Stream, Rainfall, and Water Quality Gauging Analysis
Rappahannock River Basin, VA

Germanna Riverside Center, Fredericksburg, VA
9:30 am, September 18, 2012

9:30 am **Introduction**
Holly Carpenter, USACE Norfolk District
Eldon James, RRBC Staff

9:45 am **DEQ's Water Quality Sampling in the Upper Rappahannock River Basin**
Jeff Talbott, Water Quality Monitoring Supervisor, VA DEQ

10:15 am **Flood Observation and Warning**
Mark Slauter, IFLOWS Branch Chief, VDEM

10:45 am **Open Discussion**
- **Ground Water Monitoring**
- **Dam Safety**

11:20 am **Meeting Closing Comments, Schedule of Next Meeting**

Water Quality Monitoring in Upper Rappahannock Basin

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

September 18th, 2012

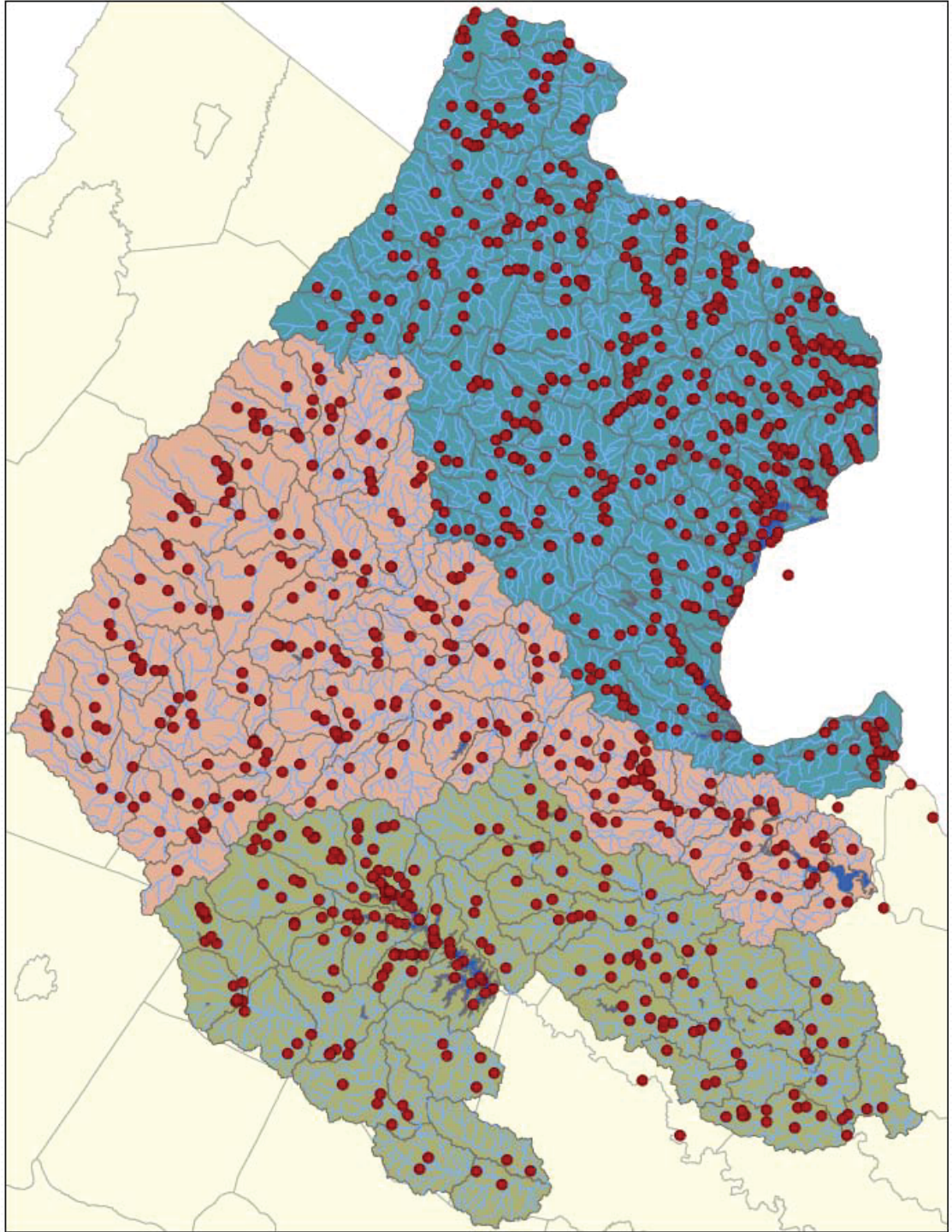
Jeff Talbott
DEQ Northern Regional Office

