

Addressing the Bacteria Impairment at Fairview Beach: Analysis of Monitoring Data and Assessment of Sources

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Interstate Commission on the Potomac River Basin

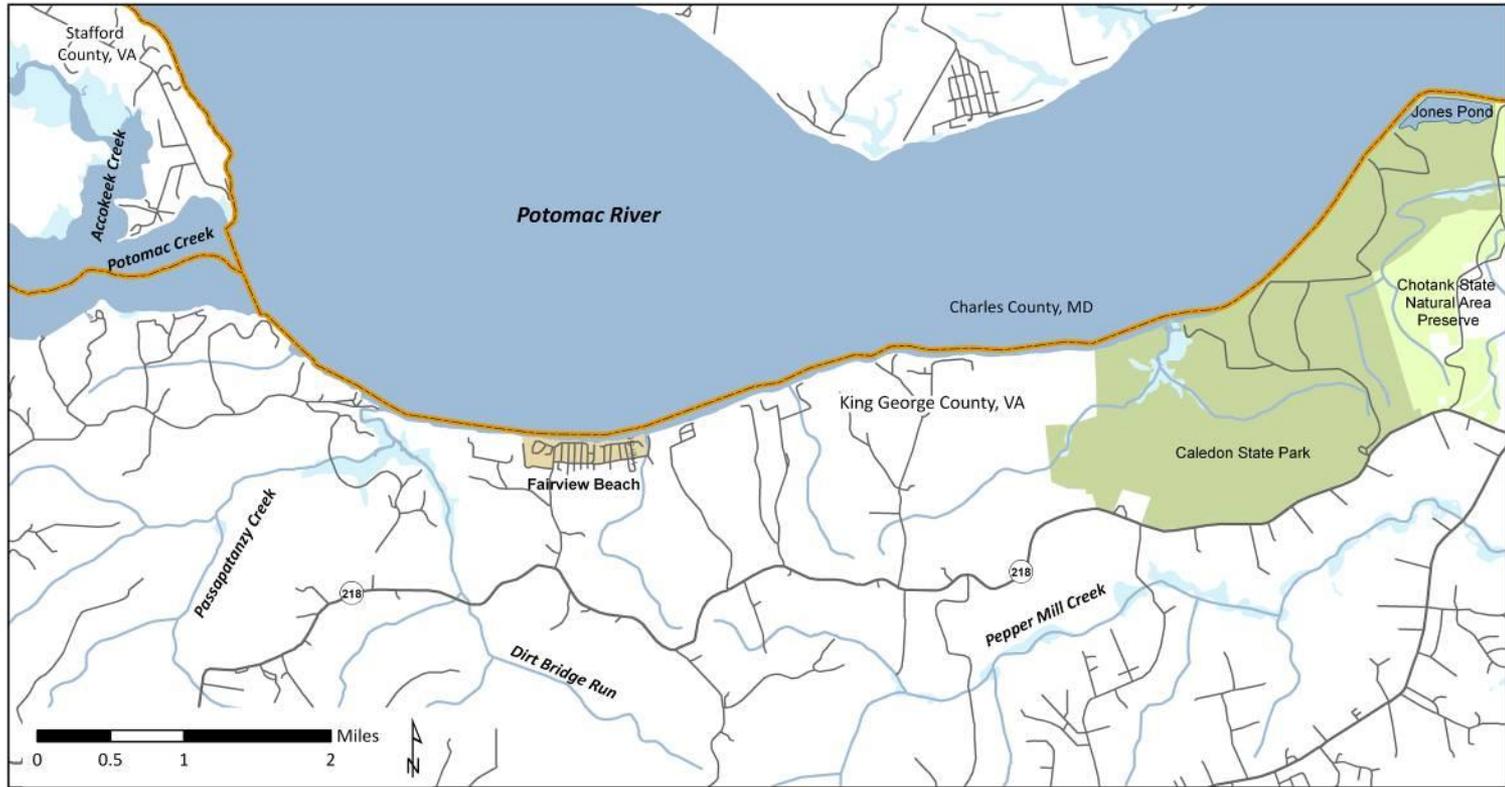
February 20, 2014



Topics

- Bacteria Impairment at Fairview Beach
 - Swimming Advisories
 - Water Quality Standards and Criteria
- Monitoring Results
 - VA Department of Health (VDH)
 - Virginia Tech (VT)
 - Fairview Beach Resident's Association (FBRA)
- Sources and Transport Paths
- Actions Already Taken to Address Impairment

