

Turkey Island Creek and James River and Tributaries Westover to Claremont

Final TMDL Public Meeting and
Introduction to Implementation
Planning

June 26, 2013



NATURAL RESOURCE SOLUTIONS
THROUGH *Science* AND *Engineering*

Why Are We Here?

To discuss bacteria TMDLs for Turkey Island Creek and James River and tributaries watersheds

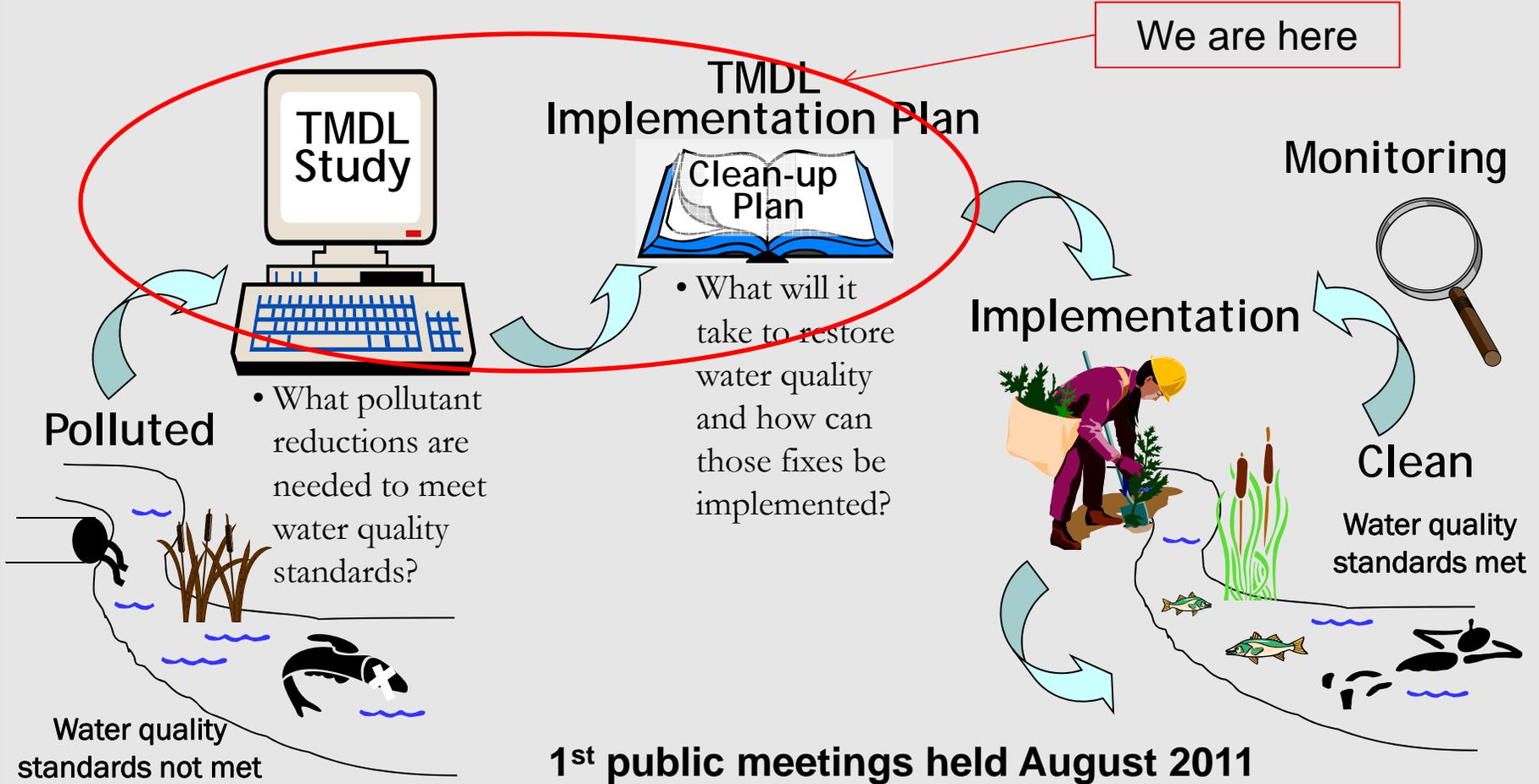
A TMDL is the maximum amount of a pollutant a water body can receive and still meet water quality standards.

AKA "Pollution Diet"



Overview of TMDL Process

We are here



Graphic adapted from Dr. Robert Brent, Virginia DEQ

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Designated Uses

- **Recreational**
- Public Water Supply
- Wildlife
- Fish Consumption
- Shellfish
- Aquatic Life



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.



Recreational Use Impairment: Fecal Coliform, *E. coli* and Enterococci Bacteria

Escherichia coli:

- Subset of fecal coliform bacteria
- Correlate better with swimming associated illness in freshwater

Enterococci:

- Subset of fecal streptococcus bacteria
- Indicator used for determining recreational risks in salt or transitional waters

Indicator	Geometric Mean (CFU/100 ml)	Instantaneous Max (Single Sample)
E. Coli (Freshwater)	126	235
Enterococci (Transitional and Saltwater)	35	104

- *Geometric Means calculated using data collected during any calendar month with a minimum of four weekly samples.*
- *If insufficient data to calculate a monthly geometric mean, no more than 10% of the total samples in the assessment period should exceed 235 cfu/100 ml of E. coli in freshwater, and 104 cfu/100 ml of enterococci in transitional and saltwater.*



Why should you participate?

- Economic benefits
 - Agricultural producers
 - Homeowners
 - Local economy
- Water quality benefits
 - Environmental
 - Human health



Study Approach

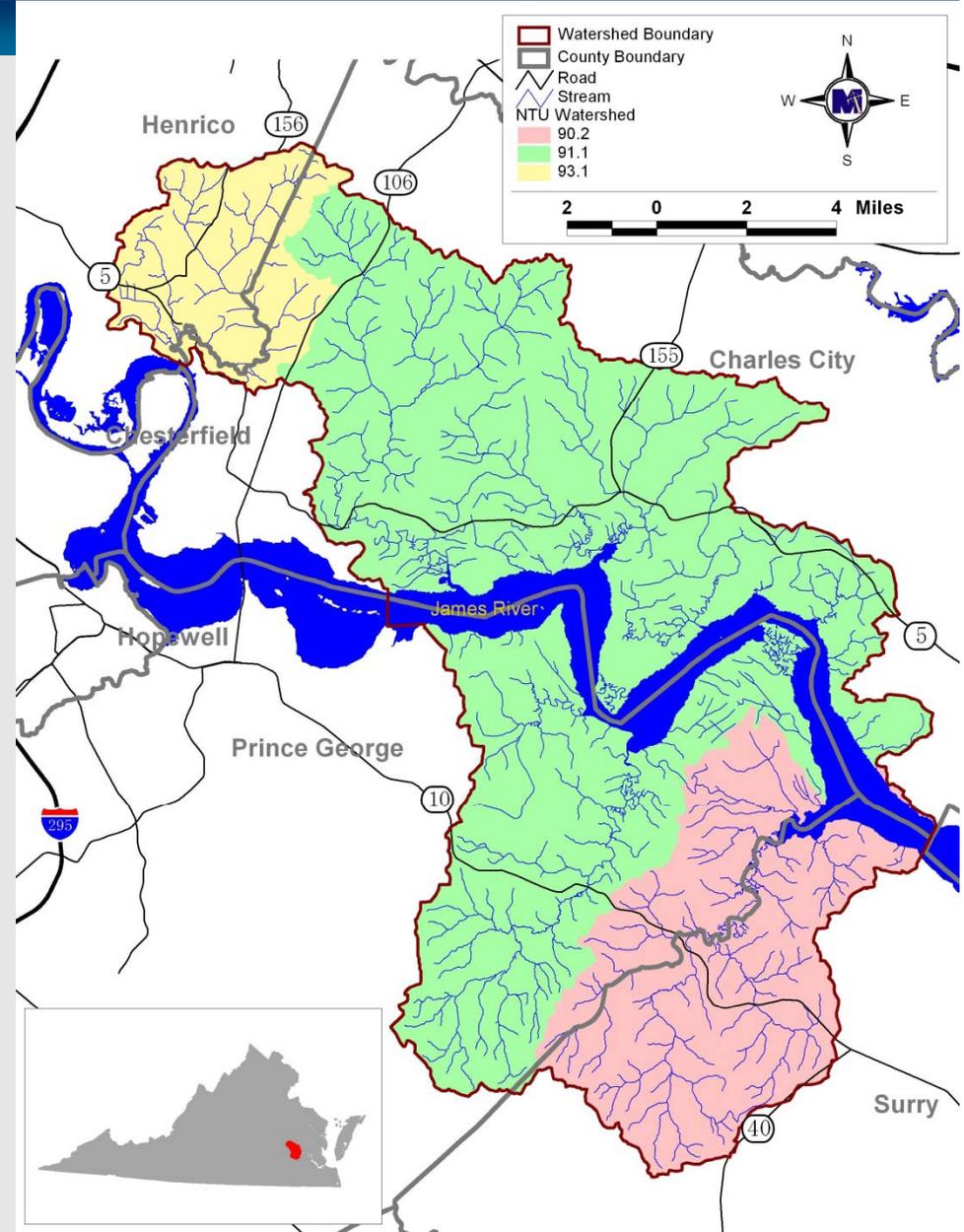
- Nested Watershed – impairments are evaluated and grouped within watersheds with similar characteristics (slope, land use, etc.)
- Identify and quantify sources of bacteria
- Incorporate watershed characteristics and estimated bacteria source loads to establish the baseline for current bacteria load
- Determine reductions needed for standard to be met (difference between current and standard)



