Implementing an In-Stream Stormwater Monitoring Program to Measure BMP Effectiveness

Eighth National Monitoring Conference

4 May 2012

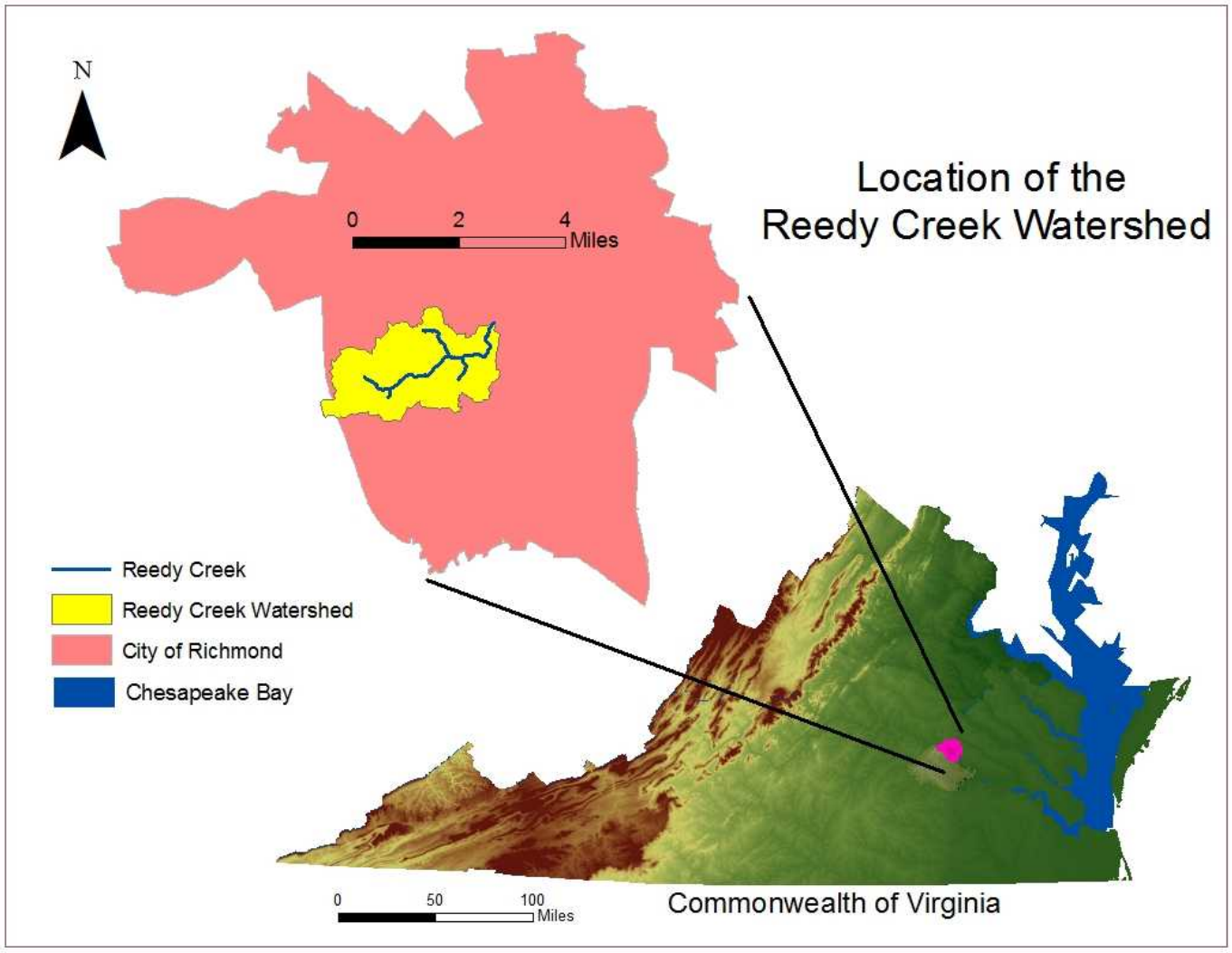
Acknowledgements

- Filterra Bioretention Systems
- Dr. Bonnie Brown, VCU

Acknowledgements

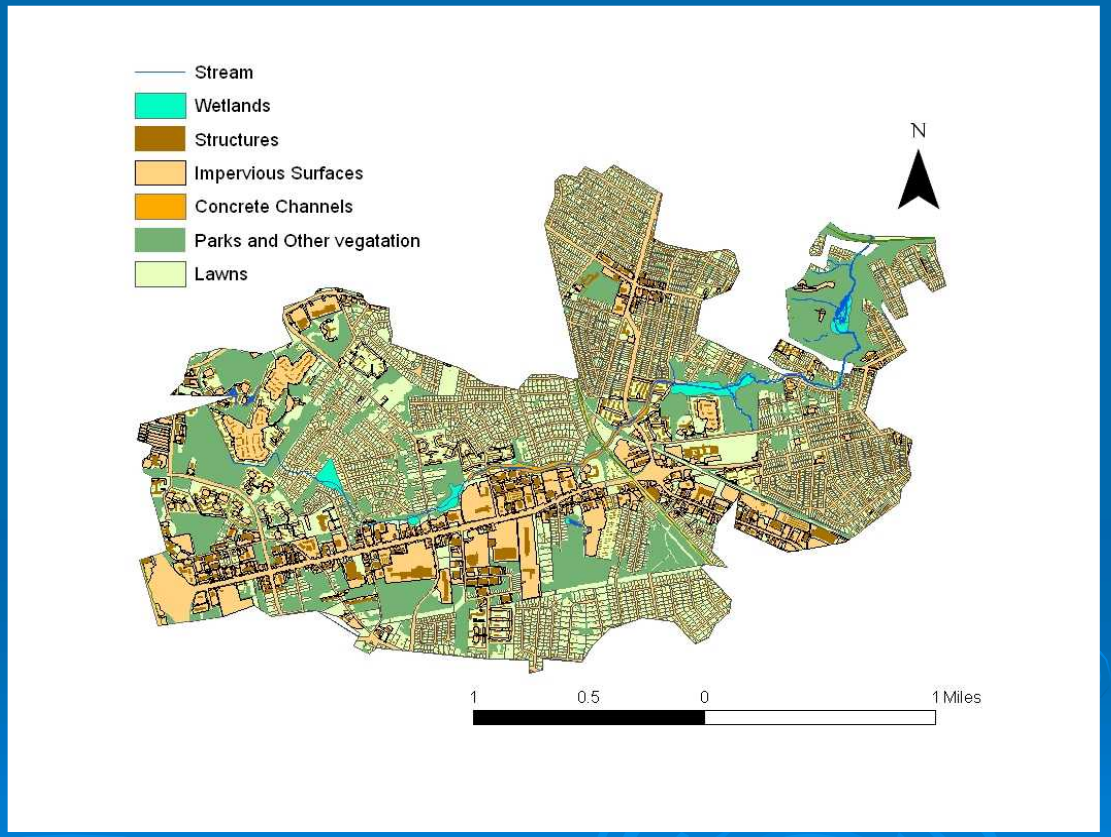
- Alliance for the Chesapeake Bay
- Reedy Creek Coalition
- City of Richmond
- National Fish and Wildlife Foundation
- Altria Client Services
- The Community Foundation Serving Richmond and Central Virginia

Reedy Creek Watershed



Reedy Creek Land Use

- Approx. 60% impervious surface
- 2 major city parks
- 4 public schools
- Large commercial sector in upper watershed



Reedy Creek Impairment Issues

- Listed Impaired by VA DEQ in 2004 for excessive bacteria levels
  - Listed as “threatened” in 1998
- Lower 1/3rd watershed contributes to Richmond’s Combined Sewer Overflow (CSO) system
- Bacteria TMDL completed
- Bacteria TMDL Implementaton Plan completed (via “Stimulus Funds”)

The Catalysts

- Richmond's stormwater utility fee program
- Broad recognition in community that single conservation projects by themselves are good, but measurement of success difficult at watershed level
- Focus on root cause of pollution - **Stormwater**

Created a Local Watershed Group

- The Reedy Creek Coalition
  - Watershed residents
  - Virginia Commonwealth University (Geography students)
  - Alliance for the Chesapeake Bay
  - 1 Doctorate Student from Virginia Tech

Reedy Creek Coalition

- Working with ACB to develop…
  - Residential stormwater conservation audits
  - Business stormwater conservation audits
  - Stormwater BMP financial incentive program
  - Stream walk surveys
  - IDDE (Illicit Discharge Detection & Elimination)
  - Community outreach activities