Location of Fairview Beach



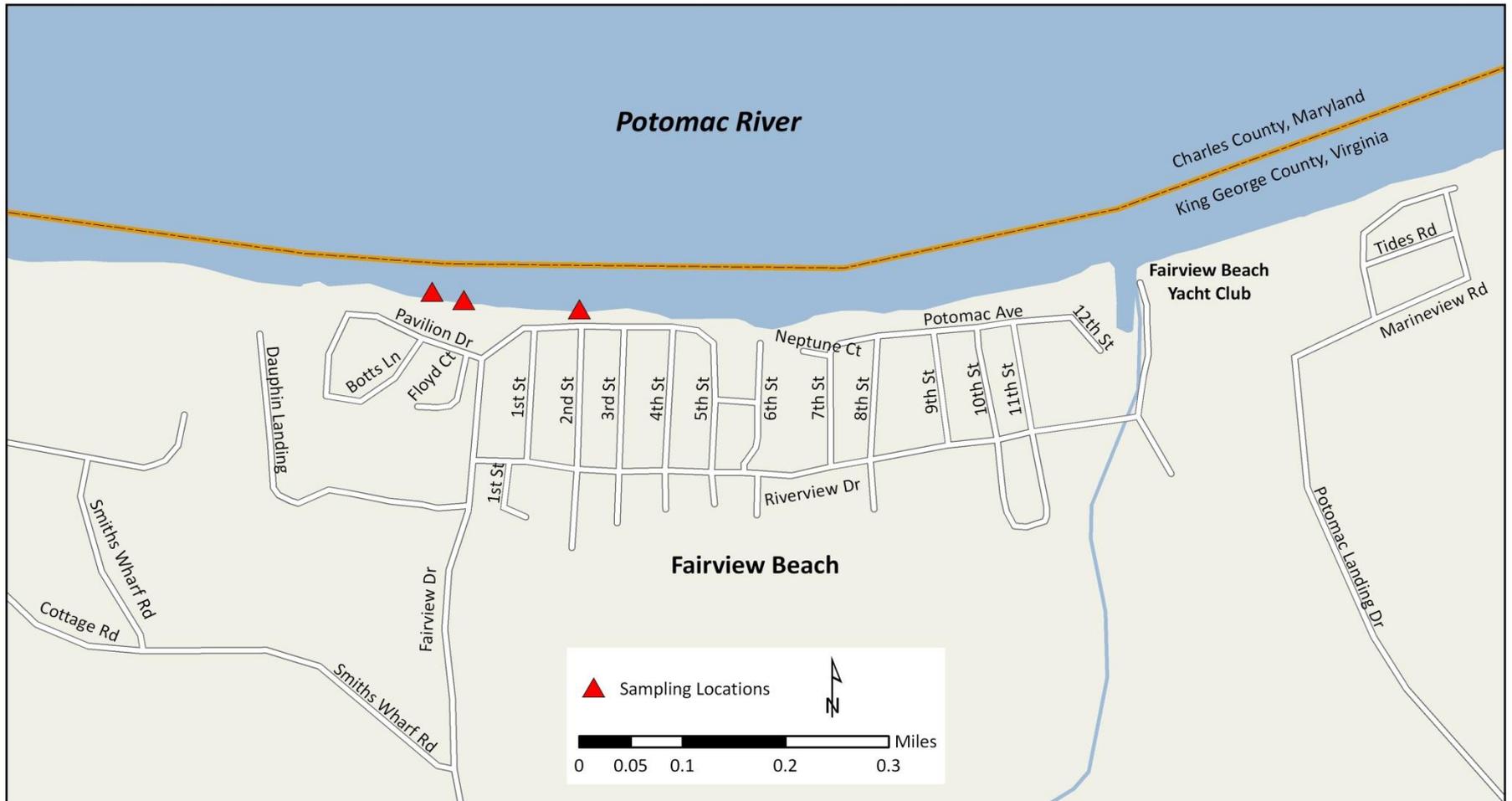
Water Quality Standards

- Virginia Water Quality Standards:
 - *all state waters are designated for recreational uses (e.g., swimming and boating) (9 VAC 25-260-10)*
- Bacteria Criteria:
 - *Enterococci bacteria shall not exceed a **monthly geometric mean of 35 CFU/100 ml** in transition and saltwater ...Geometric means shall be calculated using all data collected during any calendar month with a minimum of four weekly samples... If there are insufficient data to calculate monthly geometric means in transition and saltwater, **no more than 10% of the total samples in the assessment period shall exceed 104 CFU/100 ml.**" (9 VAC 25-260-170 A)*

Virginia Department of Health Monitoring

- Sample weekly May (Memorial Day) through September since 2004
- Four sites (2004-2005); three sites thereafter
- Swimming advisory issued if the arithmetic average *Enterococci* count exceeds the assessment threshold of 104 cfu/100 ml

VDH Monitoring Stations (2006-2011)



Swimming Advisories at Fairview Beach

Year	Number of Advisories	Days Under Advisory
2004	4	13
2005	2	8
2006	3	33
2007	6	32
2008	5	24
2009	5	16
2010	4	18
2011	4	22
2012	5	10
2013	2	5
Average	4.0	18.1

Monthly Geometric Mean Concentrations (based on VDH samples)

Year	June	July	August	September
2004	46	6	17	112
2005		84	64	
2006	149	27	7	
2007	136	43	69	52
2008	60	80	24	216
2009	84	31	39	88
2010	28	32	42	
2011	177	15	75	
2012	44	56	31	
2013	69	34	26	

Impairment Listing

Name	Cause Group Code	Description	Size	Initial Listing
Fairview Beach (Potomac River)	A29E-02-BAC	Includes all of Fairview Beach on the Potomac River	0.012 mi. ²	2006