June 26, 2013

Drainage Area

- Parts of Henrico, Prince George, Surry and Charles City counties
- Approximately 127,571 acres



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Tributaries Westover to Claremont
Bacteria TMDL & Implementation Plan

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Drainage Area – Land Use/Land Cover

Impairment	Barren	Commercial	Cropland	Forest	LAX	LMIR	Open Space	Pasture	Water	Wetland	Total Acres
Turkey Island Creek (NTU 93.1)	57	0.2	1,108	7,489	9	9	22	1,978	137	944	11,753.2
Westover to Chippokes Point (NTU 91.1)	1,768	0.7	8,207	48,668	46	90	247	11,545	9,304	6,296	86,172
Chippokes Point to Claremont (NTU 90.2)	387	0.00	2,908	19,542	15	18	75	3,083	2,129	1,488	29,645

LAX: Livestock pasture access near flowing streams

LMIR: Low-Medium Intensity Residential

2006 - NLCD



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E.coli Impairments

Watershed:

Turkey Island Creek (93.1):

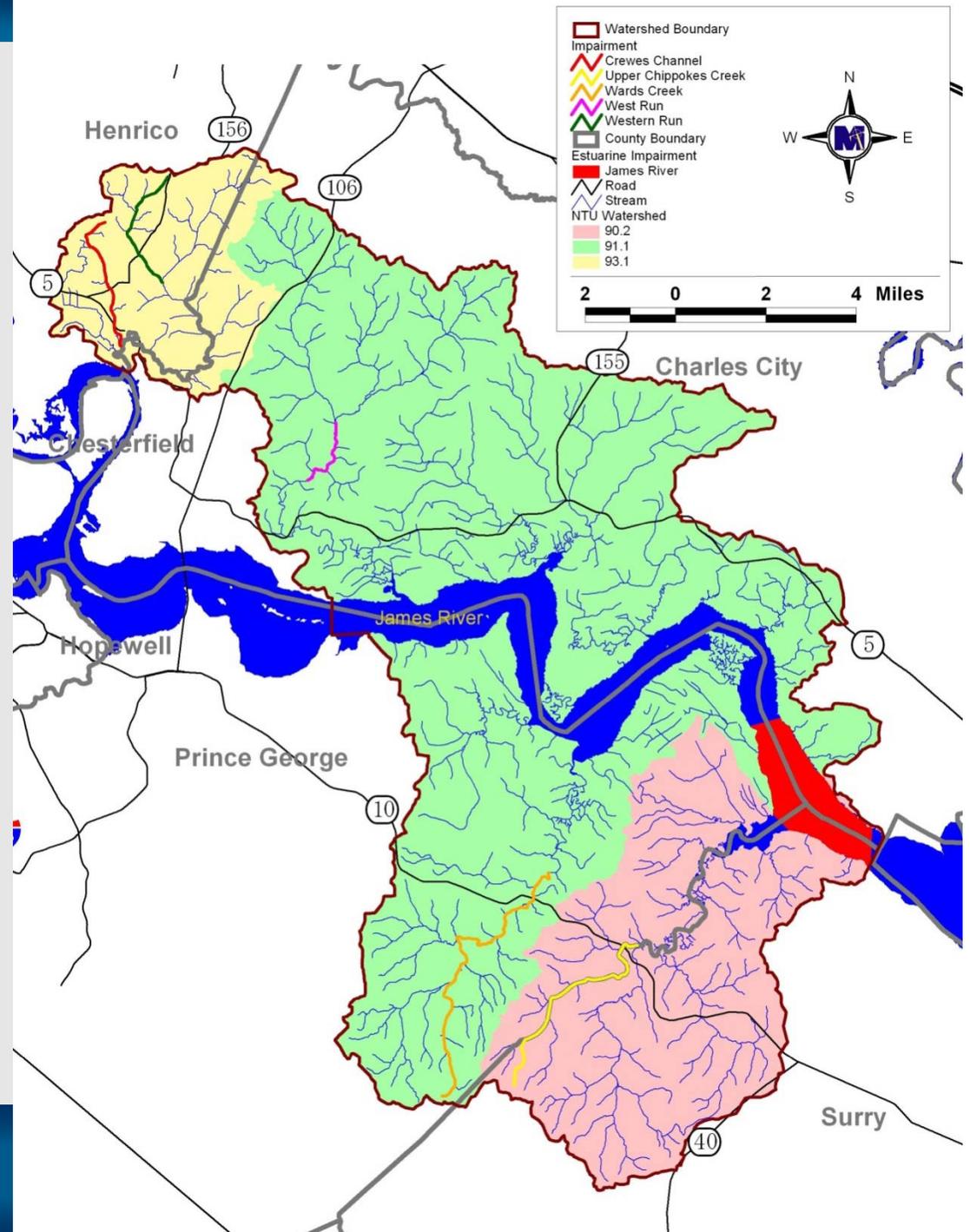
- Crewes Channel
- Western Run

Westover to Chippokes (91.1):

- West Run
- Wards Creek

Chippokes to Claremont (90.2):

- Upper Chippokes Creek



E.coli Impairments

Stream Name Impairment ID	Initial Listing Year	2010 River Miles	EC 2010 Listing Violation%	Impairment Location Description
Crewes Channel VAP-G02R_CCH01A00	2008	3.19	12.5	From its headwaters downstream to the Turkey Island Creek confluence (tidal limit).
Western Run VAP-G02R_WSN01A00	2006	1.84	37.5	From its headwaters downstream to confluence with Turkey Island Creek.
West Run VAP-G03R_WER03A00	2010	1.86	16.7	From its confluence with East Run downstream to backwaters of Harrison Lake.
Wards Creek VAP-G04R_WRD01A00	2006	8.46	18	From its headwaters to the tidal limit.
Upper Chippokes Creek VAP-G04R_UCK01A08	2008	5.61	20	From its headwaters downstream its tidal limit.
James River VAP-G04E_JMS03A04	2010	3.76 (sq. mi)	20	From Brandon Point to the transition boundary at ~ river mile 52.08.

The Instantaneous Bacteria Standard is violated when >10% of samples exceed 235 cfu E.coli



**James River and Tributaries Westover
to Claremont Bacteria TMDL &
Implementation Plan**

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Where Bacteria In Streams Comes From

- Permitted discharges
 - Wastewater treatment facilities
 - Other Permitted Discharges
- Human
 - Biosolids
 - Failed Septic Systems
 - Straight Pipes
 - Overflows
- Pets
- Livestock
- Wildlife



How do we Determine the TMDLs?