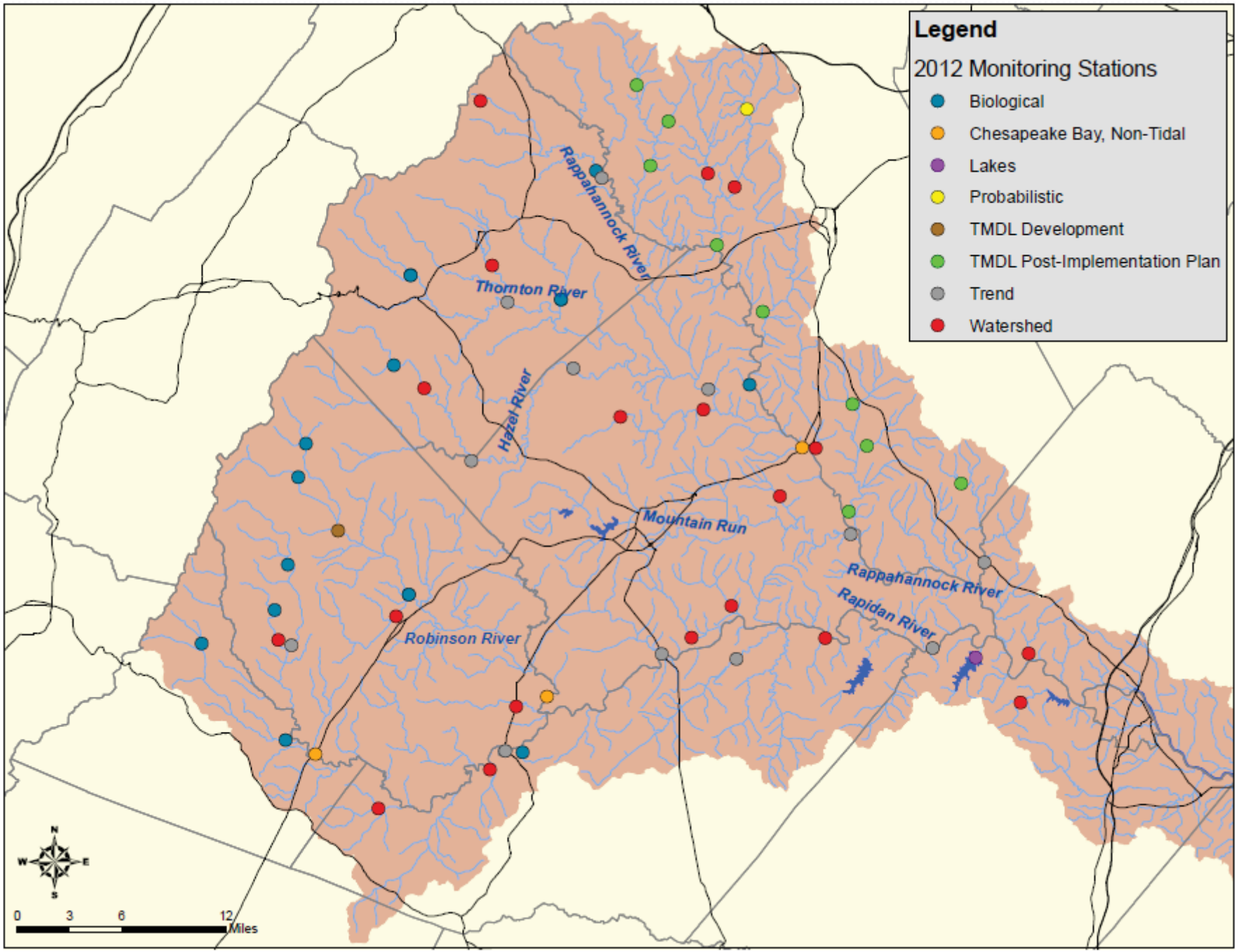
Types of Water Quality Stations

- Trend
- Watershed
- Special Study
- TMDL (IP & Development)
- Lakes
- Probabilistic (Coastal & Freshwater)
- Chesapeake Bay (Tidal & Non-Tidal)
- Biological
- Fish Tissue

All Ambient Monitoring stations collected in the Northern Region of DEQ

Three Basins: Rappahannock, Potomac, and Mattaponi




Legend
2012 Monitoring Stations
Biological
Chesapeake Bay, Non-Tidal
Lakes
Probabilistic
TMDL Development
TMDL Post-Implementation Plan
Trend
Watershed
Rappahannock River
Thornton River
Hazel River
Mountain Run
Robinson River
Rappahannock River
Rapidan River
N
W
E
S
0
3
6
12
Miles

Sampling Procedures

- Collected by bucket or wading with one exception
- Collected at bridge crossings
- Collected on the up-stream side of the bridges
- Collected at middle of the stream or greatest flow of the stream/river
- On average six to ten stations are collected on a typical monitoring run
- Field parameters are collected directly from the stream/river

Field Parameters

- The following parameters are collected at every water quality monitoring station

Parameter	STORET Parameter Code	Collection Procedure	Reporting Units
Temperature	00010	Multi-meter	°C
pH	00400	Multi-meter	S.U.
Dissolved Oxygen	00299	Multi-meter	mg/L
Specific Conductance	00094	Multi-meter	uS/cm

- DEQ uses two types of Multi-meters: YSI and Hydrolab

Trend Stations

- Historical stations on major streams/rivers