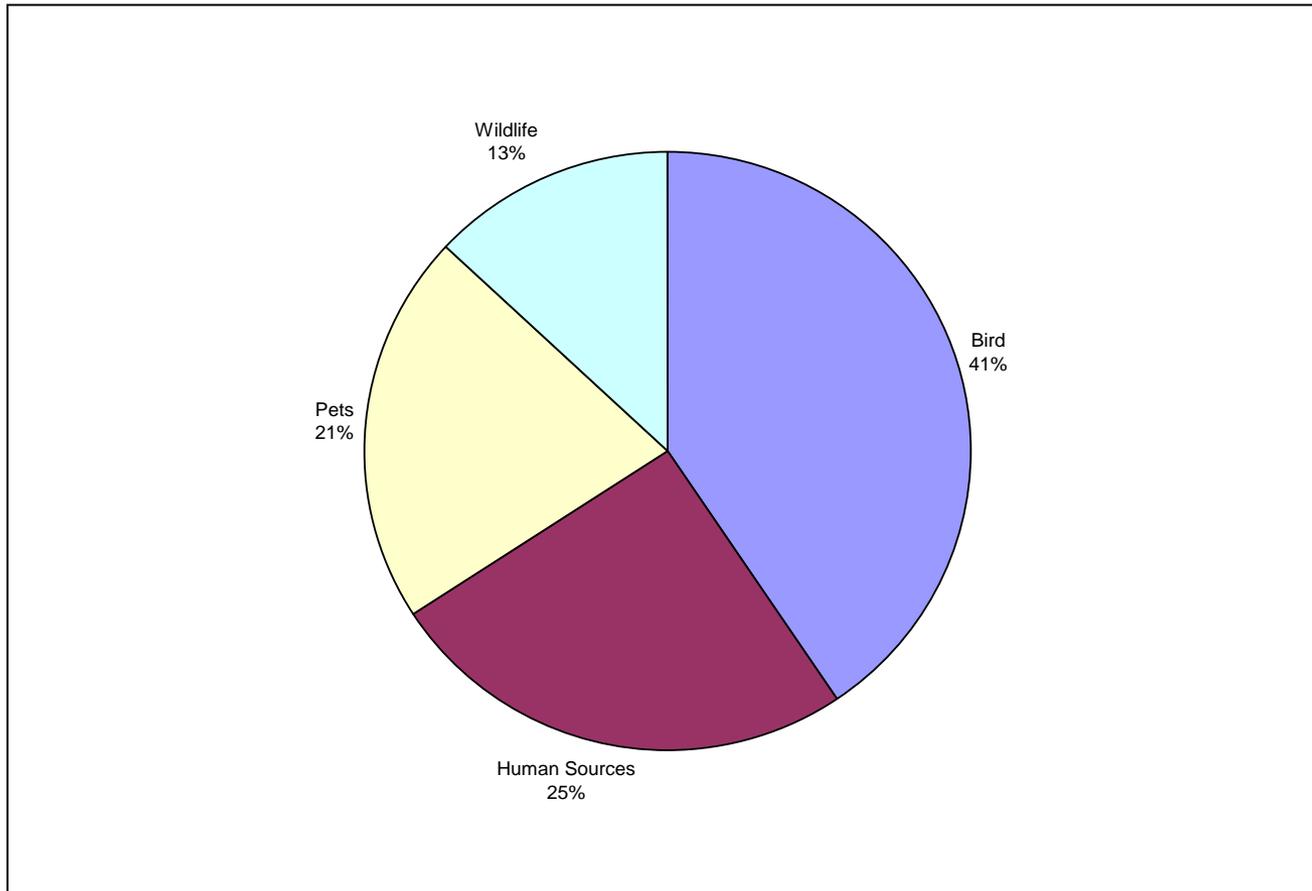
- 2010 305(b)/303(d) Water Quality Assessment Integrated Report

[http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/
WaterQualityAssessments/2010305b303dIntegratedReport.aspx](http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/WaterQualityAssessments/2010305b303dIntegratedReport.aspx)

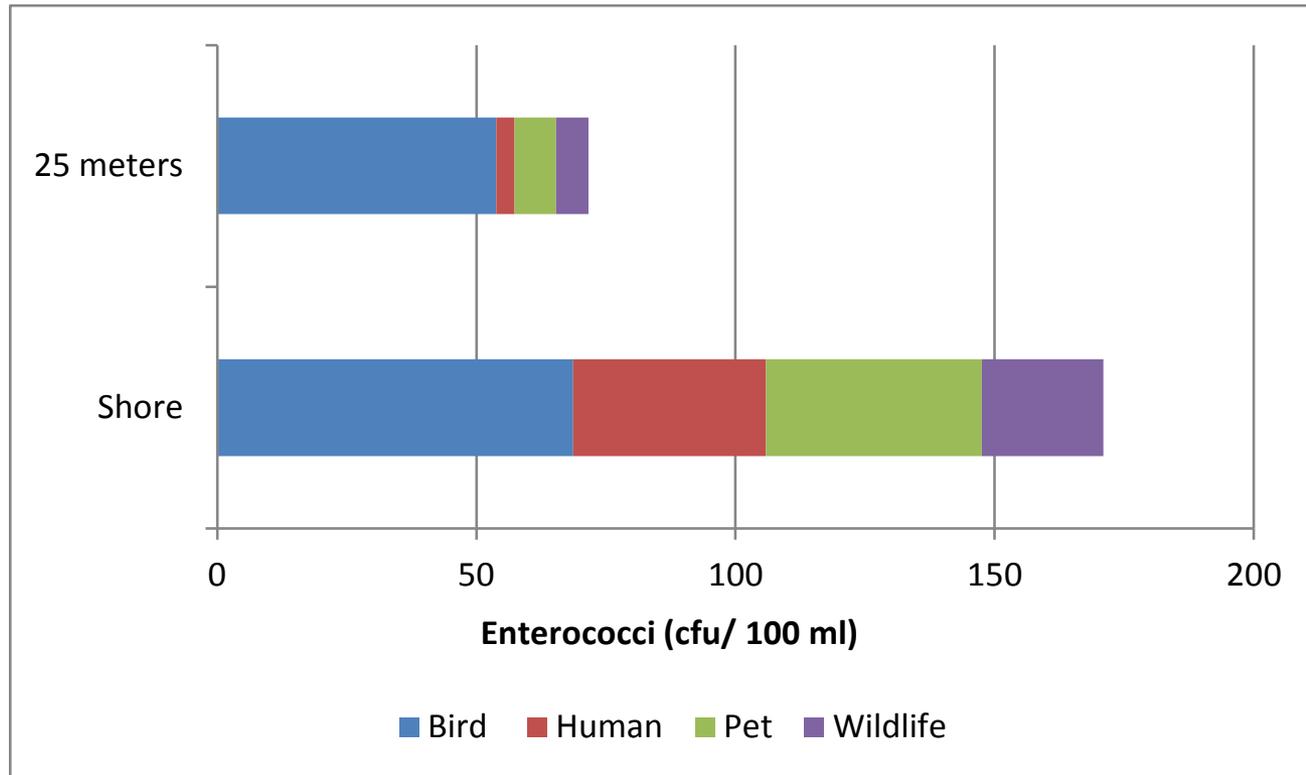
VT Monitoring Program (2004 -2008)

