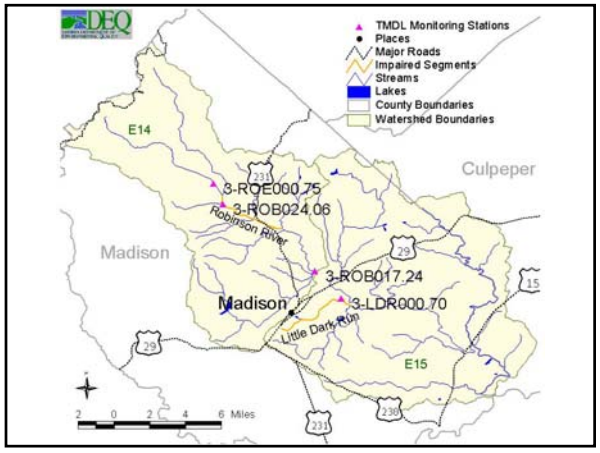
Fecal Coliform (cfu/100mL)	*E. coli** (cfu/100mL)
200	129
400	243
1,000	565

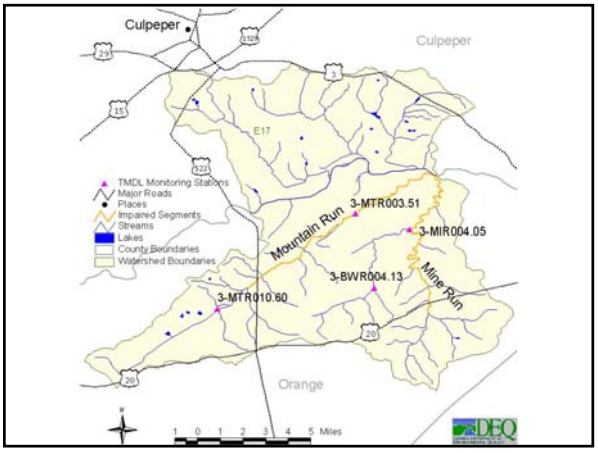
*Based on regression model between 493 dual data points

- The old and new fecal coliform geometric mean of 200 cfu/100mL is slightly higher than the new E. coli geometric mean of 126 cfu/100mL
- The old fecal coliform instantaneous maximum of 1,000 cfu/100mL is more than twice the new fecal coliform and E. coli instantaneous maxima of 400 cfu/100 mL and 235 cfu/100 mL, respectively

Impairments in the Upper Rappahannock Watershed

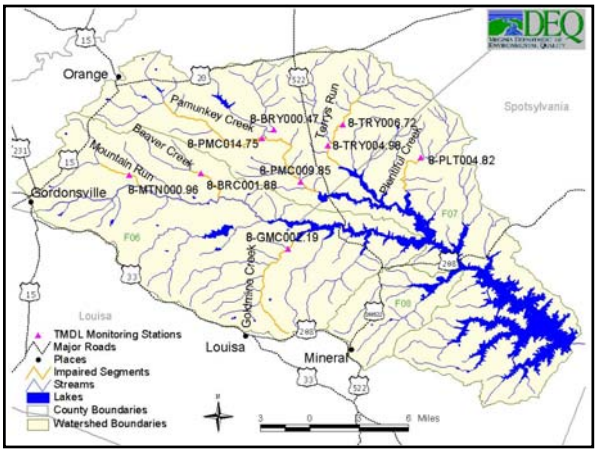
WATER BODY	CAUSE	STREAM NAME	LENGTH (Miles)	YEAR LISTED
VAN-E14R	Bacteria	Robinson River (confluence of Rose River to Route 231)	3.65	2002
VAN-E15R	Bacteria	Little Dark Run (headwaters to confluence with Dark Run)	4.26	1994
VAN-E17R	Bacteria	Mine Run (confluence of Comack Run to confluence with Rapidan River)	9.95	2002
VAN-E17R	Bacteria	Mountain Run (confluence of Mill Run to confluence with Mine Run)	9.79	2002





Impairments in the Lake Anna Watershed

WATER BODY	CAUSE	STREAM NAME	LENGTH (Miles)	YEAR LISTED
VAN-F06R	Bacteria	Mountain Run (confluence of Madison Run to confluence with North Anna River)	2.52	1998
VAN-F06R	Bacteria	Beaver Creek (confluence of Cooks Creek to confluence with North Anna River)	2.51	1998
VAN-F06R	Bacteria	Goldmine Creek (headwaters to confluence with Lake Anna)	7.16	2002
VAN-F07R	Bacteria	Pamunkey Creek (confluence of Tomahawk and Church Creeks to confluence with Lake Anna)	12.14	1998
VAN-F07R	Bacteria (DO)	Terry's Run (confluence of Horsepen Branch to confluence with lake Anna)	5.45	1998 (2002)
VAN-F07R	Bacteria	Plentiful Creek (confluence of U.T. to confluence with Lake Anna)	3.15	1998



What is a TMDL ?

A TMDL is a **pollution budget**:

TMDL = Sum of WLA + Sum of LA + MOS

Where:

- TMDL = Total Maximum Daily Load
- WLA = Waste Load Allocation (point sources)
- LA = Load Allocation (nonpoint sources)
- MOS = Margin of Safety

How is a TMDL developed?

- Identify all sources of a given pollutant within the watershed
- Calculate the amount of pollutant entering the stream from each source
- Calculate the pollutant reductions needed, by source, to attain water quality standards
- Allocate the allowable loading to each source and include a margin of safety

Required Elements of a TMDL

A TMDL must:

- be developed to meet water quality standards
- be developed for critical stream conditions
- consider seasonal variations
- consider impacts of background contributions
- include wasteload and load allocations (WLA, LA)
- include a margin of safety (MOS)
- be subject to public participation
- provide reasonable assurance of implementation

TMDL Development Process

- Technical Advisory Committee (TAC) meeting to review available data and proposed modeling approach
- Public meeting to announce beginning of TMDL development
- TAC meeting to review modeling and proposed allocations
- Public meeting to present draft TMDLs
- Submit TMDLs to EPA for approval

Roles of DEQ and DCR in TMDL Development

- DEQ is the lead for TMDL development
- DCR is the lead for nonpoint source TMDL implementation
- DEQ is responsible for ensuring public participation and submitting TMDLs to EPA for approval

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