+

Watershed data



TMDL



Total Maximum Daily Load

CALCULATION:

$$\text{TMDL} = \text{Sum of WLA} + \text{Sum of LA} + \text{MOS}$$

Where:

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



Bacteria Reductions Needed to Restore Water Quality*

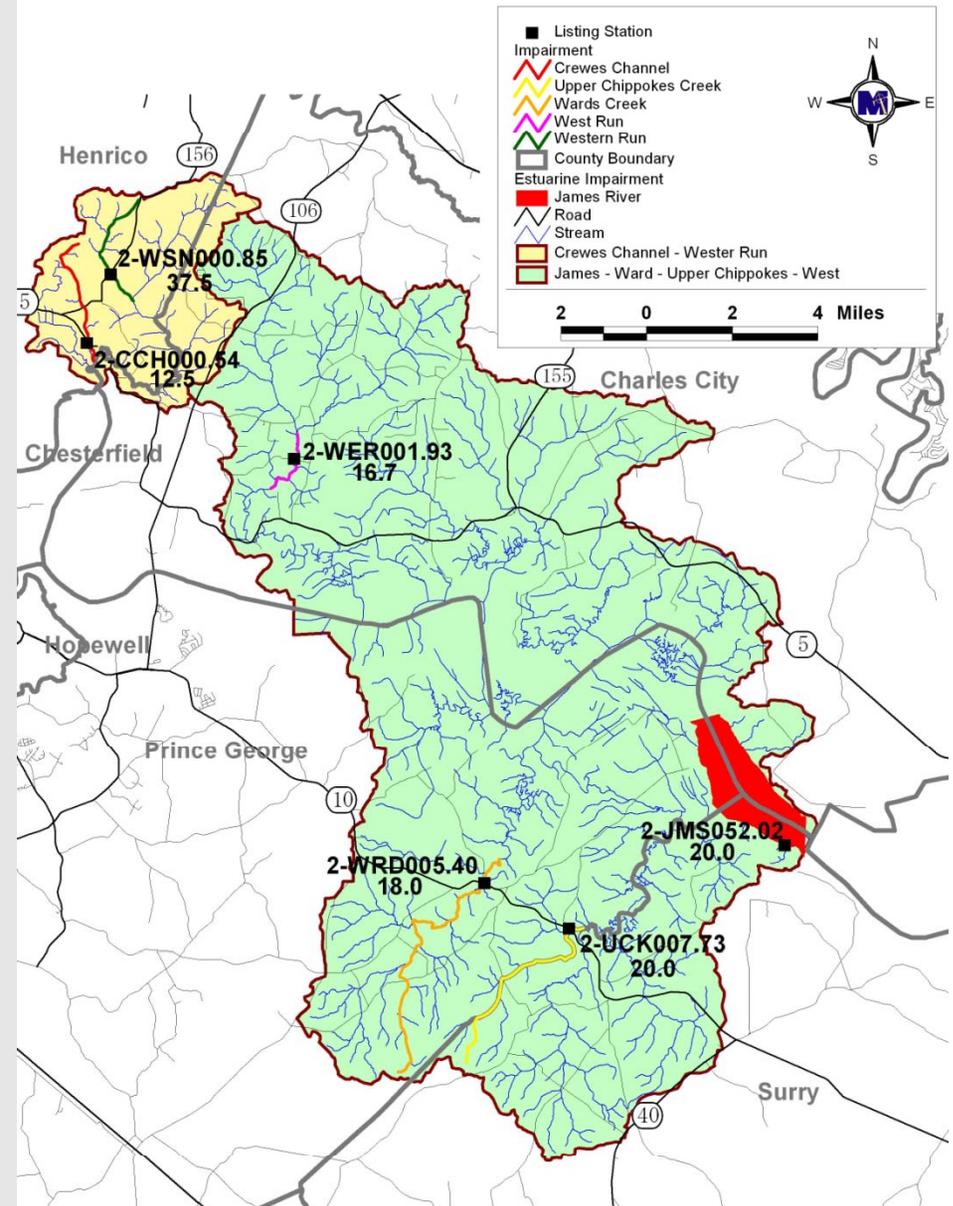
Source	Needed Reduction (%)
Straight Pipes	100
Direct Livestock Deposition to Stream	0
Direct Wildlife Deposition to Stream	0
Load from Forest, Barren, Commercial, and Wetlands	0
Load from Agricultural and Developed Lands	0

*Modeled scenarios required minimal reductions to meet standard.



Recall from first TMDL Meetings:

Bacteria Data DEQ Listing Station Locations



Recall From First TMDL Meetings: Water Quality Data Analysis - *E.coli* -

Stream	Station	Date	Count	Minimum	Maximum	Mean	Median	Standard Deviation	Violation ¹ %
Crewes Channel	2-CCH000.54	5/2004 - 11/2006	16	25	500	136	88	152	12.50
James River	2-JMS052.02	6/2007 -12/2010	22	25	300	105	100	80	9.1
Upper Chippokes Creek	2-UCK007.73	5/2005-11/2006	10	25	1,200	245	63	407	20.00
Wards Creek	2-WRD005.40	8/2003-12/2010	45	10	1,800	190	100	350	15.60
West Run	2-WER001.93	1/2007-11/2008	12	3	300	122	100	97	16.70
Western Run	2-WSN000.85	5/2004-11/2006	16	25	1,000	249	128	293	37.50

James River segment delisted as a result of TMDL development monitoring (<10% violation rate)

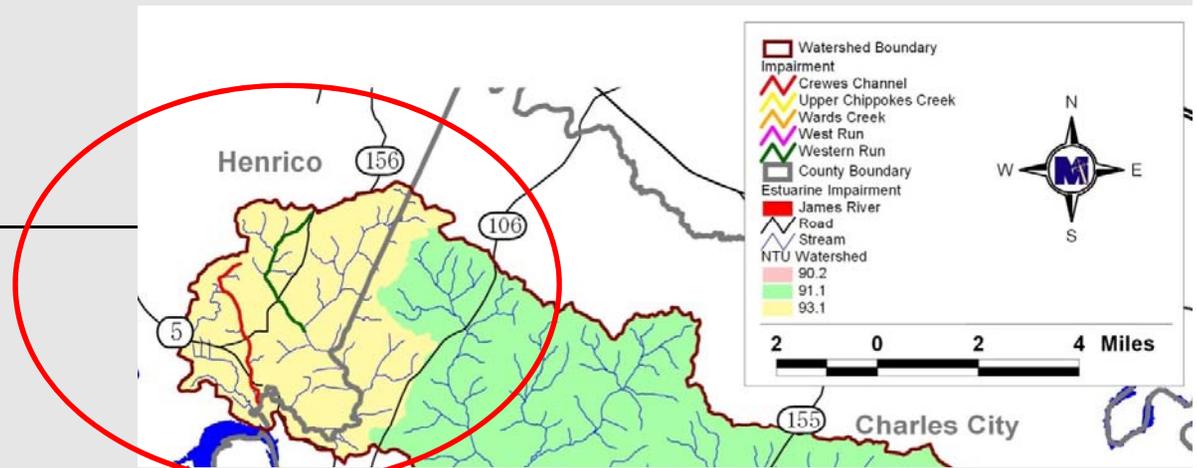


Turkey Island Creek Bacteria TMDL Summary (NTU 93.1)

Impairment	WLA	LA	MOS	TMDL
Turkey Island Creek	5.12E+11	1.99E+13		2.04E+13
Domestic Discharger VAG404206	1.74E+09			
Henrico Co. and VDOT Aggregated MS4	1.03E+11			
<i>Future Load</i>	4.07E+11			

**Bacteria
Reduction
Needed:
13.2%**

Implicit



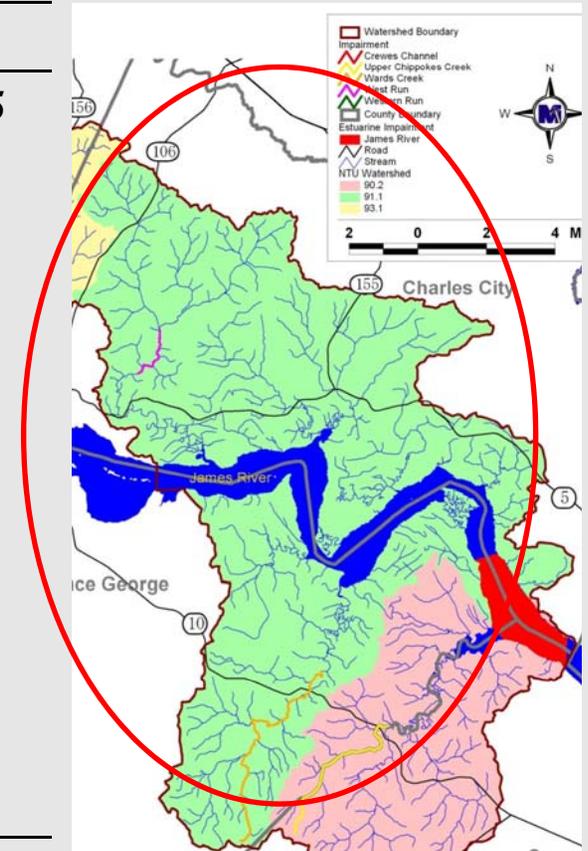
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Westover to Chippokes Bacteria TMDL Summary (NTU 91.1)