- Microbial Source Tracking
- Optical Brighteners
- Targeted bacteria monitoring to identify sources
 - “hot spots”
 - Potomac River
 - boating events and marina
 - Caledon State Park

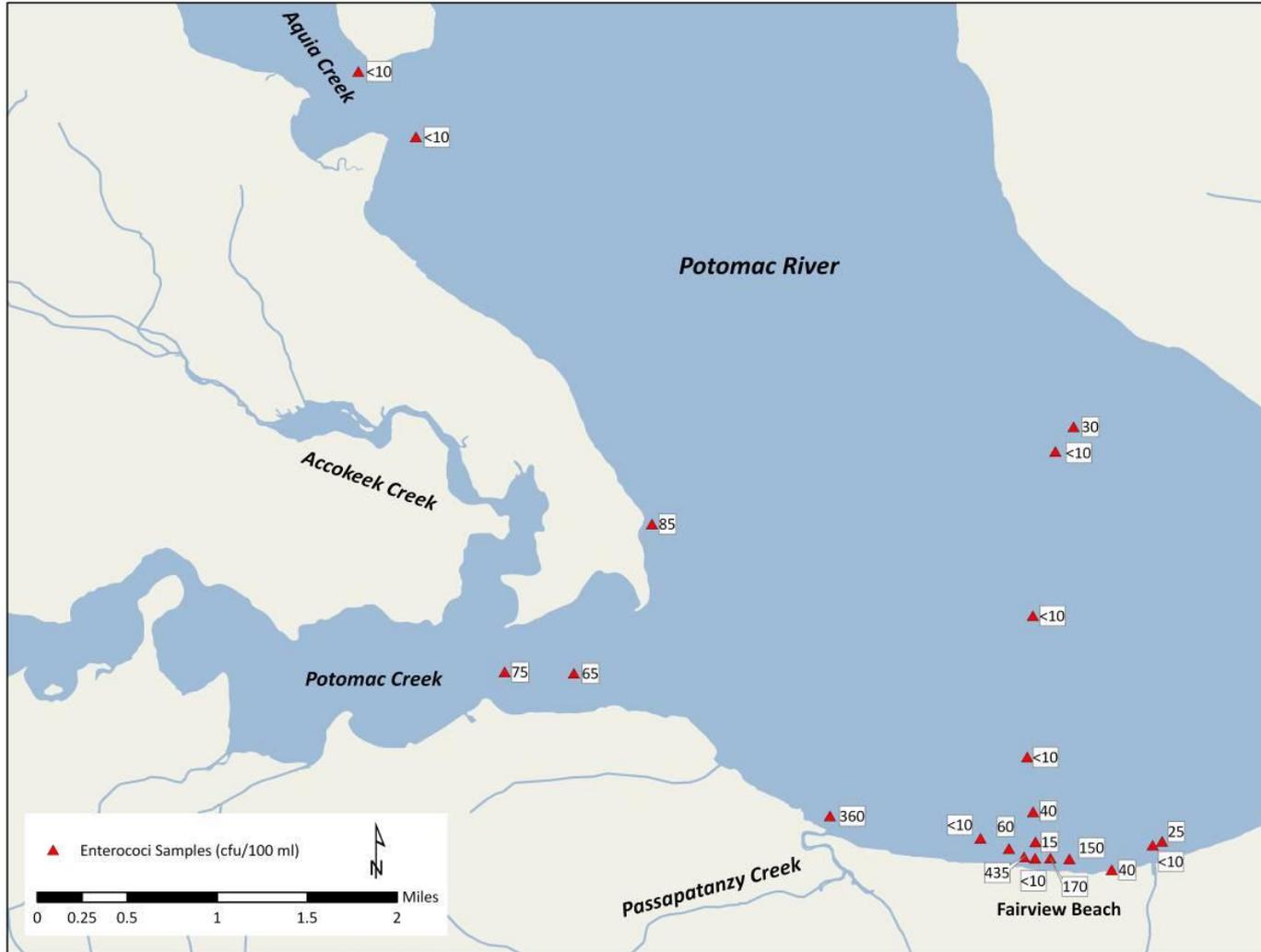
Observed Bacteria Attributable to Sources at VDH Stations, 2004-2007