- Some stations have over 40 years of data
- Parameters Collected:

Parameter	STORET Parameter Code	Reporting Units/ Detection Limit
Fecal coliform	31616	> 25 cfu /100 mg/L
E. coli	31648	> 25 cfu /100 mg/L
Total Phosphorus	00665	0.01 mg/L as P
Total Kjeldahl Nitrogen	00625	0.1 mg/L as N
Total Nitrogen	00600	0.1 mg/L as N
Total Suspended Solids	00530	3 mg/L
Total Solids	00500	5 mg/L
Turbidity	82079	0.1 NTU

DEQ Trend Stations

Station ID	Stream Name	Station Location	County	Latitude (DD)	Longitude (DD)
3-DPR001.70	Deep Run	Rt. 17	Fauquier	38.430278	-77.629722
3-HAZ005.98	Hazel River	Rt. 625	Culpeper	38.578889	-77.918889
3-HAZ018.29	Hazel River	Rt. 729	Culpeper	38.598056	-78.061944
3-HUE000.20	Hughes River	Rt. 647	Culpeper / Rappahannock	38.522222	-78.171667
3-MTN000.59	Mountain Run	Rt. 620	Culpeper	38.455833	-77.770833
3-MTR003.51	Mountain Run	Rt. 611	Orange	38.353611	-77.894167
3-RAP006.53	Rapidan River	Rt. 610	Culpeper / Spotsylvania	38.359722	-77.686111
3-RAP030.21	Rapidan River	Rt. 522	Culpeper / Orange	38.358972	-77.973056
3-RAP045.08	Rapidan River	Rt. 15 (James Madison Hwy)	Madison / Orange	38.280278	-78.140278
3-RAP077.28	Rapidan River	Rt. 662	Madison	38.370556	-78.365000
3-ROB017.24	Robinson River	Rt. 638	Madison	38.411611	-78.240056
3-RPP175.51	Rappahannock River	Rt. 647	Rappahannock / Fauquier	38.756389	-78.028333
3-THO006.50	Thornton River	Rt. 729	Rappahannock	38.628056	-79.063333
3-THO014.37	Thornton River	Rt. 622	Rappahannock	38.654250	-78.131111