Impairment	WLA	LA	MOS	TMDL
Westover to Chippokes	4.29E+13	2.10E+15		2.14E+15
Domestic Discharger	1.74E+09			
VAG404253				
VA0021261	1.74E+10			
VA0060585	7.84E+09		<i>Implicit</i>	
VA0079057	1.25E+11			
VA0086673	4.36E+10			
<i>Future Load</i>	4.27E+13			

Bacteria Reduction Needed: 0.1%



Turkey Island Creek - James River and Tributaries Westover to Claremont Bacteria TMDL & Implementation Plan

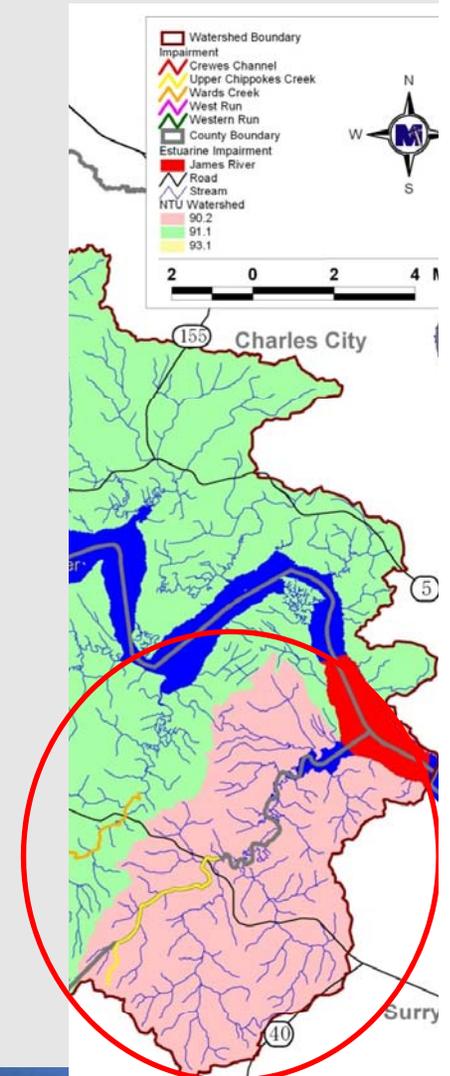
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Chippokes to Claremont Bacteria TMDL Summary (NTU 90.2)

Impairment	WLA	LA	MOS	TMDL
Chippokes to Claremont	5.10E+13	2.50E+15	<i>Implicit</i>	2.55E+15
<i>Future Load</i>	5.10E+13			

Bacteria Reduction Needed: 0.0%***

*** Current violation rate ~ 9%, standard is <10% violation rate



TMDL Implementation Plan

Document that details one possible strategy in which bacteria reductions identified by the TMDL, can be achieved.



Components of an Implementation Plan

- Review of TMDL
- Corrective Actions
 - Best Management Practices (BMPs), educational programs, regulatory authority, incentives
- Cost/Benefit Analysis
- Measurable Goals
- Timeline to Achieve Water Quality Objectives
 - Includes monitoring plan to assess progress
- Public Participation



Cost/Benefit Analysis

- Assess cost for implementation
- Evaluate environmental benefit through modeling
- Compare Cost-Effectiveness
- Identify/Evaluate economic benefits of Implementation
- Identify funding sources



Local Issues

- Coordination with other plans
 - Bay TMDL
 - Local and regional planning efforts
- Nuisance Wildlife
- Other?



Measurable Goals/Timeline

- Phased approach (Targeting)
 - Bang for the buck
 - Spatial Analysis/Modeling
- Implementation milestones – Stakeholders
- Interim water quality milestones – Modeling
- 5 - 10 year timeframe to meet water quality standard



Public Participation

- Public Meetings (today is 1st, we'll have one for the draft plan)
 - Informational
 - Solicit public participation
 - Provide a forum for public comment
- Working Groups (2)
 - Address “community” issues/concerns
- Steering Committee (1)
 - Direct the overall process
 - Review output from working groups
 - Review future implementation



Working Groups: Residential

Responsibilities:

- Identify possible constraints to implementation
- Identify methods of outreach to homeowners with sewage problems
- Identify alternative funding sources/partnerships
- Review implementation strategies from a group's perspective



Members typically include local citizens, non-profit organizations, health department

Working Groups: Government

Responsibilities:

- Identify funding sources
- Identify available technical resources
- Identify appropriate “measurable goals” and timeline for achievement
- Identify regulatory controls currently in place
- Identify potential parties to be responsible for agricultural, residential, and urban implementation
- Evaluate various corrective actions, costs, tracking procedures, and technical assistance needs



Members typically include local and state government agencies

Working Groups: Agricultural

Responsibilities:

- Identify potential constraints to implementation
- Identify alternative funding sources/partnerships
- Review implementation strategies from an agricultural perspective
- Identify outreach methods for engaging agricultural producers



Members typically include SWCDs, NRCS, extension agents, farmers, and local and state government

Steering Committee

Responsibilities:

- Direct overall process
- Review output from working groups
- Identify methods of public outreach
- Review future implementation



Residential Management Measures in Turkey Island Creek Watershed

Residential Control Measure Description	Unit	Units Needed	Suggested Unit Cost
<i>Straight Pipe Corrections:</i>			
Sewer Connection	system	2	\$6,000
Alternative Waste Treatment System Installation	system	0	\$20,000
Septic System Installation/Replacement	system	1	\$8,000



Residential Management Measures in Westover to Chippokes Watershed

Residential Control Measure Description	Unit	Units Needed	Suggested Unit Cost
<i>Straight Pipe Corrections:</i>			
Sewer Connection	system	6	\$6,000
Alternative Waste Treatment System Installation	system	1	\$20,000
Septic System Installation/Replacement	system	5	\$8,000



Residential Management Measures in Chippokes to Claremont Watershed

Residential Control Measure Description	Unit	Units Needed	Suggested Unit Cost
<i>Straight Pipe Corrections:</i>			
Sewer Connection	system	3	\$6,000
Alternative Waste Treatment System Installation	system	0	\$20,000
Septic System Installation/Replacement	system	3	\$8,000



And then:

- Public Review & Comment Period
- Submit TMDL to EPA
- Continue with Implementation Planning Working Group and Steering Committee Meetings
- Final Implementation Planning Meeting
- State Approval (TMDL & IP)
- Implementation



Contact Information

VDEQ

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*Send Written Comments to Margaret by:
Monday July 29, 2013*



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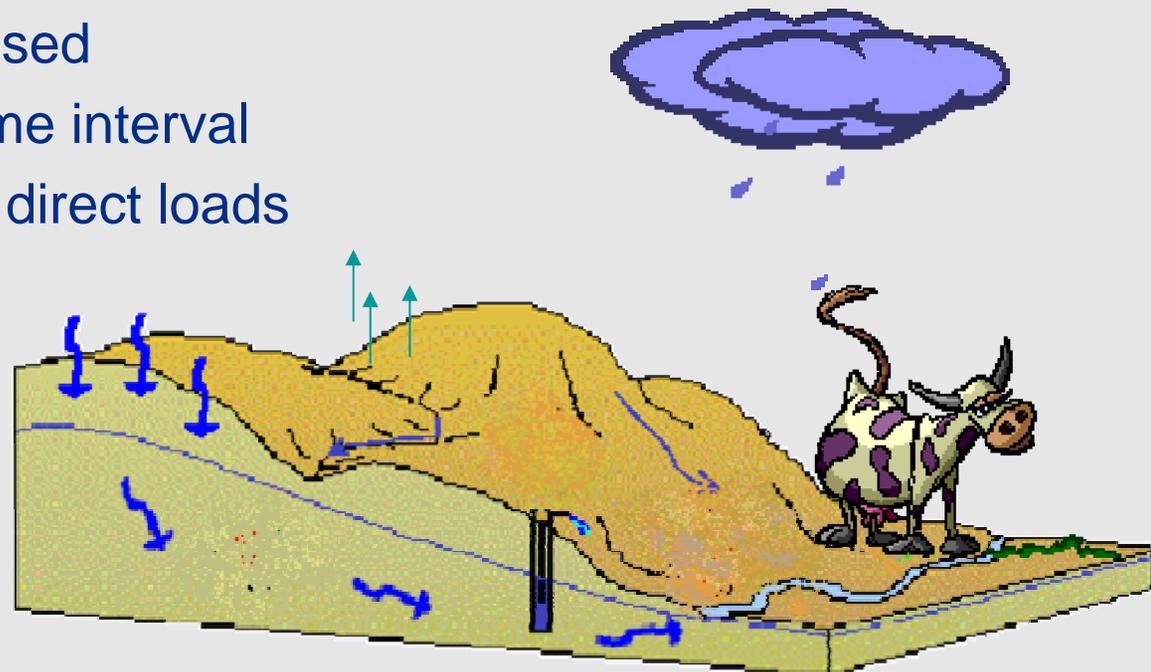
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Appendix A