Average Bacteria Concentrations (cfu/100 ml) at VDH Stations (2006-2007), Shore vs. 25 meters

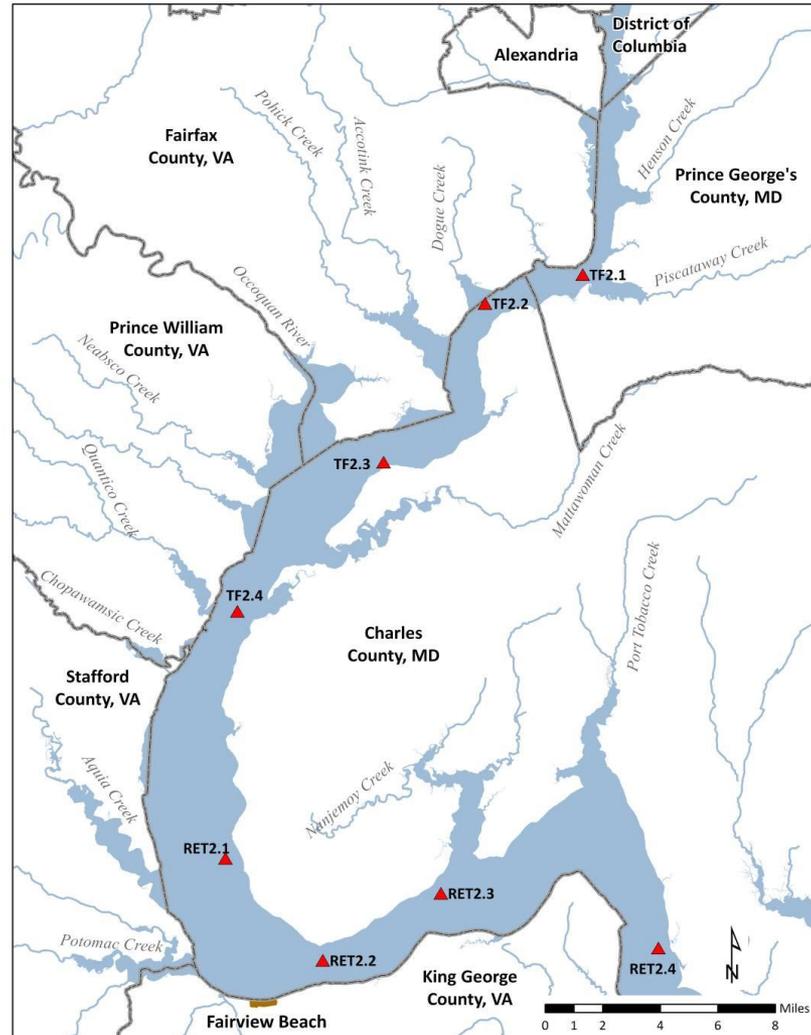


VT 2007 Potomac River Sampling



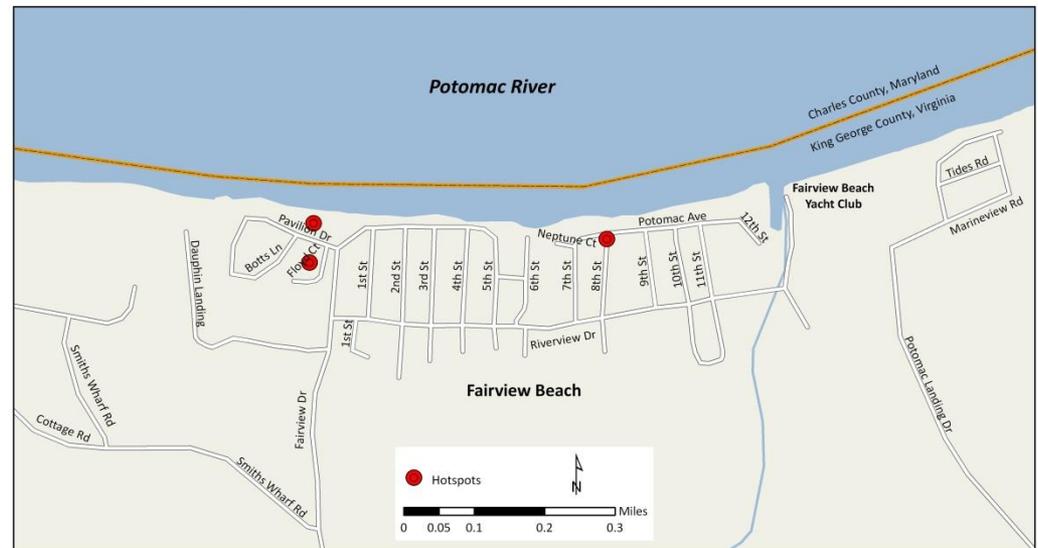
Fecal Coliform Bacteria , Potomac River, 1986-1999 (MD DNR)

Station	Geometrical Mean (cfu/100 ml)	> 400 cfu/100 ml
TF2.1	93	28%
TF2.2	56	21%
TF2.3	38	12%
TF2.4	18	8%
RET2.1	9	4%
RET2.2	7	3%
RET2.3	5	0%
RET2.4	4	1%



