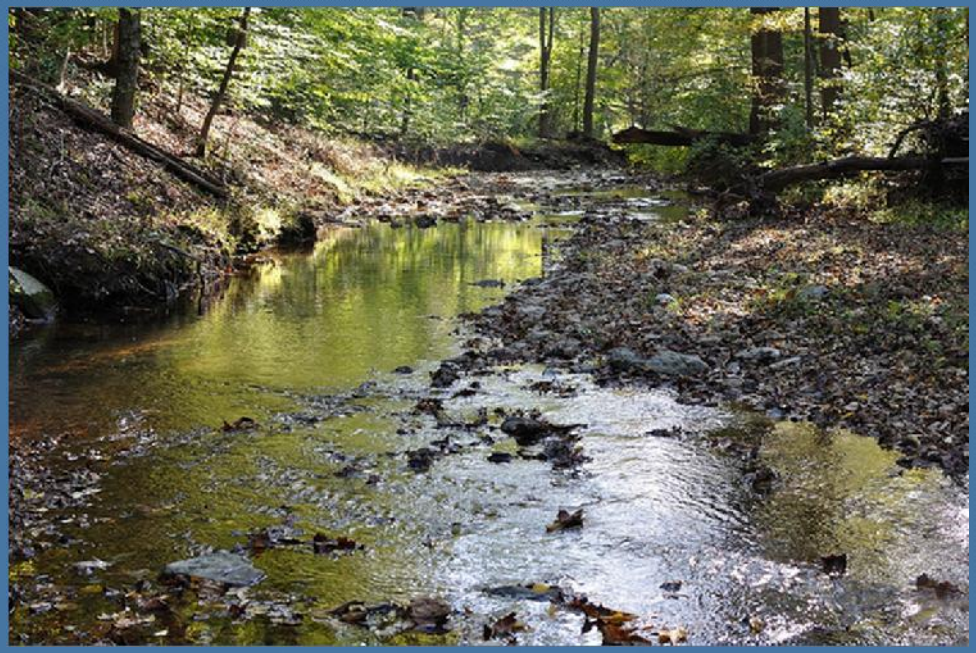
Ten Mile Creek

Montgomery County's Last, Best Creek



Diane Cameron

Audubon Naturalist Society

presentation to the Montgomery County Planning Board

4.17.2013

Ten Mile Creek

1) Speaker's Background
2) What's at Stake
3) Science & Local Experience
4) 1994 Buildout Scenario
5) Alternative Scenario
6) Conclusions and Recommendations

Diane Cameron - Brief Bio

- M.S. Environmental Engineering, UMCP
- B.A. Geology, Indiana University
- Audubon Naturalist Society 2008-present
- Natural Resources Defense Council
- Clean Water Act, Stormwater, Watershed Policy
- Co-Chair, Ad Hoc Water Quality Working Group for the Mont. County Council
  - Charged with making recommendations for Ten Mile Creek – Clarksburg Stage 4, 2009-2010.