Modeling

Modeling - Bacteria

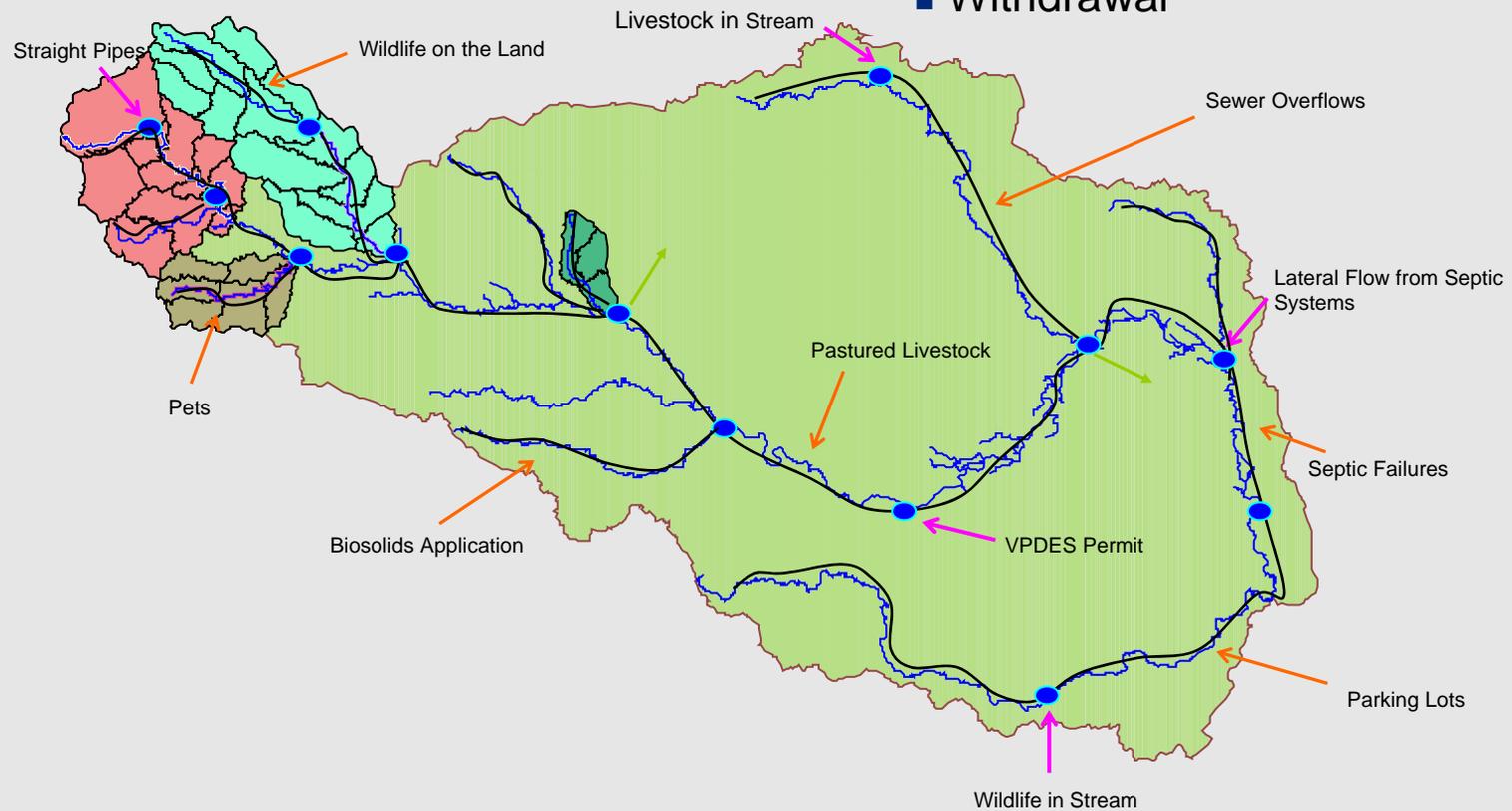
- Rainfall-Runoff-Water Quality
 - Hydrologic Simulation Program – Fortran (HSPF)
 - ◆ Watershed-based
 - ◆ Continuous time interval
 - ◆ Land-applied, direct loads



Conceptual Model



- Mathematical Representation
- Overland
- Direct discharges
- Withdrawal



Subwatersheds

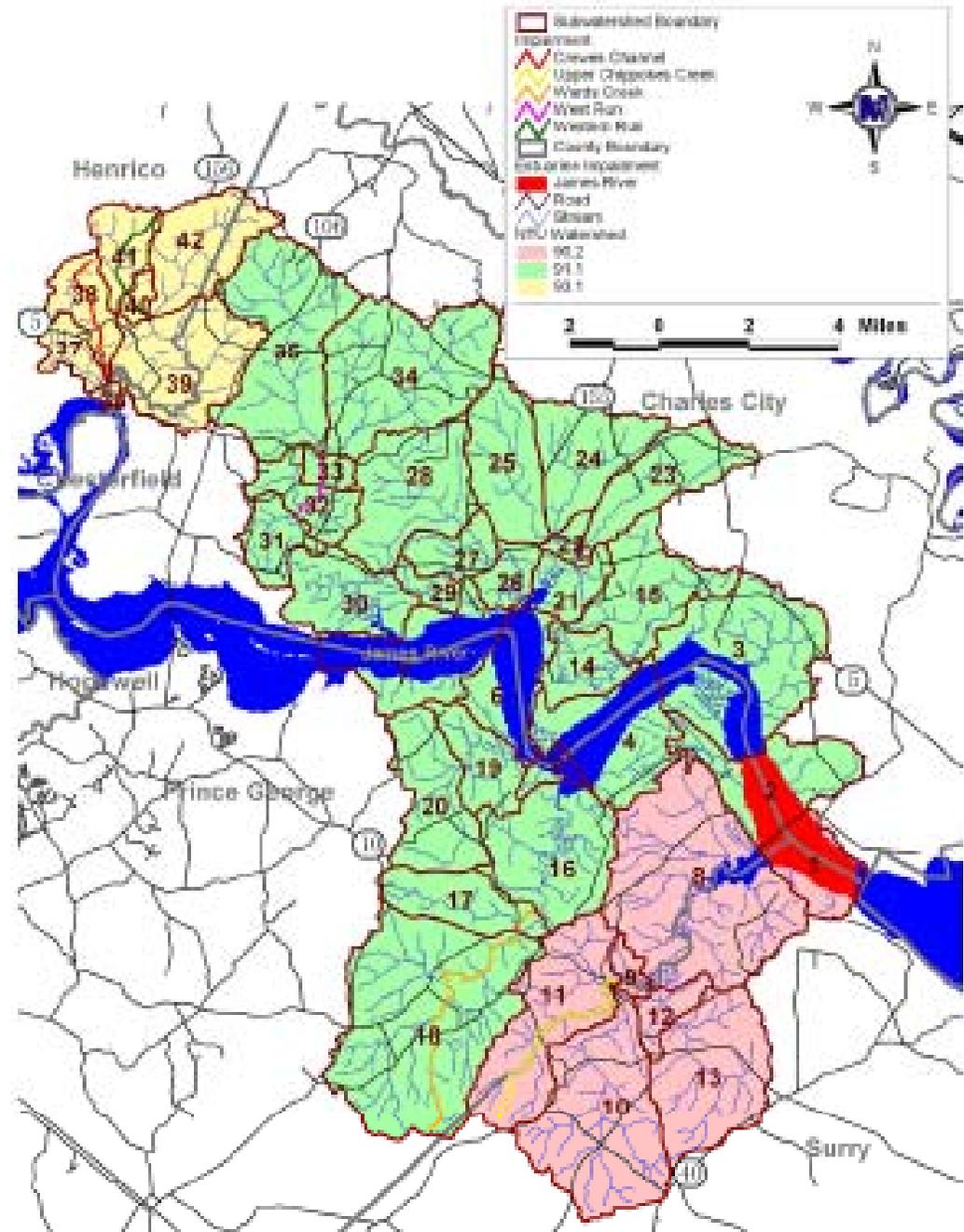


Figure 3.1 All subwatersheds delineated for modeling in the study area.

