Mattaponi River and Tributaries Bacteria TMDLs

Public Meeting
November 9, 2015

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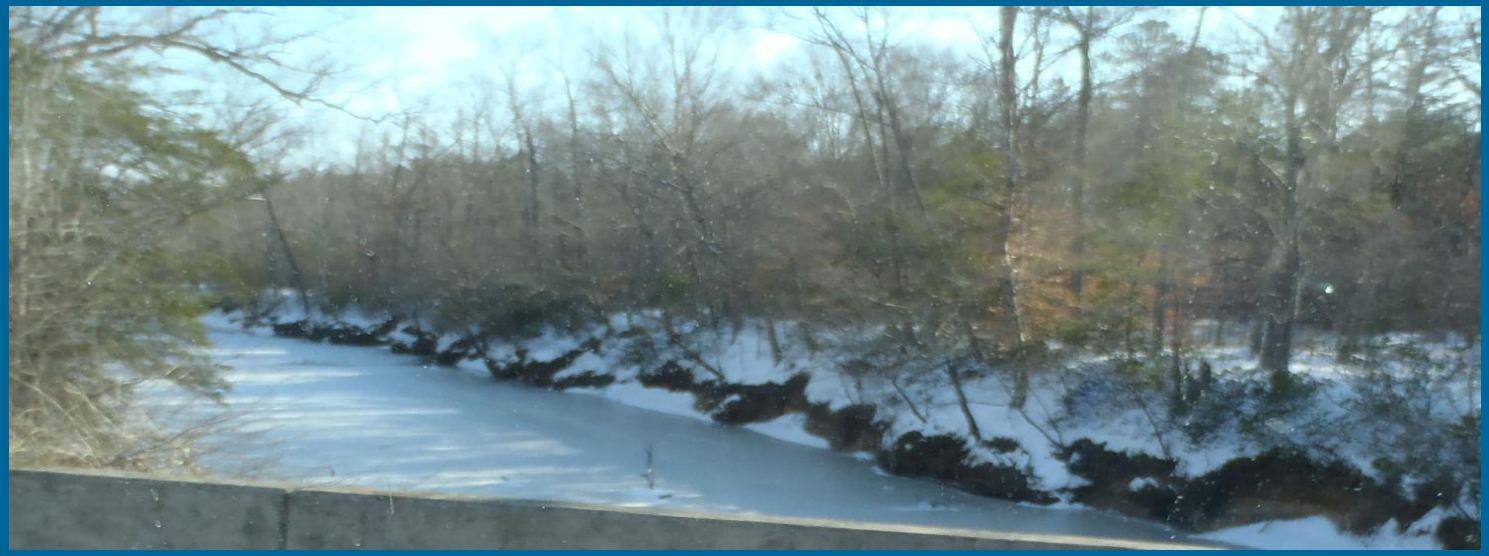
TMDL Coordinator
DEQ Northern Regional Office

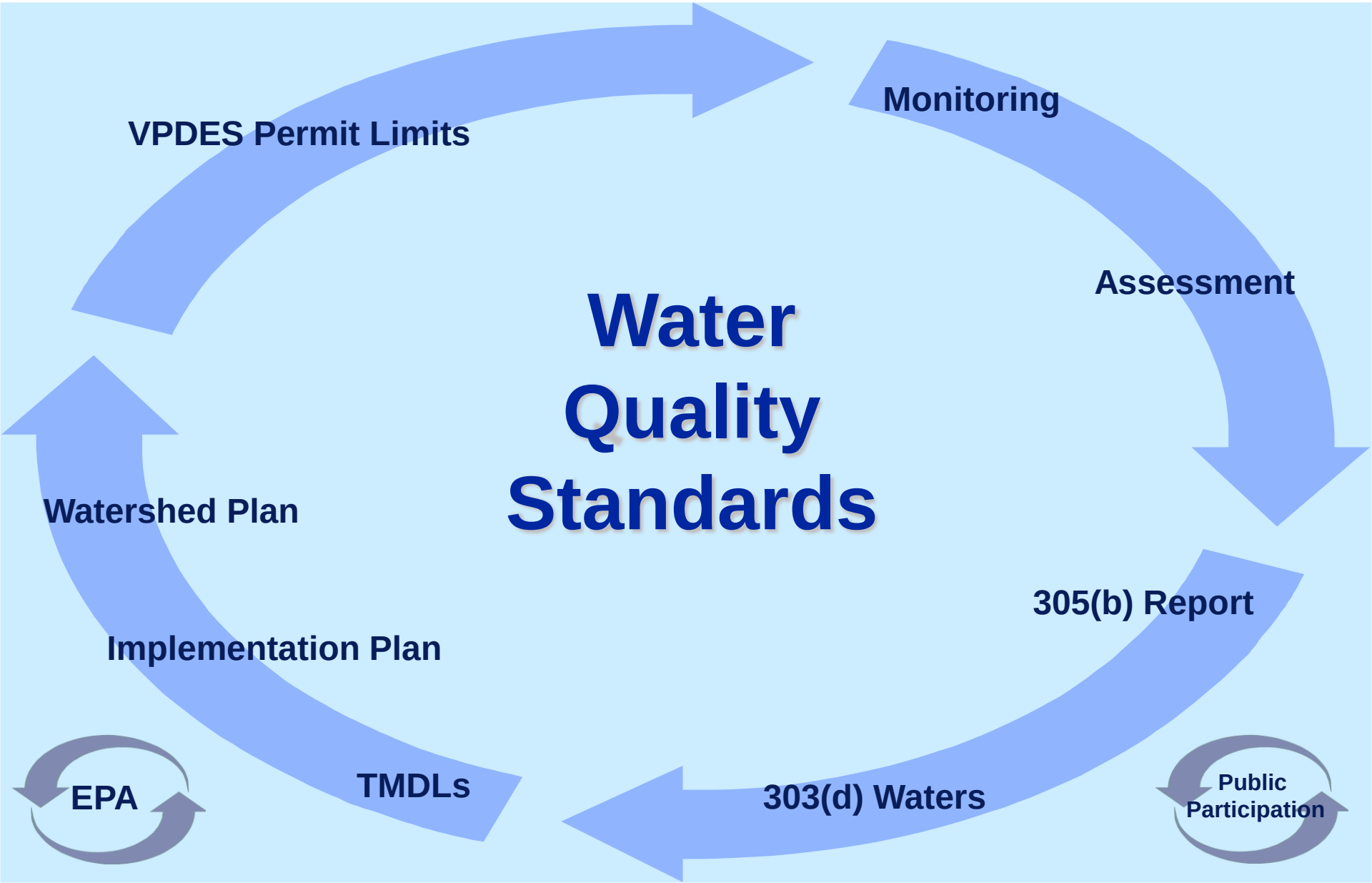
Meeting Agenda

- Introductions
- Virginia's Water Quality Standards overview
- Project impairment information
- TMDL process overview
- Proposed TMDL results
- Questions and discussion