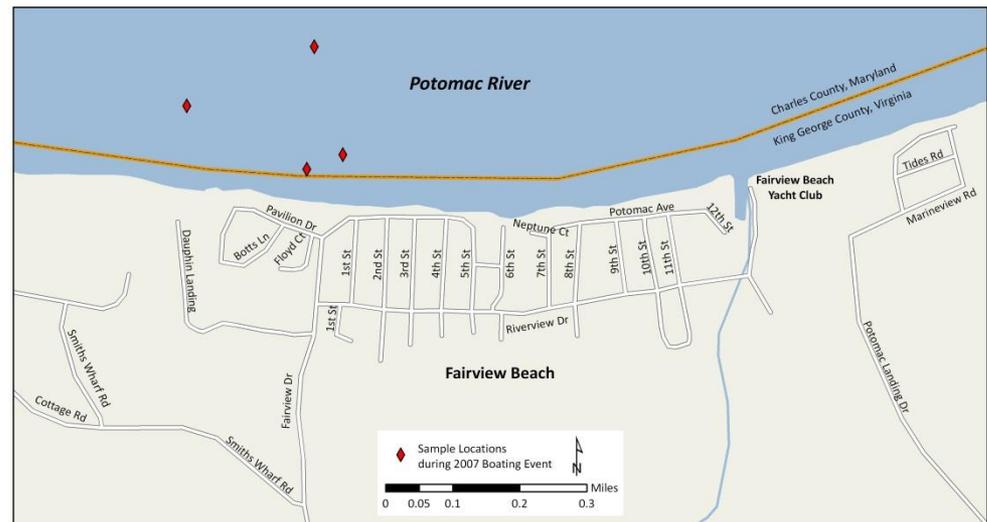
Hot Spots: Human Sources Detected

- 8th Street Sinkhole (2004)
- Pavilion Drive Drainpipe (2006,2007)
- Creek above Pavilion Drive Drainpipe (2006)



Enterococci Concentrations Generally Below 104 cfu/100 ml

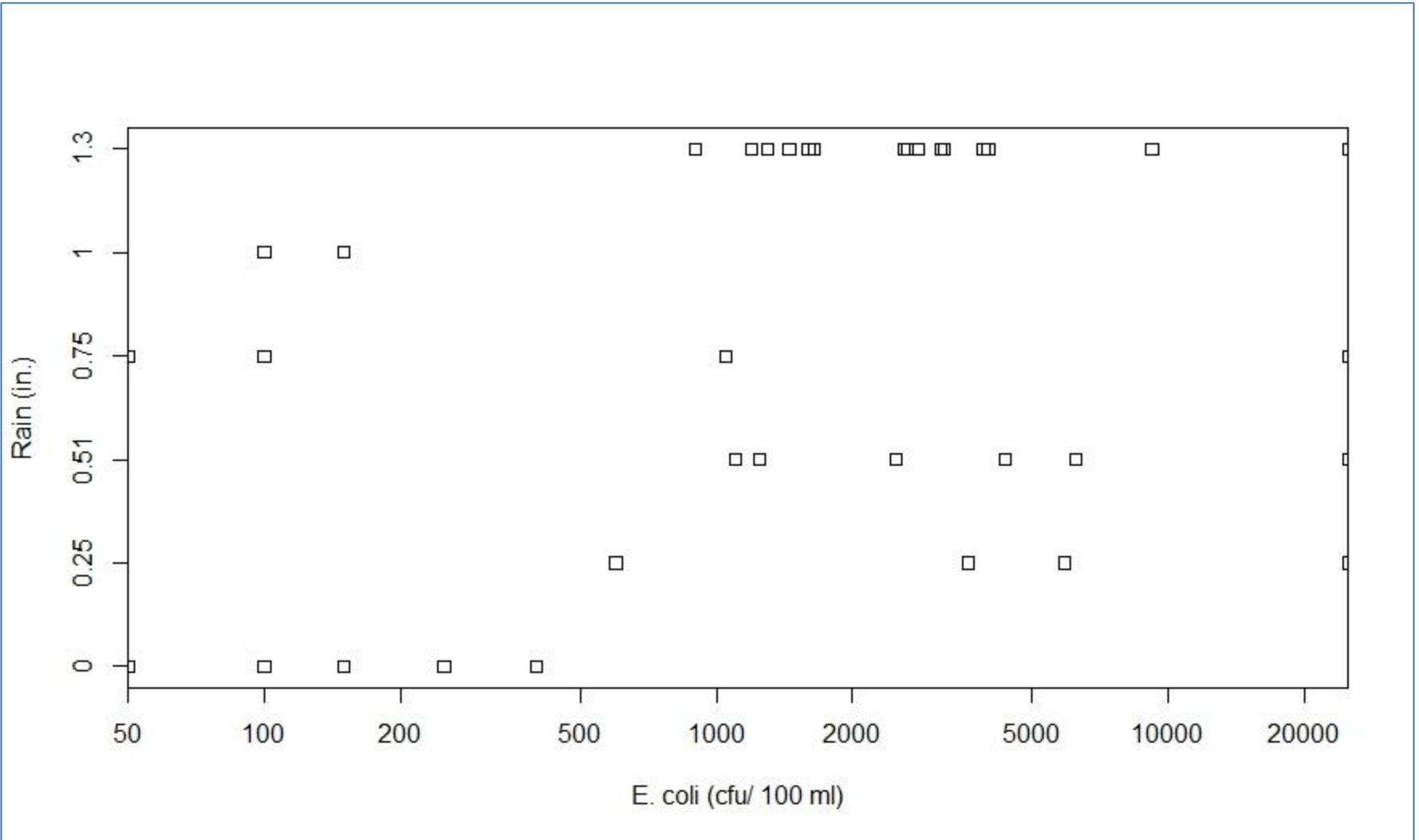
- Marina (2004)
- Large Boating Events (2007, 2008)
- Caledon State Park (2007, 2008)