Allocated Subwatersheds

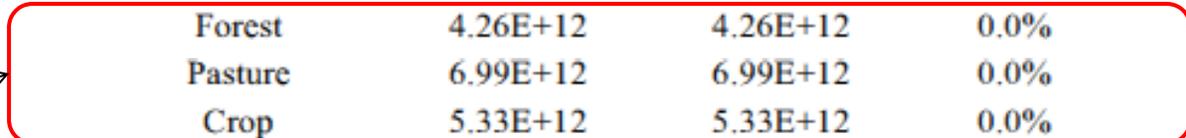
Table B. 1 Impairments and subwatersheds within the study area.

Impairment	Impaired Subwatershed(s)	Outlet	Contributing Subwatersheds within each NTU
Crewes Channel VAP-G02R_CCH01A00	38	38	38
Western Run VAP-G02R_WSN01A00	40,41	40	40,41
West Run VAP-G03R_WER03A00	32,33	32	32,33,34,35
Wards Creek VAP-G04R_WRD01A00	17,18	17	17,18
Upper Chippokes Creek VAP-G04R_UCK01A08	11	11	11
James River VAP-G04E_JMS03A04	1,2	1	1,8,9,10,11,12,13

Table 5.2 Estimated existing and allocated *E. coli* in-stream loads in the Turkey Island Creek (NTU 93.1) study area impairments.

Source	Total Annual Loading for Existing Run (cfu/yr)	Total Annual Loading for Allocation Run (cfu/yr)	Percent Reduction
Land Based			
Open Space	2.76E+10	2.76E+10	0.0%
LMIR*	1.10E+12	1.10E+12	0.0%
Barren**	1.27E+11	1.27E+11	0.0%
Commercial	1.68E+09	1.68E+09	0.0%
Forest	4.26E+12	4.26E+12	0.0%
Pasture	6.99E+12	6.99E+12	0.0%
Crop	5.33E+12	5.33E+12	0.0%
Wetland	2.93E+11	2.93E+11	0.0%
LAX***	1.96E+11	1.96E+11	0.0%
Direct			
Human	3.03E+12	0.00E+00	100.0%
Livestock	6.86E+10	6.86E+10	0.0%
Wildlife	1.46E+12	1.46E+12	0.0%
Permitted Sources	1.05E+11	1.05E+11	0%
Future Growth	Future Growth	4.07E+11	NA
Total Loads	2.30E+13	2.04E+13	13.2%****

Potential for suggested BMPs in implementation plan



* LMIR – Low-Medium Intensity Residential
 ** Barren - Areas of bedrock, strip mines, gravel pits, and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
 *** LAX - livestock pasture access near flowing streams.
 **** Calculations for total percent reductions are conducted excluding future growth.

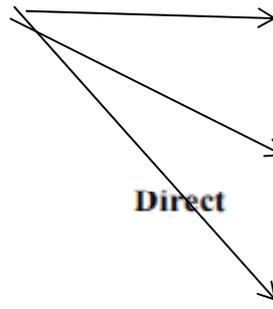


Nuisance wildlife management plans can be developed as part of an IP

Table 5.6 Estimated existing and allocated *E. coli* in-stream loads in the James River and Tributaries – Westover to Chippokes Point (NTU 91.1) study area.

Source	Total Annual Loading for Existing Run (cfu/yr)	Total Annual Loading for Allocation Run (cfu/yr)	Percent Reduction
Land Based			
Open Space	6.66E+10	6.66E+10	0.0%
LMIR [*]	3.93E+11	3.93E+11	0.0%
Barren ^{**}	3.30E+11	3.30E+11	0.0%
Commercial	1.69E+09	1.69E+09	0.0%
Forest	4.33E+12	4.33E+12	0.0%
Pasture	3.30E+12	3.30E+12	0.0%
Crop	3.99E+12	3.99E+12	0.0%
Wetland	1.19E+12	1.19E+12	0.0%
LAX ^{***}	1.09E+11	1.09E+11	0.0%
Direct			
Human	1.40E+12	0.00E+00	100.0%
Livestock	8.28E+12	8.28E+12	0.0%
Wildlife	2.12E+14	2.12E+14	0.0%
Permitted Sources	1.96E+11	1.96E+11	0%
Upstream James	1.86E+15	1.86E+15	0%
Future Growth	Future Growth	4.27E+13	NA
Total Loads	2.10E+15	2.14E+15	0.1%^{****}

Potential for suggested BMPs in Implementation Plan



^{*} LMIR – Low-Medium Intensity Residential
^{**} Barren - Areas of bedrock, strip mines, gravel pits, and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
^{***} LAX - livestock pasture access near flowing streams.
^{****} Calculations for total percent reductions are conducted excluding future growth.



Nuisance wildlife management plans can be developed as part of an IP

Table 5.10 Estimated existing and allocated *E. coli* in-stream loads in the James River and Tributaries – Chippokes Point to Claremont (NTU 90.2) study area.

Source	Total Annual Loading for Existing Run (cfu/yr)	Total Annual Loading for Allocation Run (cfu/yr)	Percent Reduction
Land Based			
Open Space	5.19E+10	5.19E+10	0.0%
LMIR [*]	7.73E+11	7.73E+11	0.0%
Barren ^{**}	1.16E+11	1.16E+11	0.0%
Commercial	0.00E+00	0.00E+00	0.0%
Forest	9.34E+11	9.34E+11	0.0%
Pasture	1.98E+11	1.98E+11	0.0%
Crop	2.93E+10	2.93E+10	0.0%
Wetland	3.21E+11	3.21E+11	0.0%
LAX ^{***}	6.42E+10	6.42E+10	0.0%
Direct			
Human	1.23E+04	0.00E+00	100.0%
Livestock	2.91E+12	2.91E+12	0.0%
Wildlife	1.10E+14	1.10E+14	0.0%
Permitted Sources	0.00E+00	0.00E+00	0%
Upstream James	2.41E+15	2.41E+15	0%
Future Growth	0.00E+00	2.53E+13	NA
Total Loads	2.52E+15	2.55E+15	<0.0%****