Reduce Stormwater Runoff

- Minimize areas of impervious surface (this includes lawns)
- Capture/redirect stormwater to reduce stream erosion and increase groundwater recharge (Rain barrels, rain gardens, etc.)
- Manage landscape and lawns to promote water retention (e.g. mulch, soil amendment, lawn-cutting practices)
- Riparian Buffers

IDDE

- Sewer/Stormwater cross connections detected

- Petroleum discharge into buried headwater stream
  - 120,000 ug/l (ppb) diesel range organics
  - Source yet to be found 2 years later

The Role of Volunteer Monitoring

- …more boots in the field
- …allows more monitoring sites to be covered
- …identify illicit discharges
- …produce high quality data for localities and other resource managers
- …allows the identification of pollution hotspots
- …educating and empowering local citizens to become involved in local & Bay restoration efforts

VA DEQ Data Acceptance

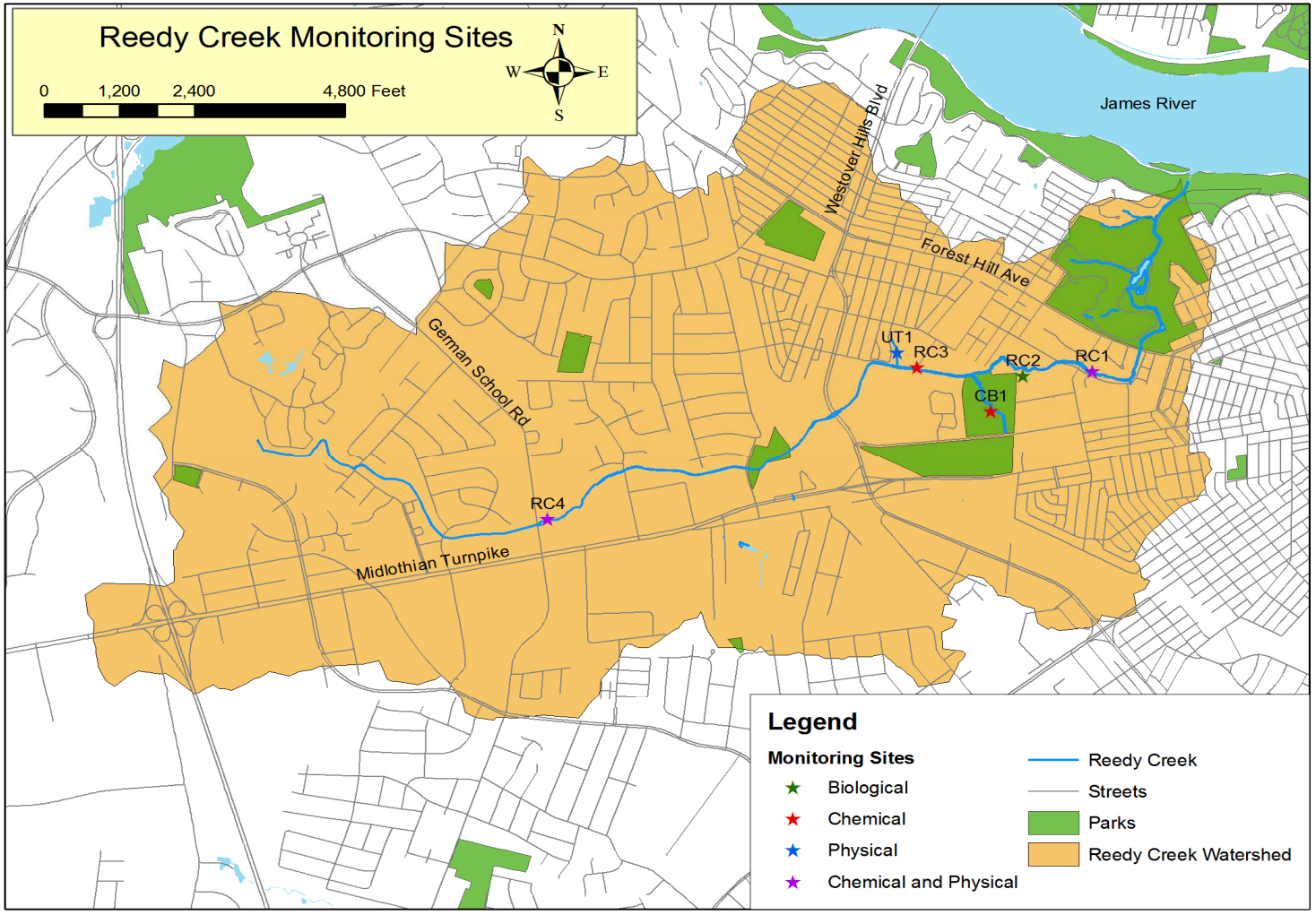
- Categories For Non-Agency Data

- Level III - approved by DEQ- (approved QAPP, and use DEQ approved methodologies)
  - Could be used for 303(d) List, TMDL Implementation tracking, Pollution Response (PReP), etc.

- Level II - partially approved-(approved QAPP, use similar but not DEQ approved methods)
  - Could be used in establishing new DEQ sampling stations, for TMDL Implementation tracking, etc.

- Level I - not approved- (no DEQ approved QAPP or methodologies)
  - Used for education or to identify water quality problems for Pollution Response