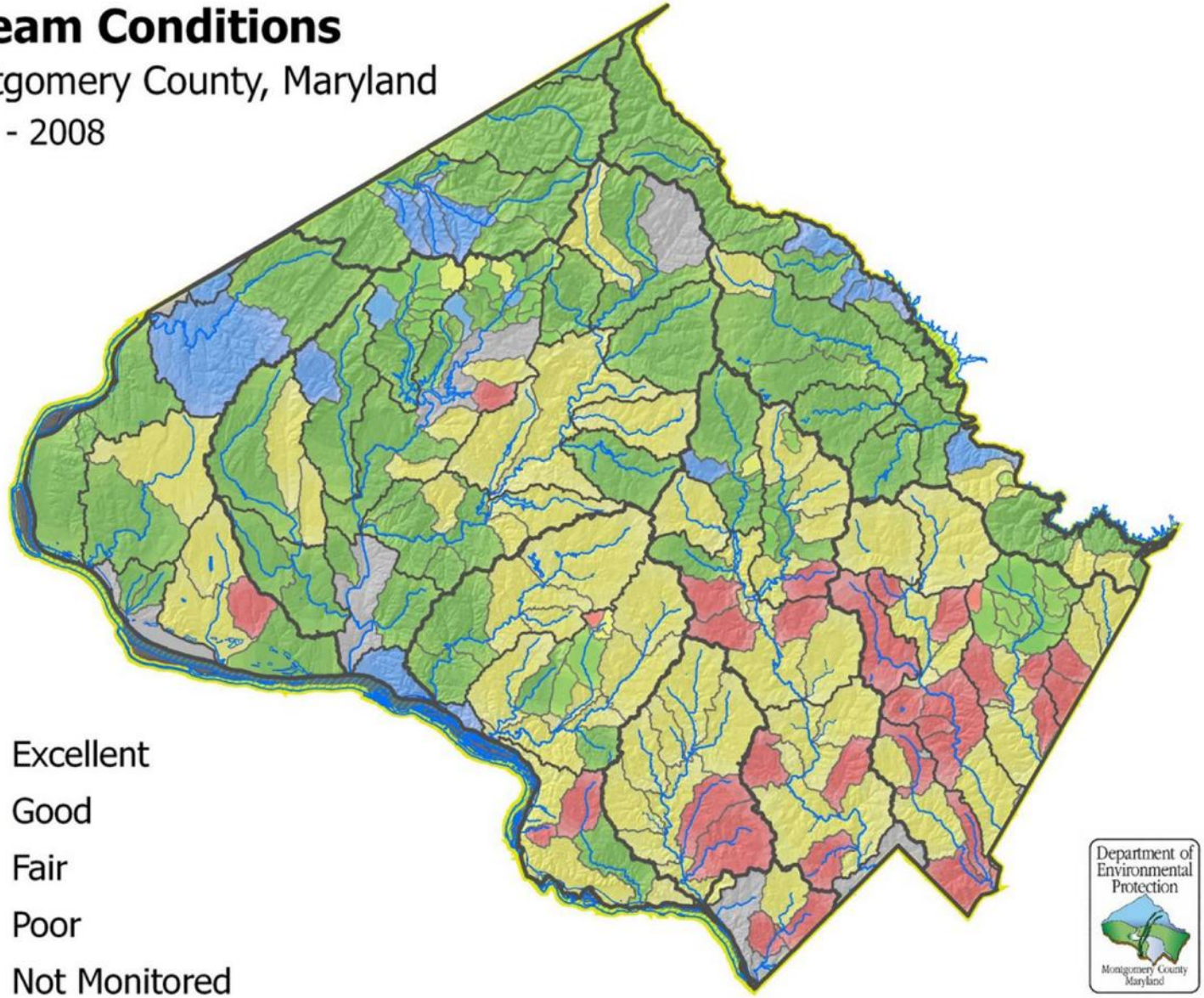
What's At Stake

- Ten Mile Creek – our last, best creek
- Source of cleanest water to Little Seneca Reservoir - Backup Drinking Water Supply
- Reference stream for biological health
- MDE: Montgomery County must reduce Sediment Loadings to Seneca Creek
- Create a vital Clarksburg Town Center
- Maintain the Ag Reserve, limit sprawl.