* LMIR – Low-Medium Intensity Residential

** Barren - Areas of bedrock, strip mines, gravel pits, and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.

*** LAX - livestock pasture access near flowing streams.

**** Calculations for total percent reductions are conducted excluding future growth.



Nuisance wildlife management plans can be developed as part of an IP

Appendix B

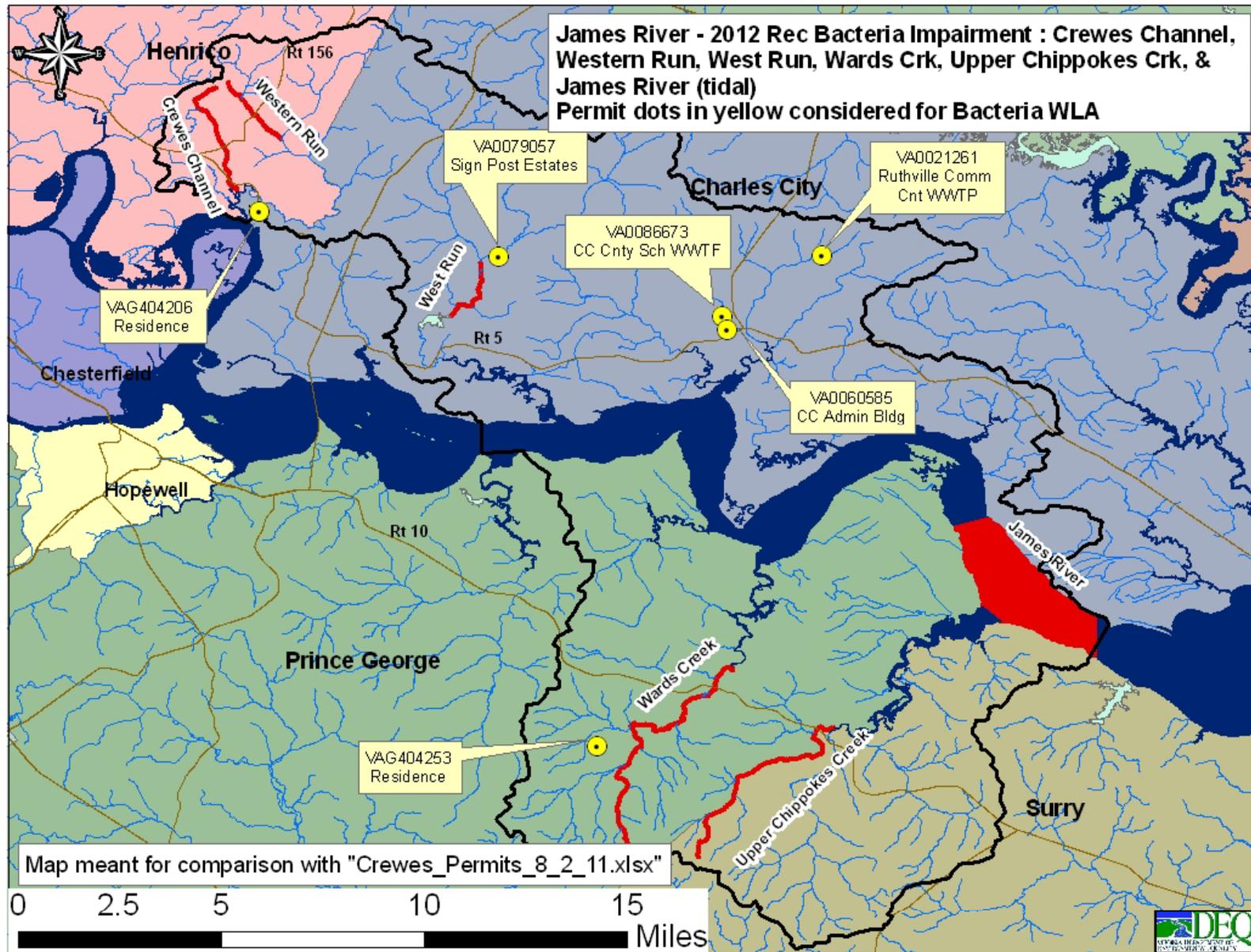
Source Assessment

Permitted Discharges

Permit Number	Facility Name	Type	Permitted for EC	Design Flow (MGD)	Receiving Waterbody
VA0021261	Ruthville Community Center WWTP	Municipal	Yes	0.01	U.T. to Glebe Creek
VA0060585	Charles City Administration Building	Municipal	Yes	0.0045	Courthouse Creek
VA0086673	Charles City County Schools WWTF	Municipal	Yes	0.025	Courthouse Creek
VA0079057	Sign Post Estates WWTP	Municipal	Yes	0.0072	East Run
VAG404206	Residence	General	Yes	0.001	UT Turkey Island Creek
VAG404253	Residence	General	Yes	0.001	UT Wards Creek

*Henrico County has an MS4 Phase I in Turkey Island Creek and is permitted for bacteria





Sampling Procedures

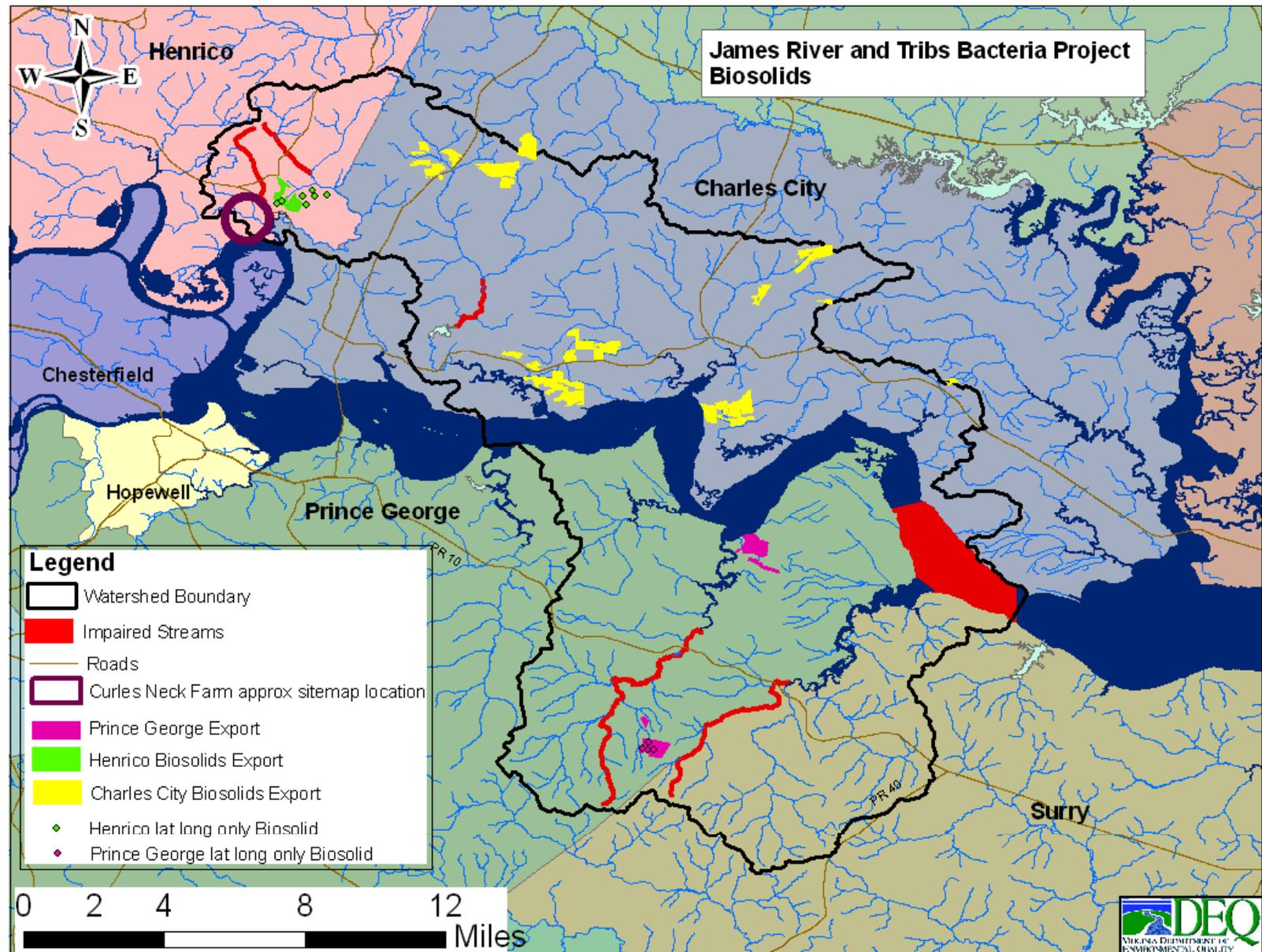
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Biosolids

Table 3.5 Application of biosolids within the study area (2001 – 2011).

Year	Dry Tons	
	Turkey Island Creek (NTU 93.1)	James River and Tributaries (NTU 91.1 + NTU 90.2)
2001	1,206	1,605
2002		2,743
2003	681	3,408
2004	1,228	2,366
2005	2,224	508
2006		929
2007		1,435
2008		2,632
2009	747	1,168
2010		1,090
2011		742
Total	6,086	18,626

Biosolids



Human Source

Population, housing units, and onsite treatment system based on U.S. Census

- Septic Systems
 - Failure to soil surface throughout year or during wet season only
 - Lateral movement continuously to stream
- Straight Pipes
 - Direct continuous input into stream
- Biosolids (DEQ Permitting Database)
 - Land-applied

Human Source

Local health departments assisted in validating the initial estimates

Watershed	Housing Units (HU)	HU on Sewer	HU on Septic	Straight Pipes	Failing Septic Systems
Turkey Island Creek	457	0	454	3	15
Westover to Chippokes	2323	24	2284	15	75
Chippokes to Claremont	517	60	454	3	15

Livestock Sources

- Population
 - Virginia Agricultural Statistics
 - Consultation with SWCD, NRCS, VADCR, and VCE
 - Watershed surveys
- Distribution of waste
 - Pastured
 - Confined, waste collected, spread
 - Direct deposition to the stream
- Seasonal varying applications