Reedy Creek Monitoring Stations



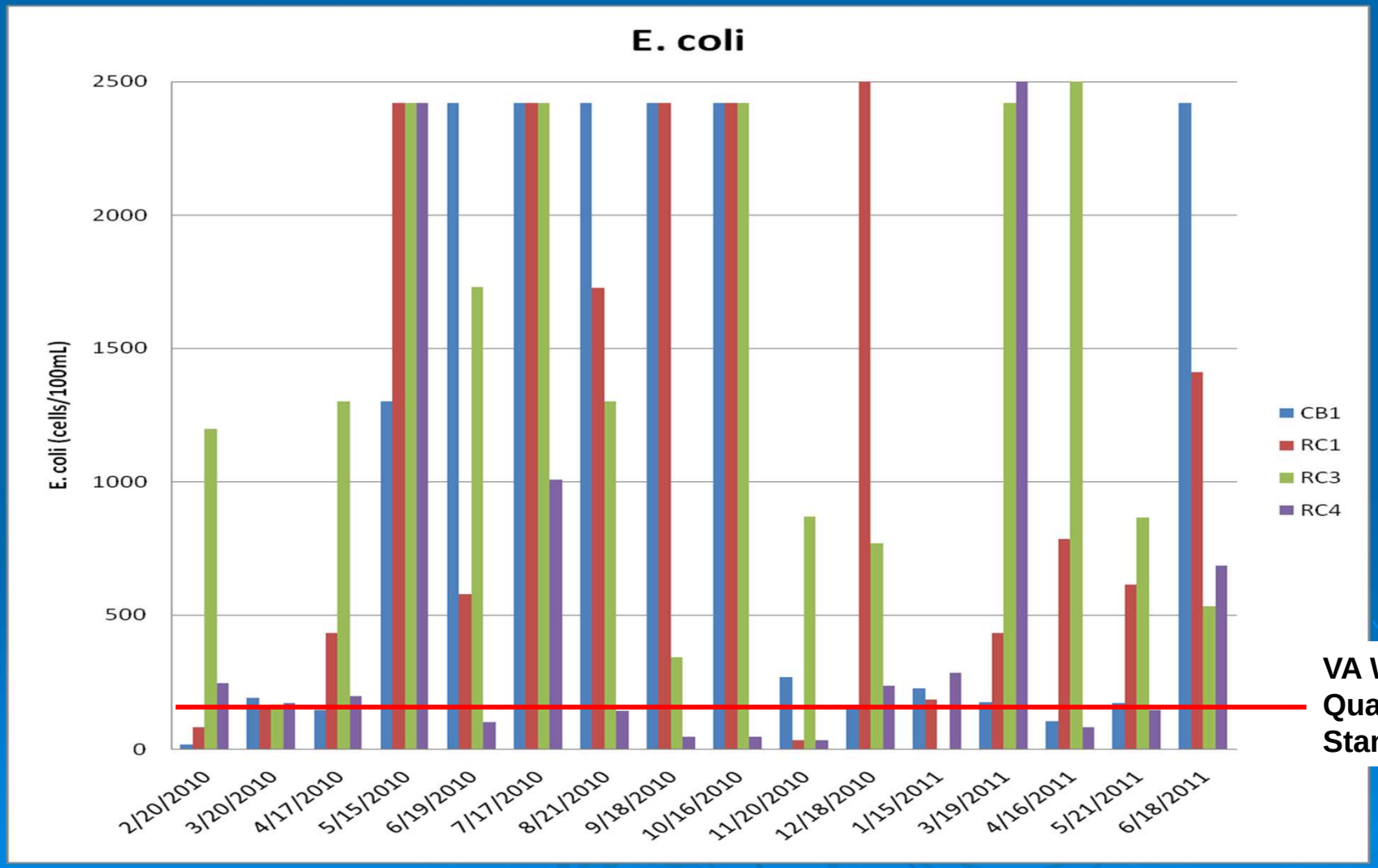
Water Monitoring

- 2 focuses
  - Water quality monitoring
    - Nutrients
    - Bacteria
    - Dissolved Oxygen
    - Turbidity
    - Conductivity
    - Benthic macroinvertebrates
  - Flow monitoring