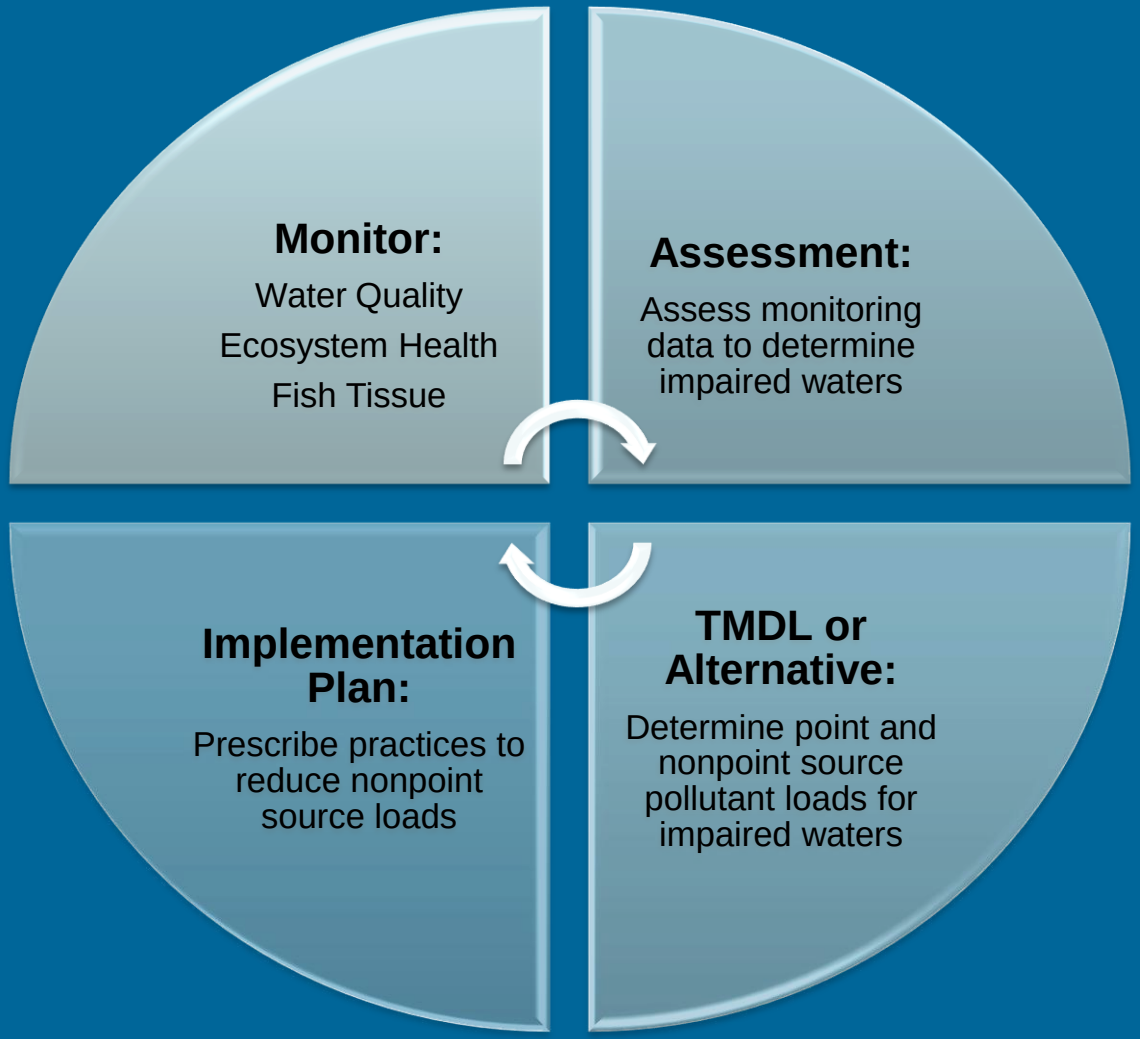


Water Quality Standards

Continuous Planning Process



TMDL Development Process



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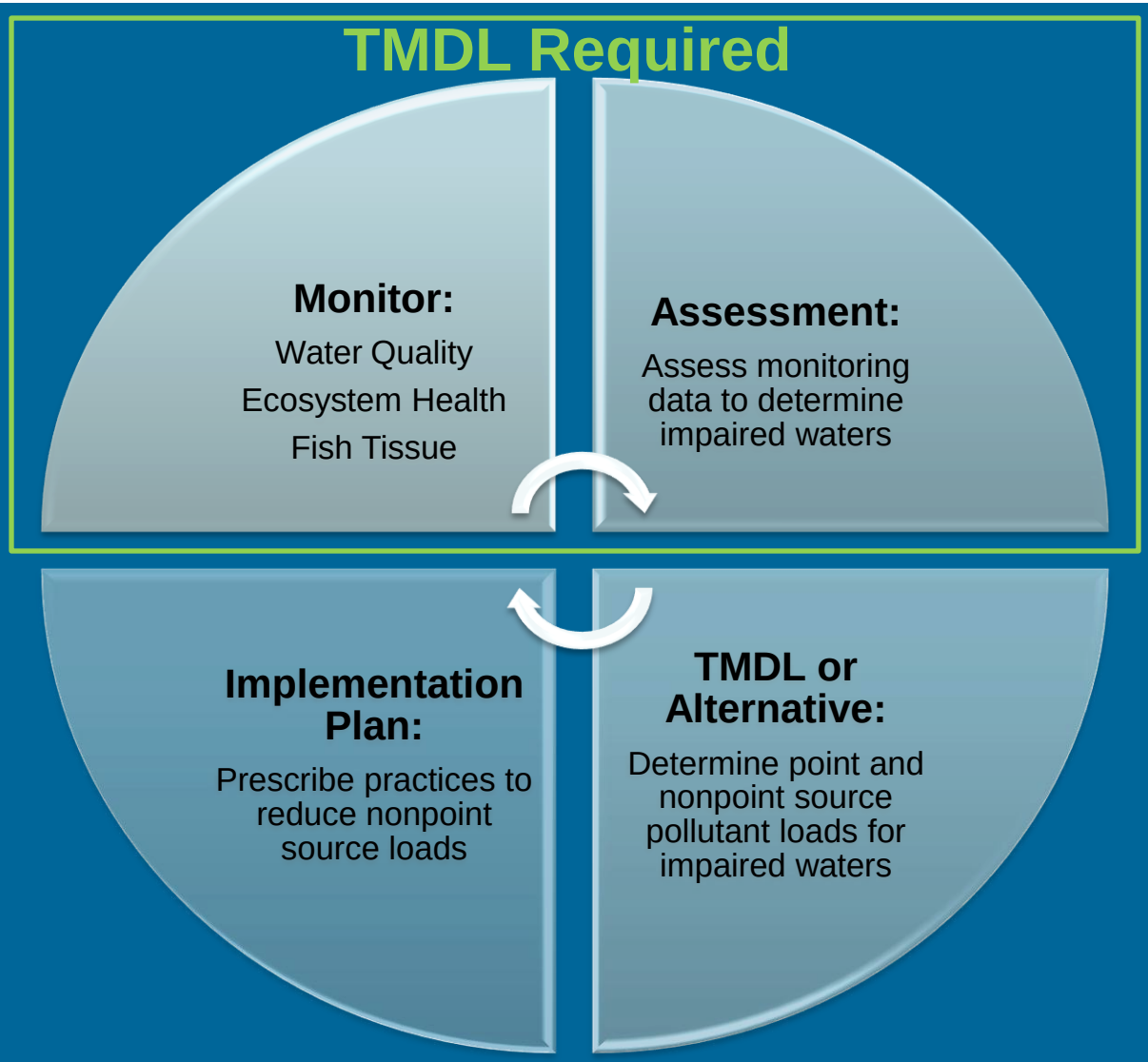
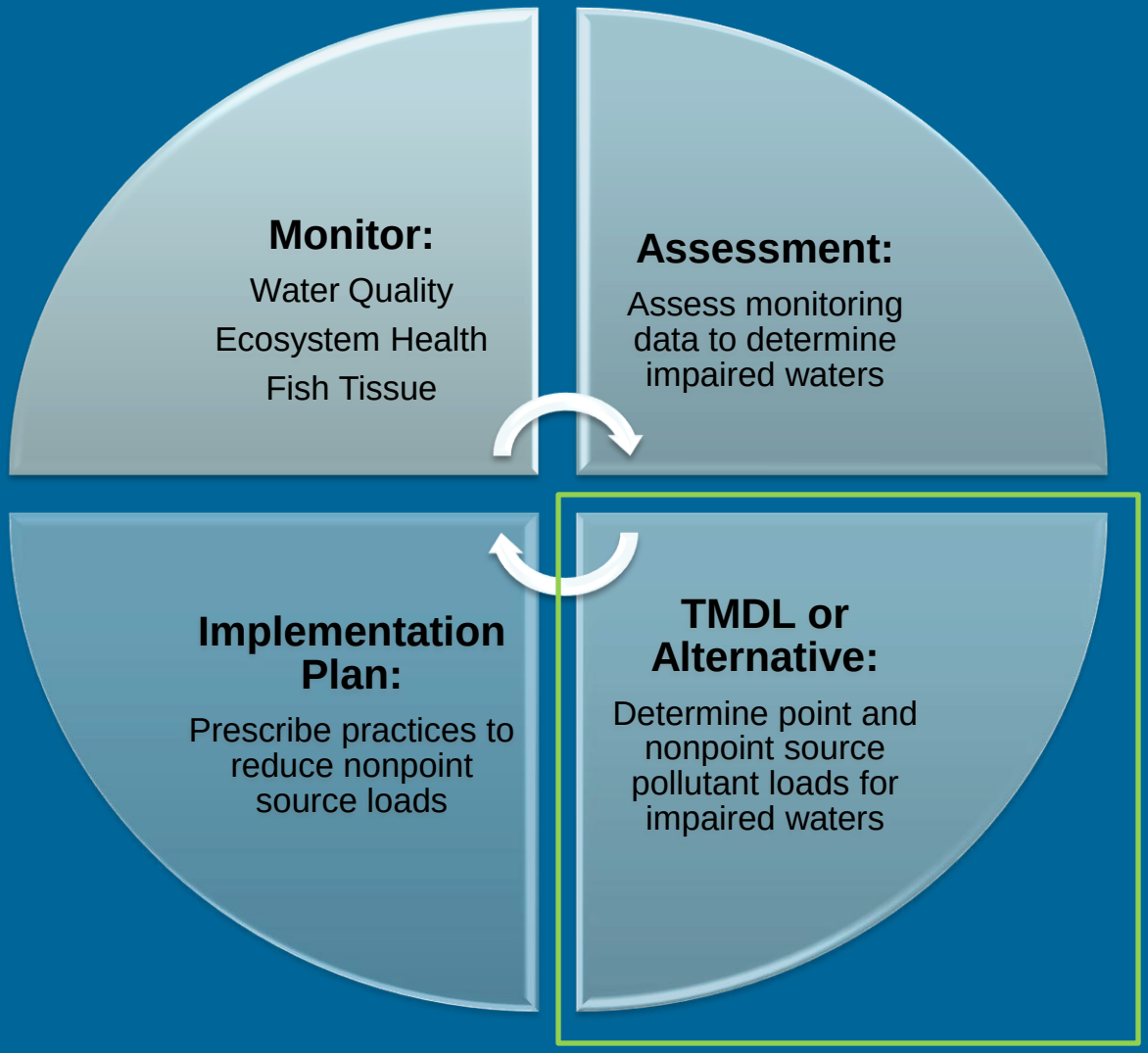


TMDL Development Process



TMDL Development Process

Monitor:

Water Quality

Ecosystem Health

Fish Tissue

Assessment:

Assess monitoring data to determine impaired waters

TMDL or Alternative:

Determine point and nonpoint source pollutant loads for impaired waters

Implementation Plan:

Prescribe practices to reduce nonpoint source loads

Project Update: Implementation Plan will be completed as a separate project, sometime after TMDL completion

Water Quality Standards: Designated Uses

- Recreation
- Aquatic Life
- Wildlife
- Fish Consumption
- Shellfish
- Public Water Supply

The attainment of the recreational use is evaluated by testing for the presence of E. coli bacteria in freshwater systems and enterococci bacteria in transitional and salt waters.

Water Quality Standards: Recreation Use Water Quality Criteria

E. Coli bacteria in freshwater:

- Monthly geometric mean not exceeding 126 CFU/100 ml
- If insufficient data to calculate geometric mean, no more than 10% of total samples >235 CFU/100 ml