Watershed Stations

- Stations are collected on a six rotation cycle
- Stations are collect near the bottom of the watersheds. This is to get the most drainage from a watershed per station.
- Parameters Collected:

Parameter	STORET Parameter Code	Reporting Units/ Detection Limit
E. coli	31648	> 25 cfu /100 mg/L
Total Phosphorus	00665	0.01 mg/L as P
Total Nitrogen	00600	0.1 mg/L as N

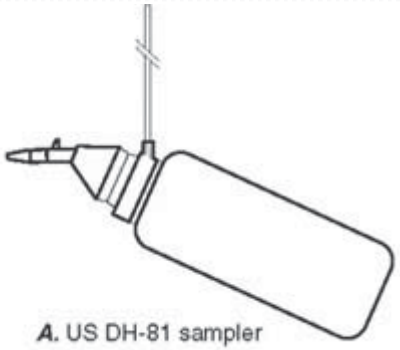
DEQ Watershed Stations 2011/12

Station ID	Stream Name	Station Location	County	Latitude (DD)	Longitude (DD)
3-COV001.95	Covington River	Rt. 621	Rappahannock	38.822333	-78.156583
3-FLA001.93	Flat Run	Rt. 675	Culpeper	38.488806	-77.845167
3-GAR000.95	Garth Run	Rt. 718	Madison	38.375250	-78.379222
3-GRA002.01	Great Run	Rt. 15	Madison	38.317000	-78.128167
3-HAZ039.26	Hazel River	Rt. 618	Rappahannock	38.583469	-78.221033
3-HOR000.50	Horsepen Run	Rt. 655 (Holly Corner Rd)	Stafford	38.353528	-77.584722
3-MAS001.55	Marsh Run	Rt. 644 (Ridge Rd)	Orange	38.233431	-78.275139
3-MIN002.14	Mine Run	Rt. 620 (Spotswood Furnace Rd)	Spotsylvania	38.312972	-77.594028
3-MUU000.82	Muddy Run	Rt. 625 (Mt. Zion Church Rd)	Culpeper	38.561944	-77.924722
3-MUU008.52	Muddy Run	Rt. 632 (Dutch Hollow Rd)	Culpeper	38.557056	-78.013056
3-POL000.10	Poplar Run	Rt. 633 (Amicus Rd)	Orange	38.264722	-78.156944
3-POT001.06	Potato Run	Rt. 647 (Twin Mountains Rd)	Orange	38.398056	-77.898611
3-RUL000.39	Russell Run	Rt. 603 (Indiantown Rd)	Orange	38.369722	-77.799722
3-RUS003.23	Rush River	Rt. 621	Rappahannock	38.685000	-78.146694
3-SUM002.40	Summerduck Run	Rt. 647 (Twin Mountains Rd)	Orange	38.371944	-77.941111
3-TIN000.36	Tinpot Run	Rt. 651	Fauquier	38.528306	-77.806333
3-WHO001.48	White Oak Run	Rt. 231 (Blue Ridge Turnpike)	Madison	38.393722	-78.253778
3-CAE006.32	Carter Run	Rt. 738	Fauquier	38.746944	-77.887222
3-SUT002.62	South Run	Rt. 737 (Conde Rd)	Fauquier	38.758611	-77.915556

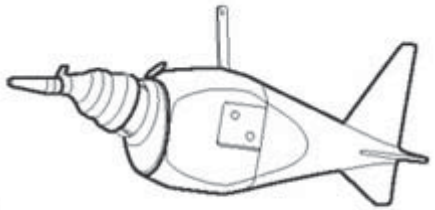
Chesapeake Bay Non-tidal Stations

- Stations are collected every month
- Stations are collected vertically and horizontally.
- Stations are located near gauge stations.
- Parameters Collected:

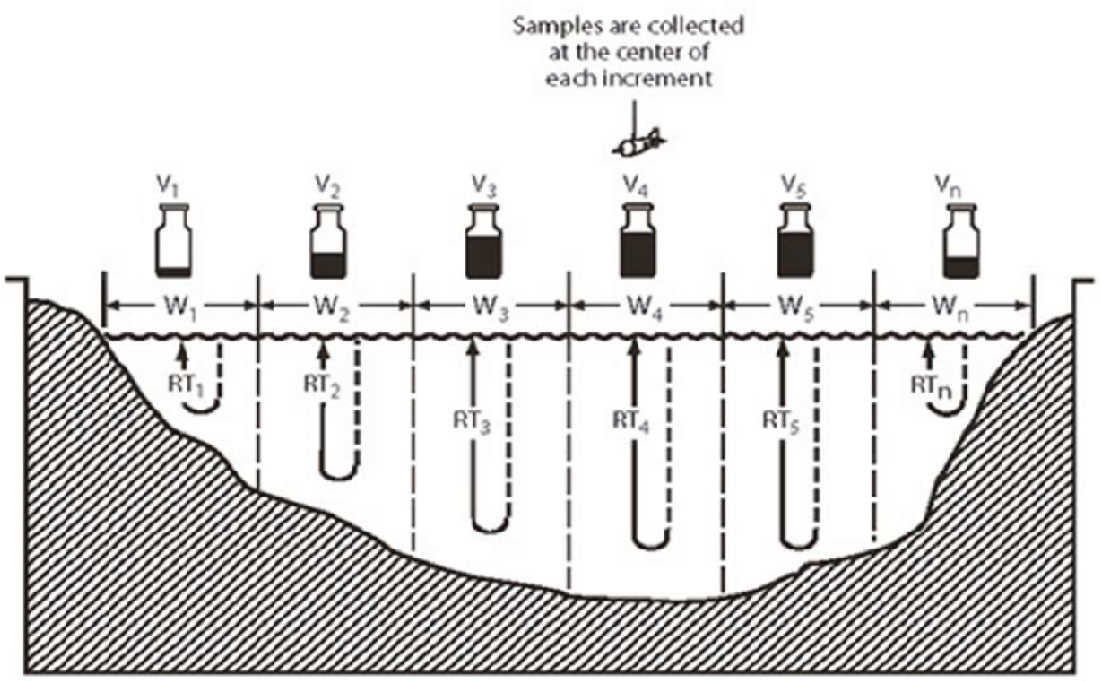
Parameter	STORET Parameter Code	Reporting Units/ Detection Limit
Enterococci	31649	>25 cfu/100 mg/l
Fecal coliform	31616	> 10 cfu /100 mg/l
E. coli	31648	> 10 cfu /100 mg/l
Total Phosphorus	00665	0.01 mg/l as P
Total Kjeldahl Nitrogen	00625	0.1 mg/l as N
Total Nitrogen	00600	0.1 mg/l as N
Total Ammonia	00610	0.04 mg/l as N
Nitrite Plus Nitrate	00630	0.04 mg/l as N
Ortho phosphorus	OPWLF	0.002 as P
Total Suspended Solids	00530	3 mg/l
Total Dissolved Solids	00540	3 mg/l
Suspend Sediment Concentration - Total		0 mg/l



A. US DH-81 sampler



B. US DH-95 sampler



DEQ Chesapeake Bay Non-tidal Stations

Station ID	Stream Name	Station Location	County	Latitude (DD)	Longitude (DD)
3-RAP066.54	Rapidan River	Rt. 29	Madison / Green	38.279722	-78.341111
3-ROB001.90	Robinson River	Rt. 614	Madison	38.325000	-78.095556
3-RPP147.49	Rappahannock River	Rt. 29 (James Madison Hwy)	Fauquier / Culpeper	38.528889	-77.820278

USGS Chesapeake Bay Non-tidal Stations

Station ID	Stream Name	Station Location	County	Latitude (DD)	Longitude (DD)
3-RAP030.21	Rapidan River	Rt. 522	Orange	38.528889	-77.820278