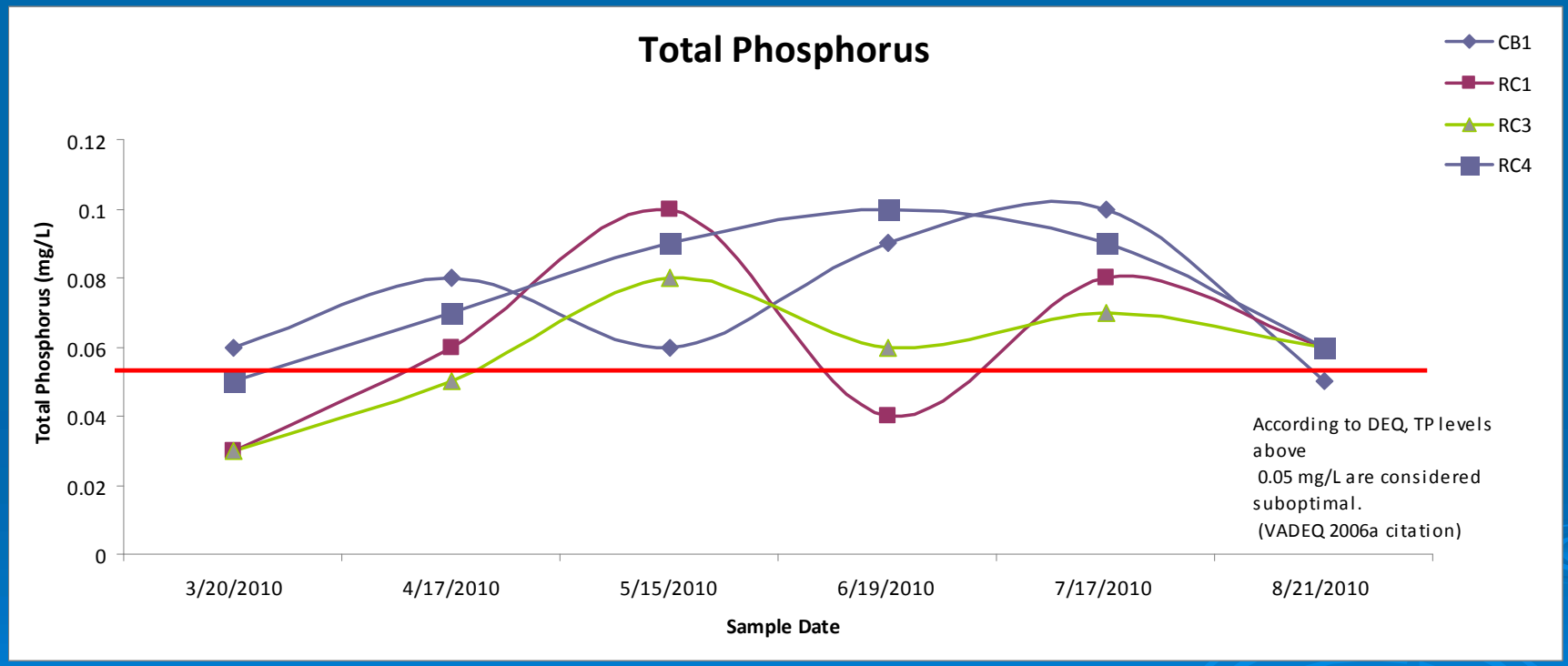
Water Monitoring

- Samples collected by volunteers under ACB's volunteer water monitoring program (RiverTrends)
  - VA DEQ approved QAPP
- Partnership with City of Richmond Dept. of Public Utilities (DPU)
- DPU analyzes most water samples at Richmond WWTP laboratory