Mattaponi TMDL: Recreation Impairments

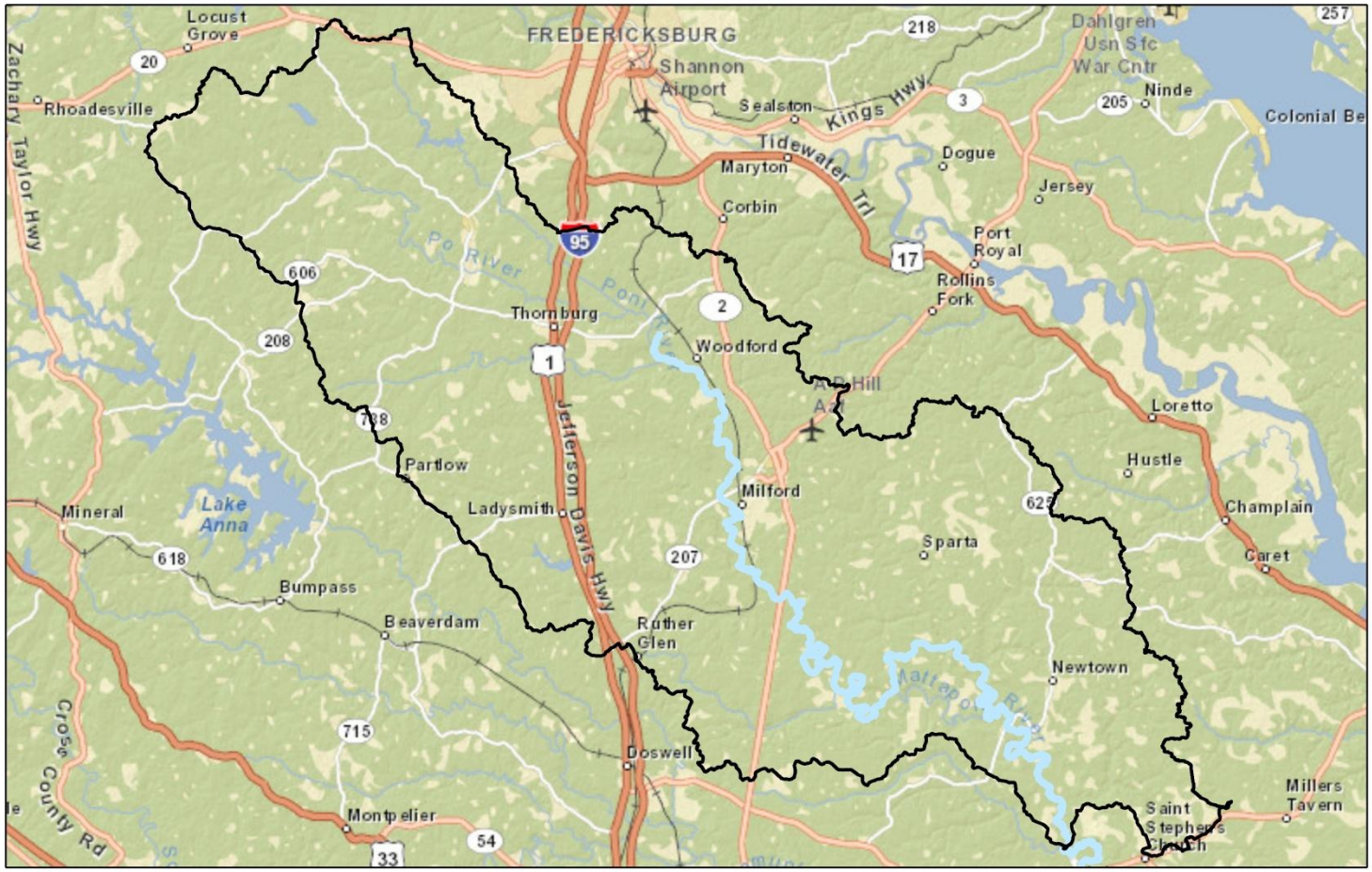
- Impairment information included in the 2014 DRAFT Assessment
- All impairments currently caused by *E. coli* bacteria

Impaired Stream Name	Impairment Length (miles)	Year Impairment First Listed	Upstream Limit	Downstream Limit	Impairment Listing Station
Brock Run	2.56	2008	Aunt Sarah Spring Creek	Ni River	8-BRK000.06
Chapel Creek	4.44	2014	Beaver Branch	Mattaponi River	8-CPL004.15
Doctors Creek	2.32	2014	Tanyard Swamp	Maracossic Creek	8-DOC000.69
Glady Run	9.30	2010	headwaters	Po River	8-GDY003.00
Maracossic Creek	4.21	2006	Beverly Run	Mattaponi River	8-MAR003.24
Mat River	2.30	2014	~0.3 mi upstream from Route 647	Ta River	8-MAT001.87
Matta River	11.89	2004*	~0.5 mi upstream from Route 646	Poni River	8-MTA001.69, 8-MTA008.96
Mattaponi River	3.20	2008	unnamed tributary draining from Goose Pond	Polecat Creek	8-MPN083.62
Motto River	1.80	2014	~0.4 mi upstream from Route 1	~0.2 mi downstream from I-95.	8-MOT002.62
Po River	7.21	2010	~2.7 mi upstream from Route 1	Ni River	8-POR004.13
Polecat Creek	5.31	2012	headwaters	Stevens Mill Run	8-PCT010.10
Poni River	3.21	2010	~0.7 mi upstream from Route 606	Matta River	8-PNI002.43
Reedy Creek	9.39	2004†	headwaters	Route 301	8-RDY003.43
	3.30		Route 301	Reedy Millpond	
Root Swamp	7.83	2014	headwaters	Beverly Run	8-ROT001.09

- 15 Segments
- 78 miles

** Matta River impaired for fecal coliform bacteria in 2004 assessment*
†Reedy Creek impaired for fecal coliform bacteria in 2004, 2006, 2008 assessments

Mattaponi TMDL Project Area



Legend

Mattaponi TMDL Project Area

Mattaponi Main Stem

0 5 10 20 Miles

Data Sources:
VADEQ - Watersheds, Assessments Segments, Monitoring Stations
USGS - National Hydrography Dataset
ESRI - Roads and Jurisdictional Boundaries

Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong),

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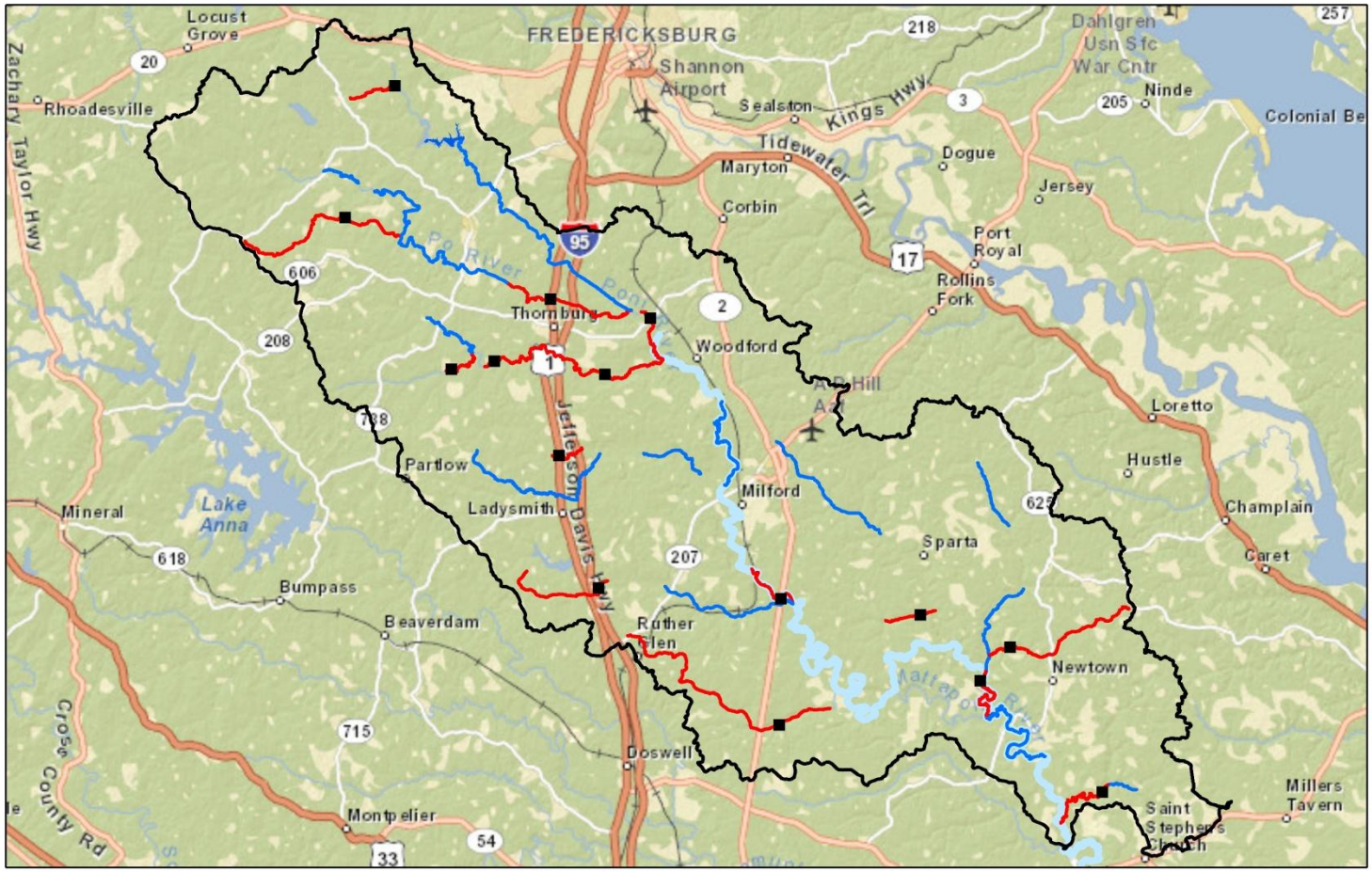
Mattaponi TMDL Project Area: 2014 Draft Recreation Use Assessment