TMDL Stations

- TMDL = Total Maximum Daily Load
- There are two types of TMDL stations:
  - Development – commonly collect for a year period, every month
  - Post Development / Implantation Plan – collected for a period of time to determine if impacts have decreased.
- Parameters Collected :
  - Bacteria
  - Nutrients
  - Solids / turbidity
  - PCB's (Water / Sediment)
  - Metals (Water / Sediment)
  - Biological / Benthic
  - Toxicity

DEQ TMDL Stations

Station ID	Station Type	Stream Name	Station Location	County	Latitude (DD)	Longitude (DD)
3-BOS000.72	IM	Browns Run	Rt. 653 (Morgansburg Rd)	Fauquier	38.529167	-77.751639
3-CAE000.25	IM	Carter Run	Rt. 688	Fauquier	38.698889	-77.907222
3-CRA000.46	IM	Craig Run	Luck Stone Rd	Fauquier	38.564306	-77.766083
3-DPR008.98	IM	Deep Run	Rt. 634	Fauquier	38.496389	-77.652222
3-GRT001.70	IM	Great Run	Rt. 687	Fauquier	38.642778	-77.859722
3-MAH000.19	IM	Marsh Run	Rt. 651 (Summerduck Rd)	Fauquier	38.474917	-77.772389
3-THM001.40	IM	East Branch Thumb Run	Rt. 647 (Cresthill Rd)	Fauquier	38.802750	-77.956806
3-THU004.69	IM	Thumb Run	Rt. 688 (Leeds Manor Rd)	Fauquier	38.766139	-77.976778
3-THW004.68	IM	West Branch Thumb Run	Rt. 635 (Humes Rd)	Fauquier	38.833333	-77.989722
3-ROB024.06	TM	Robinson River	Rt. 649	Madison	38.465833	-78.314444

Biological / Benthic Stations

- Collected twice a year
  - Spring : March 1st – May 30th
  - Fall: September 1st – November 30th

- Collected in total of 2 $m^{2;}$ Habitat: riffles / runs
- Stations are sorted and identified to Genus level
- All biologist must be certified by passing a benthic family level taxonomic identification proficiency test.
- Not collected during period of high or low flows
- Habitat assessment

- Probabilistic Monitoring are random selected throughout the state.
  - Stream characteristics are collected in a reach of stream based on the average width of the stream.
  - This reach is than divided in 10 thalwegs where the following are collected: stream width, stream depth, bankfull height, incised height, bankfull width.

DEQ Benthic Stations

Station ID	Stream Name	Station Location
3-BTL000.94	Battle Run	Rt. 729
3-CAE012.67	Carter Run	~0.2 RM above conf. w/ Horner Run
3-COV001.95	Covington River	Rt. 621
3-ENT000.65	Entry Run	Rt. 643
3-GAR003.56	Garth Run	Next to Rt. 665
3-GRA002.01	Great Run	Rt. 15
3-HAZ042.43	Hazel River	Rt. 681
3-HUE000.20	Hughes River	Rt. 644
3-JOR000.50	Jordan River	Rt. 637
3-PIY000.01	Piney Run	10 yd upstream from conf. w/ NFThornton
3-RAP043.70	Rapidan River	Rt. 634
3-RAP082.43	Rapidan River	Next to Rt. 662
3-ROB017.24	Robinson River	Rt. 638
3-ROE004.07	Rose River	Rt. 600 (upper bridge)
3-RPP150.32	Rappahannock River	Rt. 621
3-SOT001.00	South River	Rt. 619
3-THO014.37	Thornton River	Rt. 626
3-THR002.00	North Fork Thornton River	30 ft upstream from conf. w/ Piney

Lakes and Special Studies

- Lakes
  - Collected monthly from the beginning of April to the end of October
  - Two year rotation
  - Mainly on public lakes over 100 acres
  - Profile is collected 1 meter intervals from the surface to the bottom

- Special Studies
  - Citizen Requests
  - Observed Effects
  - Special Projects

Stream Name	Station Location	County	Latitude (DD)	Longitude (DD)
Hunting Run	100' from spillway	Spotsylvania	38.351175	-77.640678

Questions?