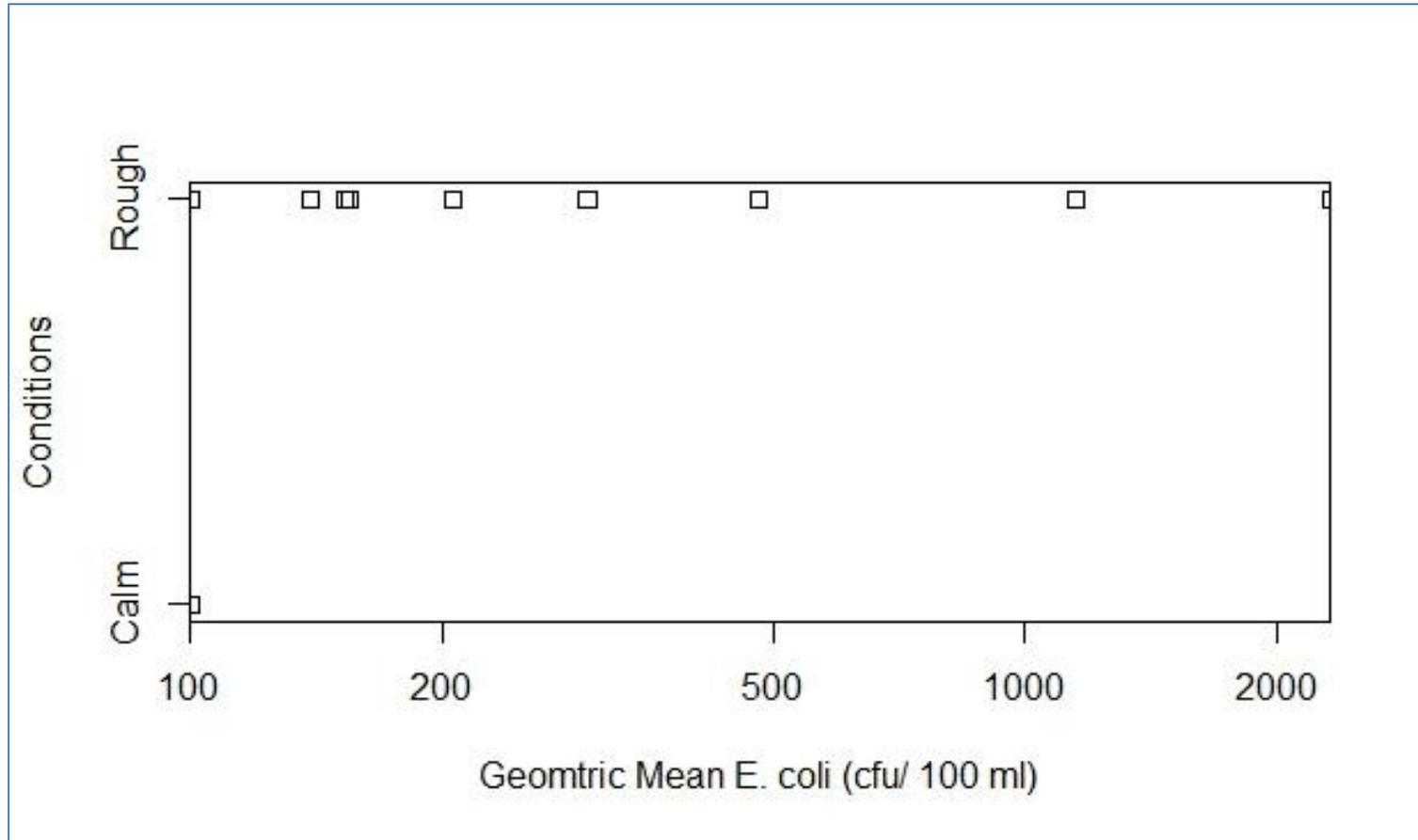
Fairview Beach Resident's Association Monitoring (2011-2012)

- Coliscan kits to measure *E. coli* bacteria
 - Inexpensive and easy to use
 - Cannot be used quantitatively to assess waters due to variations in quality assurance
 - 235 cfu/100 ml *E. coli* \approx 104 cfu/100 ml *Enterococci* (*E.coli* die off more rapidly in salt water)
- Sampling targeted
 - Stormwater
 - Rough conditions
 - Drain pipes near Pavilion Drive