Reedy Creek E. cli Data



Reedy Creek Example

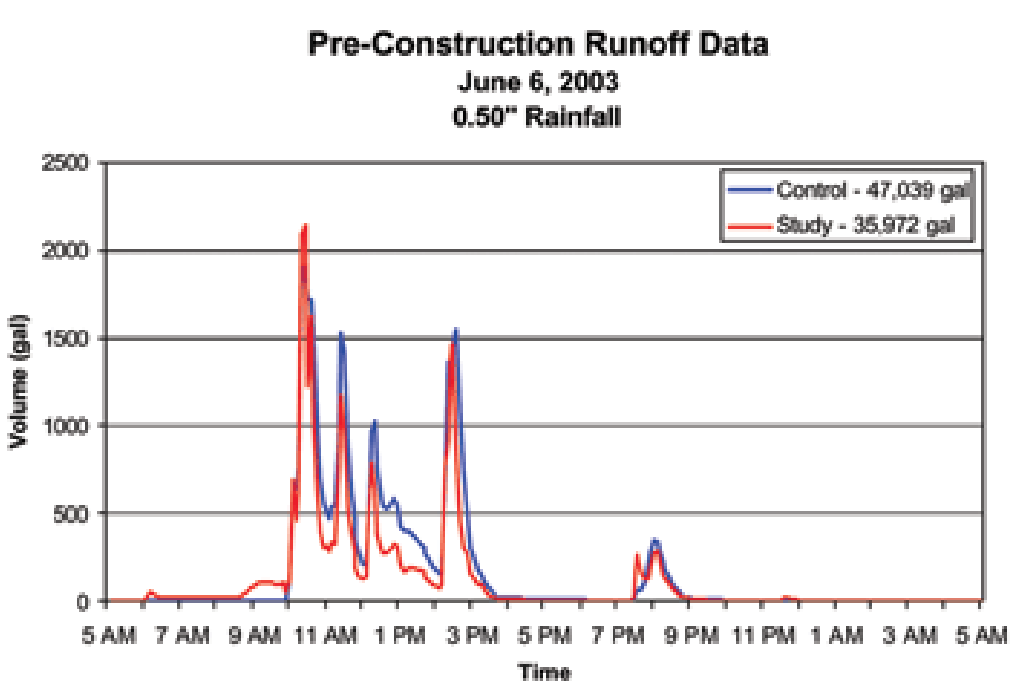


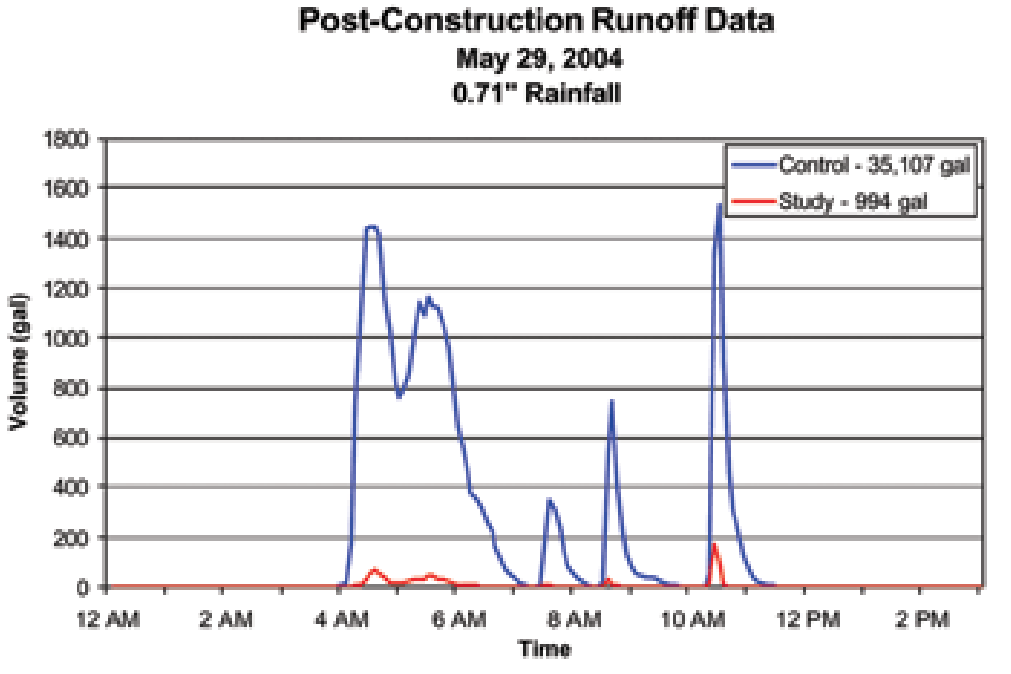
Water Monitoring

- Flow monitoring
- Goal:
  - Document reduction of stormwater flows in Reedy Creek before and after BMP implementation on landscape
  - Modeled on 2006 Burnsville, MN Raingarden Study

Burnsville, MN

Burnsville, MN Study Results





Reedy Creek Flow Monitoring

- Using In-Situ probes for monitoring stream flow.
- Pressure Sensor
- 2 rain gages in watershed
  - NBC 12
  - Patrick Henry Charter School

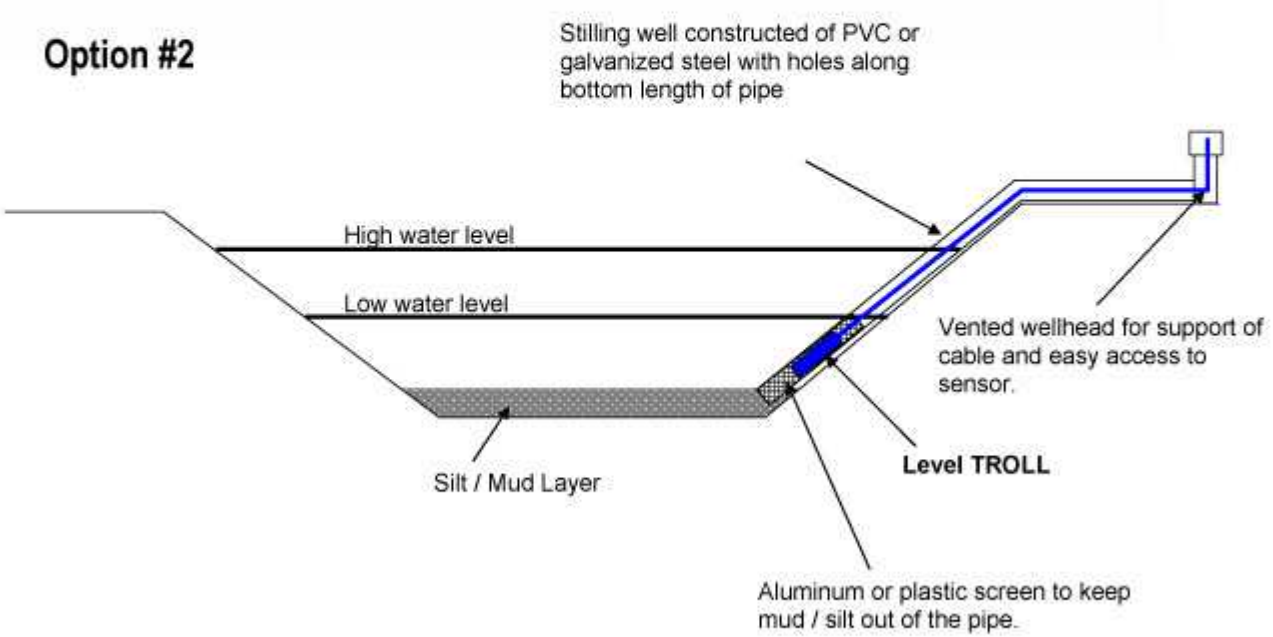
Reedy Creek Flow Monitoring

In-Situ Inc.

Level TROLL® 500

Typical Submersible Sensor Installation in Streams, Lakes and Reservoirs

Option #2



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Program Challenges

- Timeline
  - Stormwater conservation efforts expected to take many years before observed recovery
  - Bacteria and flow monitoring believed to be most responsive parameters to change
- Lose of financial resources/support
- Program primarily supported by grants. Need long term funding solution.

Questions?

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