Legend

- Mattaponi TMDL Project Area
- Mattaponi Main Stem
- DEQ Monitoring Stations - Bacteria Impairments

2014 DRAFT Clean Water Act §305(b) List

Recreation Use

- Fully Supporting
- Not Supporting

0 5 10 20 Miles

Data Sources:
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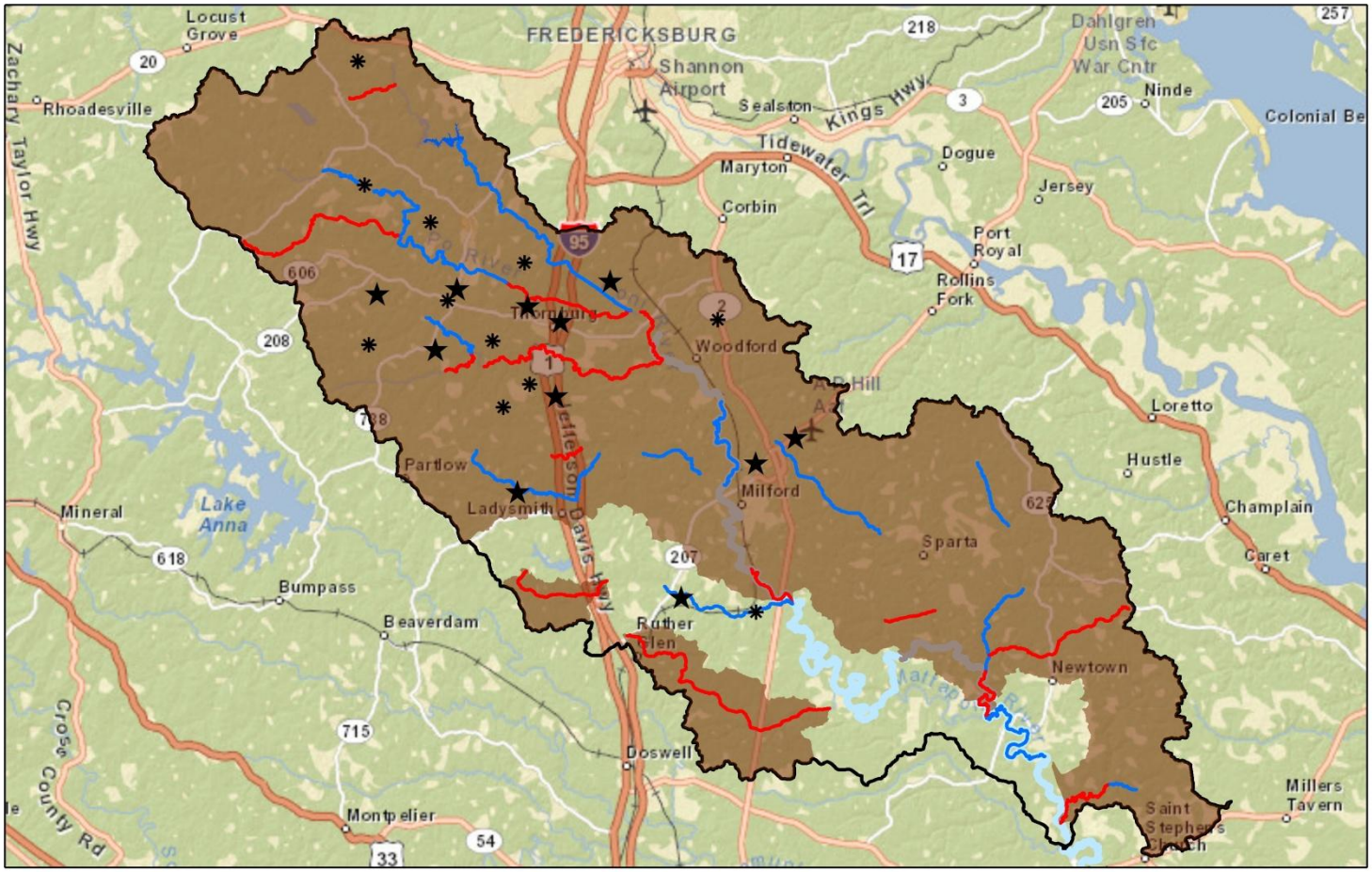
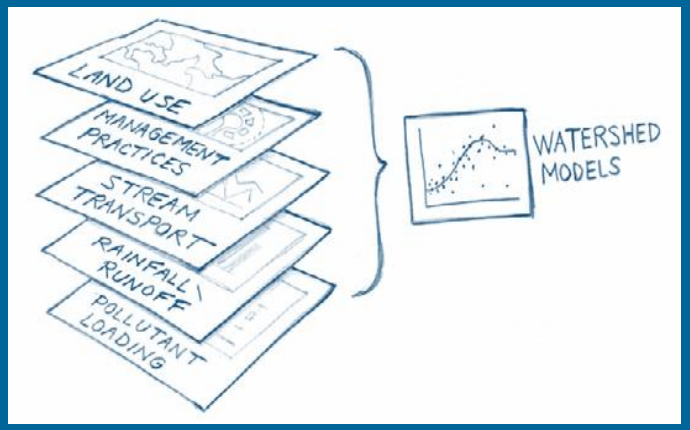
Mattaponi TMDL Project Area: 14 TMDL Watersheds



What is a Total Maximum Daily Load?