Dry vs. Wet Weather Samples



Calm vs. Rough Conditions



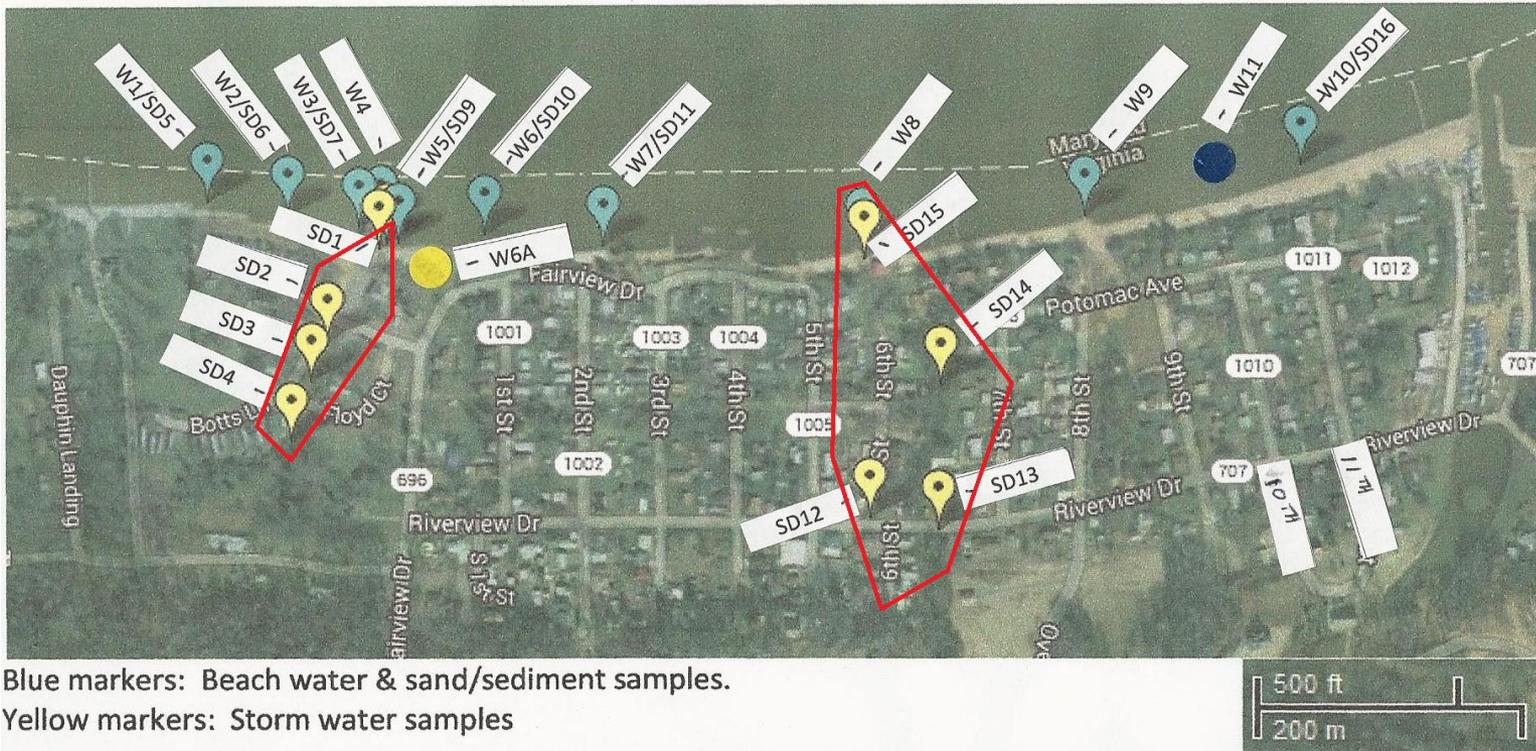
VT/VDH Sampling Nov-18-2013

- Conditions
 - Within 12 hours of rain
 - Wind calm to breezy, tide calm
- Medium
 - Water
 - Sediment
- Sampling Analysis
 - Enterococci
 - Optical Brighteners (water samples only)
 - Genetic Fingerprinting for Human Sources using HF182

Summary of Monitoring Results

- Fairview Beach is not supporting its recreational use:
 - Bacteria concentrations higher than criteria in VA WQS
- MST indicates that some bacteria are from human sources
- Bacteria concentrations are higher under rough conditions
- Bacteria sources are predominately local:
 - Hot spots detected
 - High bacteria concentrations in stormwater
 - Bacteria concentrations higher closer to shore
 - Background bacteria concentrations in Potomac River are generally lower than those found at Fairview Beach

Nov-18-2013 Sampling Locations



C. Hagedorn (Virginia Tech). 2013 Final Project Report: Microbial Source Tracking and Virginia's Beach Monitoring Program

Nov-18-2013 Sampling Results

Medium	Description	Sites	Enterococci (cfu/ 100 ml)	OB	HF 183
Water	20 ft. off-shore	10	< 27	< 35	-
Sediment	20 ft. off-shore	7	< 60	NA	-
Sediment	Pavilion Drive Drainage	4	1460-6000	NA	dry
Water	Stagnant Pool near Pumping Station	1	2200	98.2	+
Sediment	6 th Street Drainage	4	800-3050	NA	+
Water	20 ft. off-shore (6 th Street)	1	830	88.1	+

Likely Sources and Causes of Bacteria Impairment

- Controllable sources:
 - Failing septic systems and faulty sewer connections
 - Dogs
- Primary transport paths:
 - Stormwater runoff
 - Resuspended sediment and beach sand
- Condition of beach and stormwater infrastructure:
 - Protection of beach from storms and wave action
 - Management of stormwater runoff

Actions Already Taken to Address Impairment

- Identification and repair of failing septic systems and faulty sewer connections in trailer park
- Pet waste stations
- Repairing bulkheads and groins
 - Reduce wave energy and erosion