Livestock Population

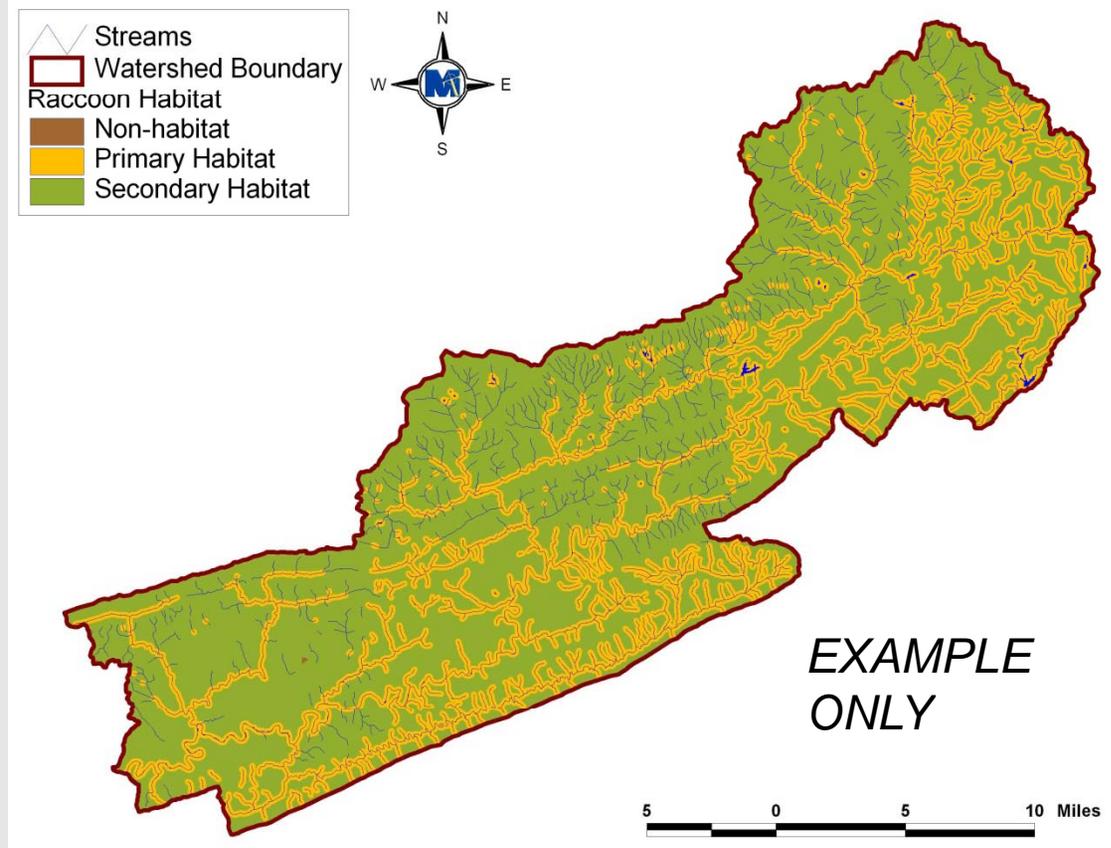
Watershed	Beef	Beef Calves	Horse	Sheep	Hog*
Turkey Island Creek	25	15	37	16	0
Westover to Chippokes	157	177	233	0	100
Chippokes to Claremont	27	386	78	18	0

*USDA Census/VA DCR AFO Database indicated one farm in Courthouse Creek with 3500 Hogs – determined only about 100 on the farm at any time.

Wildlife Source

- Population
 - Animal densities from VDGIF biologists
 - Habitat from literature values and GIS
- Distribution of waste based on habitat
 - Land-applied
 - Direct deposition to the stream
- Seasonal variations based on migration patterns and food sources

*Example: If raccoon density were 0.0343 animal per acre of habitat, and there were 103,032 acres of raccoon habitat, then raccoon population would be $0.0343 * 103,032 = 3,534$ raccoon.*



Wildlife Population

Watershed	Deer	Turkey	Beaver	Raccoon	Muskrat	Duck	Goose
Turkey Island Creek	405	105	212	1179	379	39	39
Westover to Chippokes	2596	681	811	5182	7182	748	734
Chippokes to Claremont	938	246	287	1873	2122	222	217

Monitoring





Figure 2.1 Location of VADEQ water quality monitoring stations in the Study area.

Fecal Coliform

Table 2.1 Summary of fecal coliform (cfu/100 mL) data collected by VADEQ from January 1990 – August 2011.

Stream	Station	Date	Count	Minimum	Maximum	Mean	Median	Standard	
								Deviation	Violation ¹ %
Bailey Branch	2-BLB001.19	10/2005 - 11/2005	3	120	340	230	230	110	0.0
Bailey Branch	2-BLB002.04	4/2003	1	50	50	50	NA	NA	0.0
Gunns Run	2-GUN004.00	7/1990 - 3/2001	50	18	2,400	166	100	334	2.0
James River	2-JMS055.94	1/1994 – 8/2011	174	2	790	82	25	123	3.4
James River	2-JMS064.52	7/2005	1	25	25	25	NA	NA	0.0
James River	2-JMS066.88	6/2006	1	25	25	25	NA	NA	0.0
James River	2-JMS069.08	1/1994 – 8/2011	174	2	3,500	181	100	420	8.6
Upper Chippokes Creek	2-UCK005.21	8/2008	1	200	200	200	NA	NA	0.0
Wards Creek	2-WRD005.40	8/1990 - 8/2011	92	18	9,200	451	100	1,304	15.2
West Run	2-WER000.02	5/2003 - 10/2004	6	100	2,200	450	100	857	16.7
West Run	2-WER001.93	6/2001 - 5/2003	13	100	400	154	100	113	0.0
West Run X-Trib	2-XUD000.15	4/2003	1	25	25	25	NA	NA	0.0

NA – Not applicable

¹Based on an instantaneous fecal coliform standard of 400 cfu/100 mL.

E. coli

Table 2.2 Summary of *E. coli* (cfu/100 mL) data collected by VADEQ from January 2001 – August 2011.

Stream	Station	Date	Count	Minimum	Maximum	Mean	Median	Standard Deviation	Violation ¹ %
Bailey Branch	2-BLB001.19	12/2005	1	300	300	300	NA	NA	100.0
Bailey Branch	2-BLB002.04	4/2003	1	20	20	20	NA	NA	0.0
Courthouse Creek	2-CRT001.00	6/2005 – 8/2011	14	25	750	173	98	207	21.4
Crewes Channel	2-CCH000.54	5/2004 - 11/2006	16	25	500	136	88	152	12.5
Gunns Run	2-GUN004.00	7/2003 - 4/2008	12	25	400	83	50	105	8.3
James River	2-JMS052.02 ²	6/2007 - 12/2010	22	25	300	105	100	80	9.1
James River	2JMS055.04	8/2010	1	10	10	10	NA	NA	0.0
James River	2-JMS055.94	7/2004 –8/2011	83	25	480	63	25	68	2.4
James River	2-JMS064.52	7/2005	1	20	20	20	NA	NA	0.0
James River	2-JMS066.88	6/2006	1	10	10	10	NA	NA	0.0
James River	2-JMS069.08	7/2004 – 8/2011	82	25	1,100	103	88	145	7.3
Turkey Island Creek	2-TIC002.69	6/2005 – 7/2011	14	25	220	88	88	59	0.0
Upper Chippokes Creek	2-UCK001.23	8/2003 - 3/2005	10	25	280	61	25	81	10.0
Upper Chippokes Creek	2-UCK005.21	8/08	1	90	90	90	NA	NA	0.0
Upper Chippokes Creek	2-UCK007.73	5/2005 - 11/2006	10	25	1,200	245	63	407	20.0
Wards Creek	2-WRD005.40	8/2003 - 12/2010	49	10	1,800	178	100	338	14.3
West Run	2-WER000.02	4/2003 - 10/2008	8	25	25	25	25	0	0.0
West Run	2-WER001.93	1/2007 - 11/2008	12	3	300	122	100	97	16.7
West Run X-Trib	2-XUD000.15	4/2003	1	10	10	10	NA	NA	0.0
Western Run	2-WSN000.85	5/2004 - 11/2006	16	25	1,000	249	128	293	37.5

NA – Not applicable

¹Based on the current instantaneous *E. coli* standard of 235 cfu/100 mL.

² This station is the listing station for the impaired segment on the James River (VAP-G04E_JMS03A04). This segment was delisted during the course of the TMDL development. However, a decision was made by DEQ to continue with developing a TMDL for the segment because the violation rate is close to DEQ's impairment threshold of 10%.