- A TMDL is the total amount of a pollutant a waterbody can receive and still not exceed water quality standards
- Required by federal and state law
- The TMDL Process
  - Characterize watershed
  - Account for point and nonpoint sources
    - Assess pollutant sources
    - Model pollutant loadings
  - Calculate pollutant reductions to attain criteria
  - Allocate allowable loadings
  - Include a margin of safety



What is a Total Maximum Daily Load?

TMDL = Sum of WLA + Sum of LA + MOS

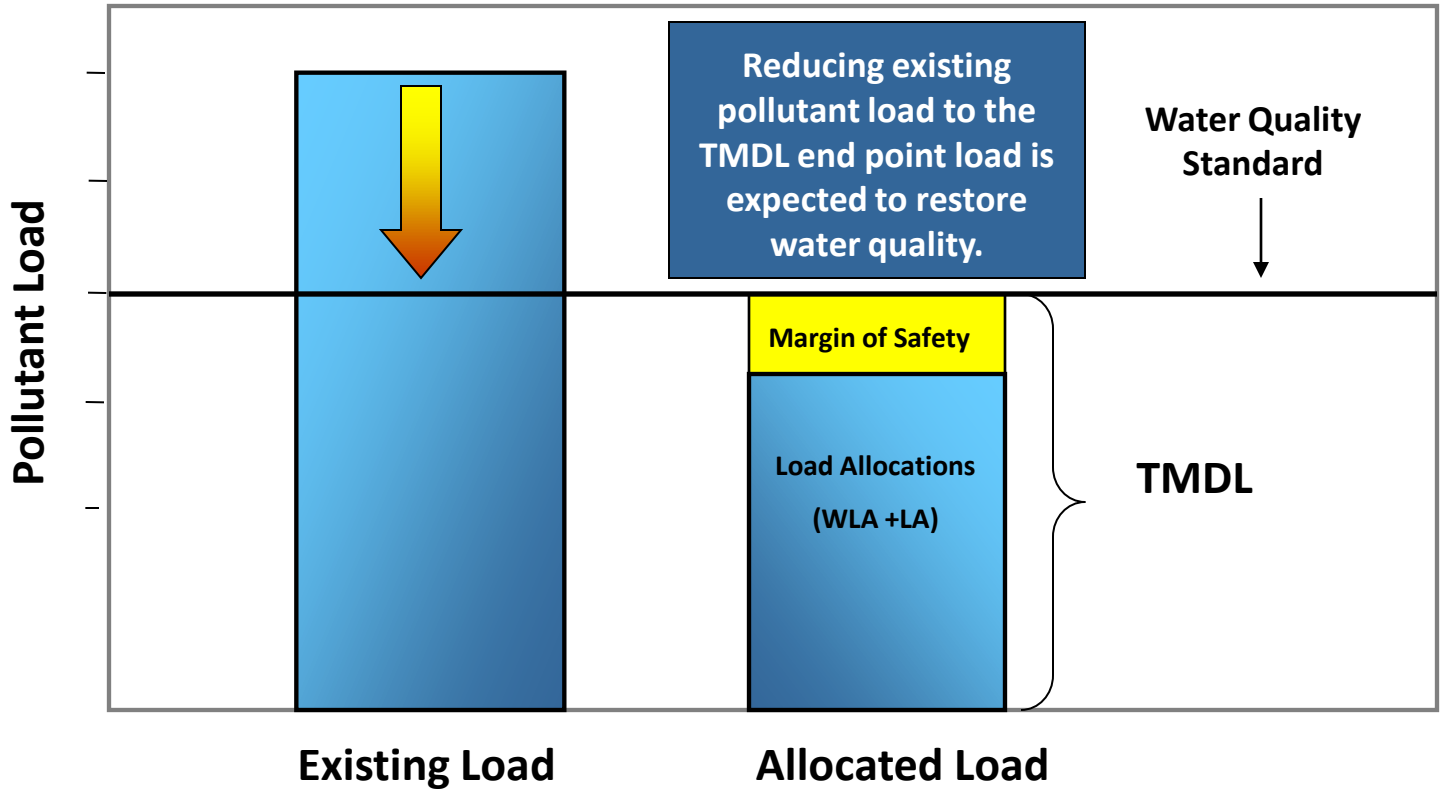
Where:

TMDL	=	Total Maximum Daily Load
WLA	=	Waste Load Allocation (Point Sources)
LA	=	Load Allocation (Non-point Sources)
MOS	=	Margin of Safety (Implicit or Explicit)

Determined by inputting watershed characteristics and bacteria sources into a model.

An alternative restoration approach may be substituted.

An Example TMDL



Source Assessment: Permits

- VDOT MS4 permit – Fredericksburg Census Urban Area
- No Animal Feeding Operation permits
- 10 domestic General VPDES permits

County	TMDL Watershed	Receiving Stream	Permit No
Caroline	Poni River	Meadow Creek, UT*	VAG406563
Spotsylvania	Matta River	Glebe Run	VAG406432
		Ta River, UT*	VAG406545
		Matta River, UT*	VAG406557
	Mattaponi River	Motto River, UT*	VAG406130
		Motto River, UT*	VAG406515
	Po River	Po River, UT*	VAG406173
		Wrights Pond, UT*	VAG406416
	Poni River	Ni River, UT*	VAG406396
		Spring Creek	VAG406560

*UT: unnamed tributary

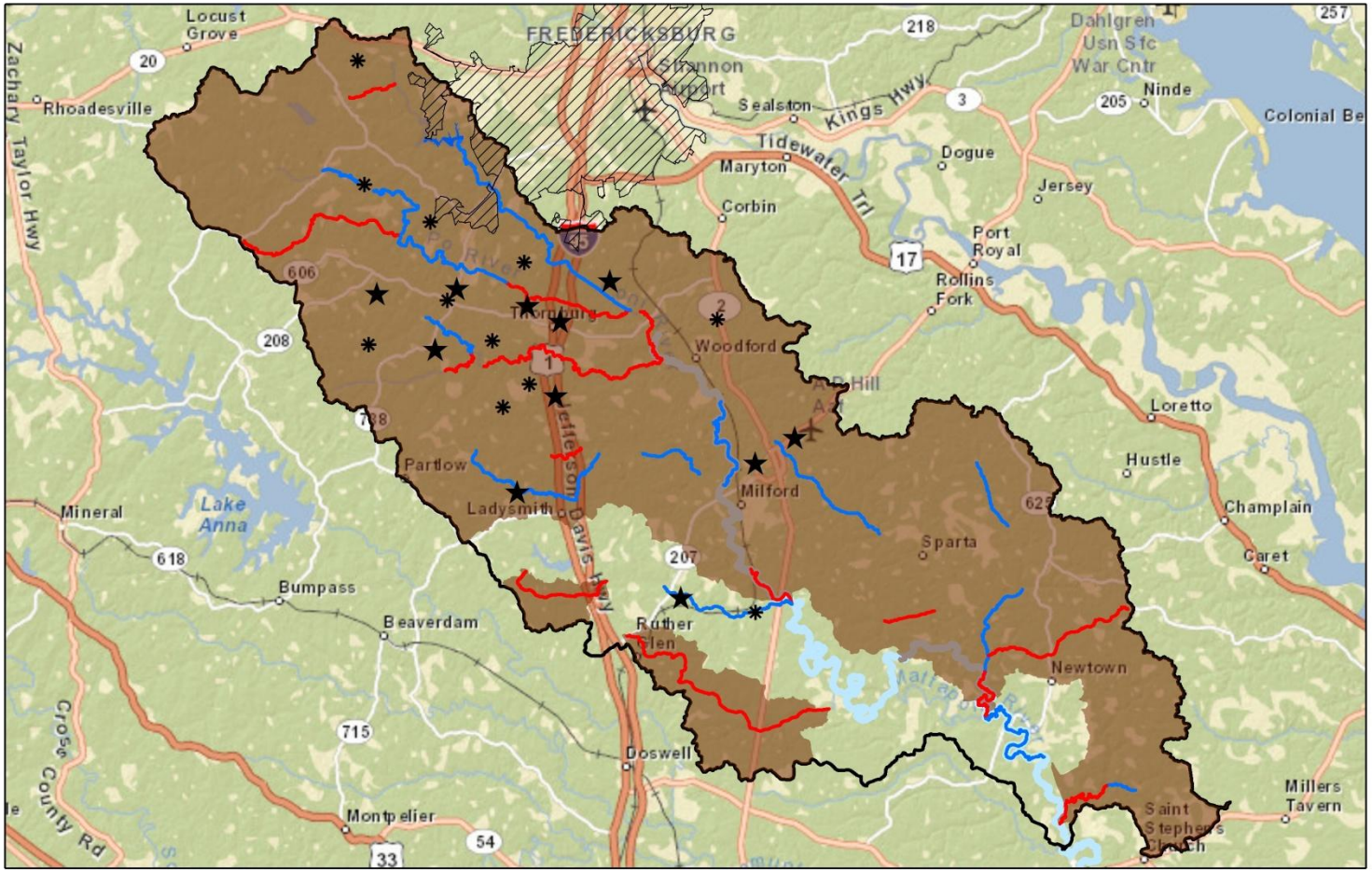
Source Assessment: Permits

- VDOT MS4 permit – Fredericksburg Census Urban Area
- No Animal Feeding Operation permits
- 10 domestic General VPDES permits
- 10 applicable Individual VPDES permits:

County	TMDL Watershed	Receiving Stream	Permit No	Facility Name
Caroline	Maracossic Creek	Maracossic Creek, UT*	VA0090689	Hill Mobile Home Park Sewage Treatment Plant 2
	Mattaponi River	Mattaponi River, UT*	VA0020737	Bowling Green Wastewater Treatment Plant
		South River, UT*	VA0060887	Land Or Utility
		Motto River, UT*	VA0061409	Woodford Estates MHC Limited Liability Corp.
Spotsylvania	Mat River	Mat River, UT*	VA0061301	Berkeley Elementary School
	Matta River	Ta River	VA0087271	Spotsylvania County High School
	Po River	Po River, UT*	VA0029513	Thornburg Community Sewage Treatment Plant
		Po River	VA0029769	Po River Water and Sewer WWTP
		Po River, UT*	VA0061298	John J Wright Educational and Cultural Center
	Poni River	Ni River, UT*	VA0091014	Dominion Campground Incorporated

*UT: unnamed tributary

Mattaponi TMDL Project Area: Permits



Legend

- Mattaponi Main Stem
- Individual VPDES
- Domestic VPDES
- Census Urban Area
- Mattaponi TMDL Project Area
- TMDL Watersheds

2014 DRAFT Clean Water Act §305(b) List

Recreation Use

- Fully Supporting
- Not Supporting

0 5 10 20 Miles

Data Sources:
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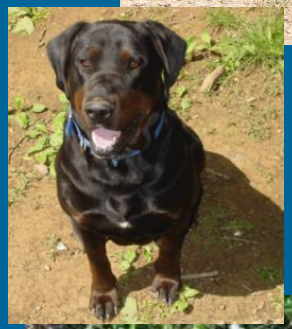
DEQ Virginia Department of Environmental Quality

Source Assessment

- Humans
  - Failed septic systems
  - Straight pipes
- Pets
- Agriculture/Livestock
- Wildlife



Data Collection: Watershed Characterization

Characteristic	Data
Climate Data	Precipitation Temperature Evapotranspiration (sources such as NASA, NWS, Virginia IFLOWS)
Land Use/Land Cover	Department of Health National Agricultural Statistics Survey National Land Cover Database Soil and Water Conservation Districts
Soils	NRCS SSURGO
Stream Flow	USGS National Water Information System
Topography	USGS National Water Information System
Water Quality	DEQ
Watersheds and Subwatershed Boundaries	National Watershed Boundary Dataset

TMDL Development Methodology

Input

Bacteria

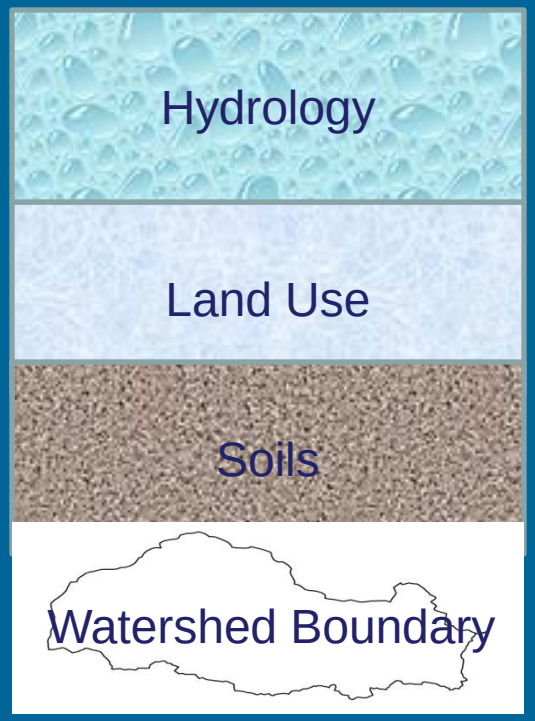
Sources
- Human
- Pets
- Livestock
- Wildlife

Die-off Rates

Data

Weather
Streamflow
Water Quality Monitoring
Permitted Point Sources

Model



Output

Stream Response

- Bacteria loadings under historical conditions
- Bacteria loadings that meet water quality criteria

Model Information

Hydrologic Simulation Program Fortran

- Uses fecal coliform with a formula to determine *E. coli*

Initial Model Setup	• 135 modeling subwatersheds • 14 TMDL watersheds
Hydrologic Calibration and Validation	• USGS daily flow gage near Spotsylvania • Calibration: 2010-2012 • Validation: 2007-2009
Water Quality Calibration and Validation	• DEQ water quality monitoring stations • 2008-2012

TMDL Model: Water Quality Calibration and Validation

TMDL Watershed	Model Segment	Water Quality Monitoring Station	Geometric Mean		Exceedance of Criterion (235 cfu/100 ml)	
			Simulated	Observed	Simulated	Observed
Brock Run	66	8-BRK000.06	127.9	136.4	41.8%	40.0%
Chapel Creek	3	8-CPL004.15	83.9	85.1	27.8%	25.0%
Doctors Creek	34	8-DOC000.69	141.0	146.9	42.7%	33.3%
Glady Run	85	8-GDY003.00	63.9	73.8	25.0%	23.5%
Maracossic Creek	11	8-MAR003.24	85.4	88.0	18.9%	20.0%
Mat River	100	8-MAT001.87	89.3	91.4	19.5%	12.5%
Matta River	100	8-MTA001.69	112.7	119.4	26.8%	27.6%
Mattaponi River	44	8-MPN083.62	55.2	57.6	12.6%	11.8%
Motto River	110	8-MOT002.62	85.8	61.3	22.3%	25.0%
Po River	69	8-POR004.13	74.2	58.3	14.1%	5.9%
Polecat Creek	126	8-PCT010.10	79.9	79.8	14.2%	13.6%
Poni River	55	8-PNI002.43	76.3	64.5	14.3%	10.7%
Reedy Creek	132	8-RDY003.43	73.0	74.6	27.9%	11.8%
Root Swamp	14	8-ROT001.09	92.9	98.2	35.4%	22.2%

Example TMDL Results: Po River TMDL Watershed

WLA:

Permit Number	Facility Name	Design Flow (MGD)	Allocated Wasteload (cfu/year)
VA0029769	Po River Water and Sewer WWTP	0.100	1.74E+11
VA0029513	Thornburg Community Sewage Treatment Plant	0.345	6.01E+11
VA0061298	John J Wright Educational and Cultural Center	0.015	2.61E+10
VAG406173	Domestic	0.001	1.74E+09
VAG406416	Domestic	0.001	1.74E+09
VAR040115	MS4 VDOT Spotsylvania County		2.90E+11
	Future Growth		3.66E+11
			TOTAL = 1.46E+12

LA Reduction Scenarios:

Scenario	Percent Reductions to Existing Bacteria Loads					Percent Exceedance of *E. coli* Criteria	
	Failing Sewage Disposal System	Direct Deposition from Cattle	Nonpoint Source - Pasture	Nonpoint Source - Developed Land uses	Direct Deposition from Wildlife	%>126 GM	%>235 cfu/100 ml[1]
1	100					20%	16%
2	100	100				0%	13%
3	100	100			100	0%	12%
4	100	50	50	50	0	3%	10%
5[2]	**100**	**100**	**64.7**	**64.7**	**0**	**0%**	**10%**

[1]The 235 cfu/100 ml criterion allows no more than 10% exceedance
[2]Final TMDL Scenario

TMDL (cfu/yr *E. coli*):

WLA	LA	MOS	TMDL
1.46E+12	1.69E+13	IMPLICIT	1.83E+13

TMDL (cfu/day *E. coli*):

WLA	LA	MOS	TMDL
4.00E+09	1.74E+11	IMPLICIT	1.79E+11

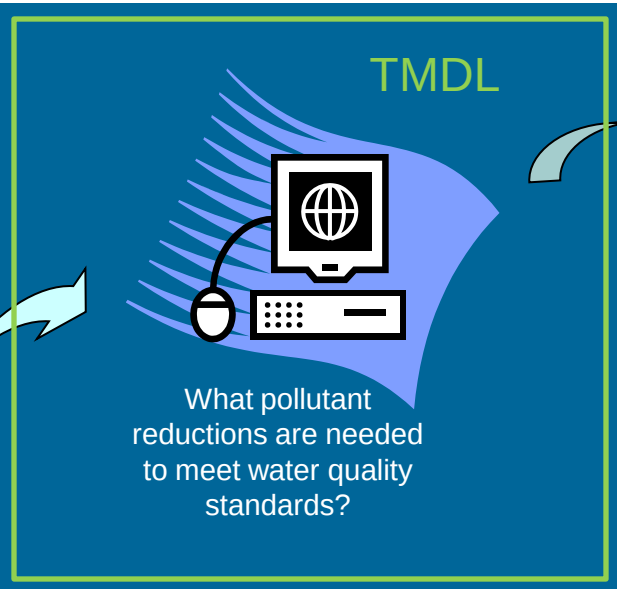
TMDL: What's Next?

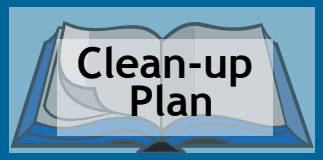
- Public comment period through Tuesday, December 8
- Comments submitted in writing (include name, address, phone number) to:

Rebecca Shoemaker
Virginia Department of Environmental Quality
13901 Crown Court
Woodbridge, VA 22193

Email: rebecca.shoemaker@deq.virginia.gov

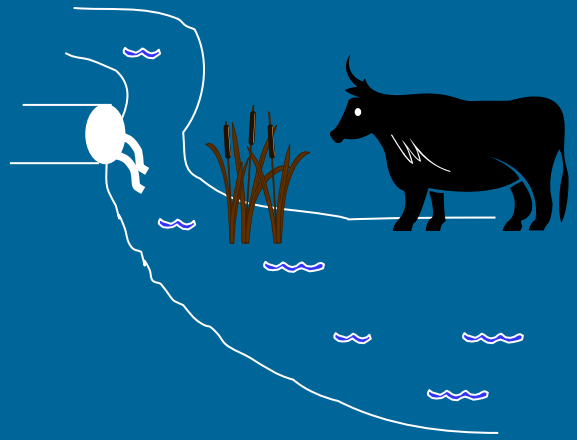
After the TMDL: What's Next?





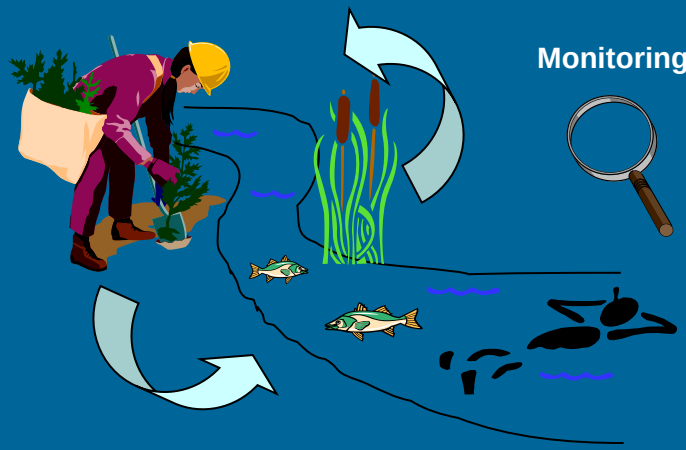
What will it take to restore water quality and how can fixes be implemented?

Water quality standards not met



Implementation

Monitoring



Questions? Comments?

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