Stream Conditions

Montgomery County, Maryland

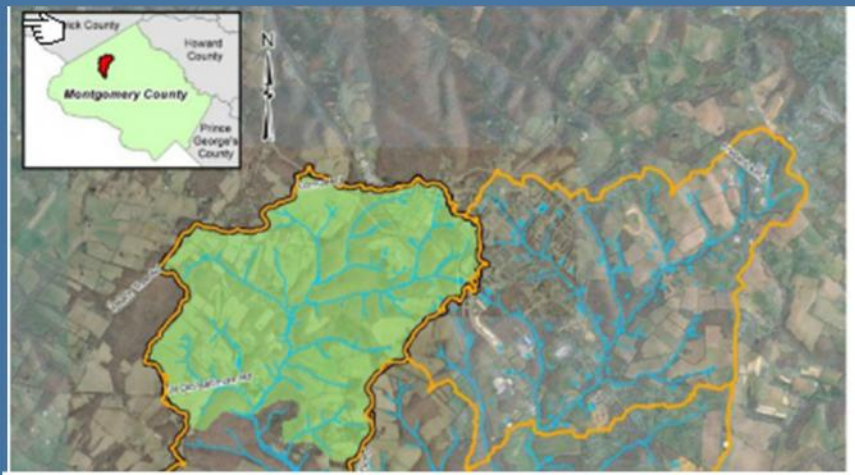
2000 - 2008



- Excellent
- Good
- Fair
- Poor
- Not Monitored

Department of Environmental Protection

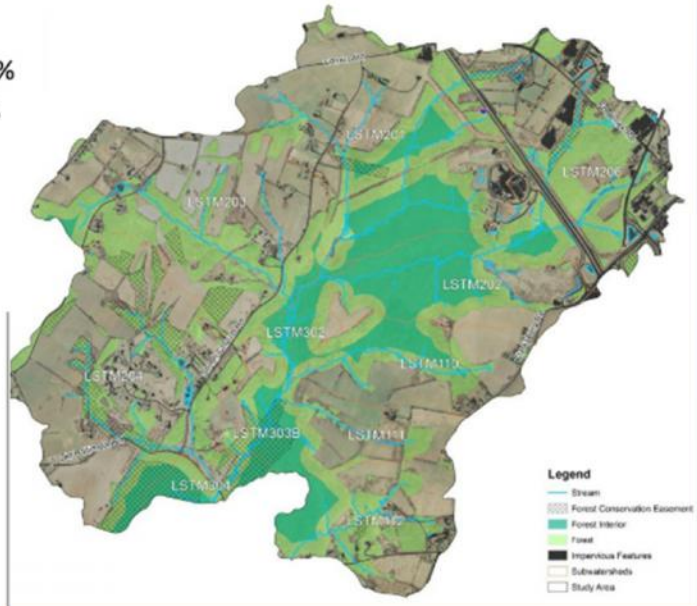
Montgomery County Maryland



10 Mile Creek
Limited Amendment

Forest	46%
Imperviousness	4%

Existing Land Cover



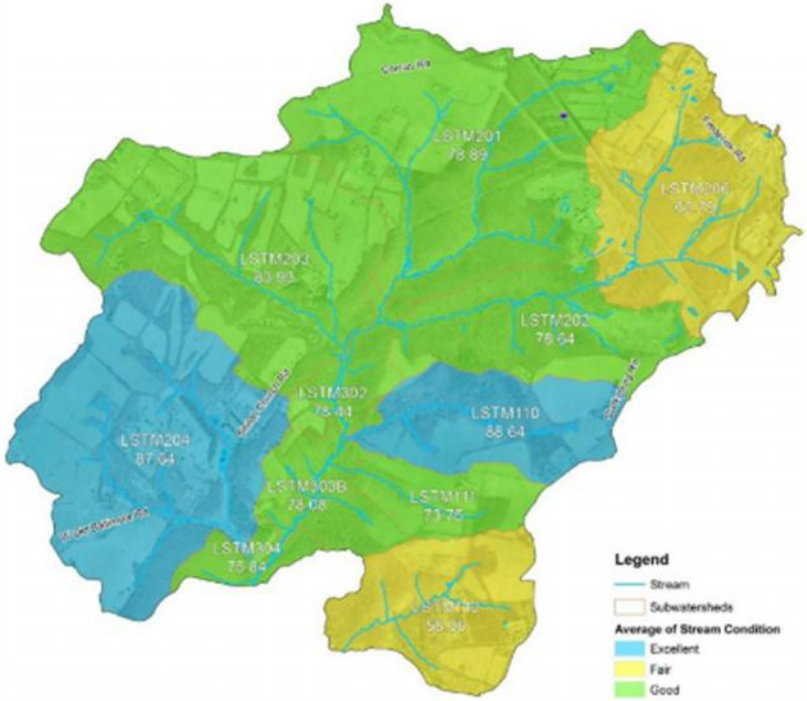
10 Mile Creek
Limited Amendment

Aquatic Habitat & Biology

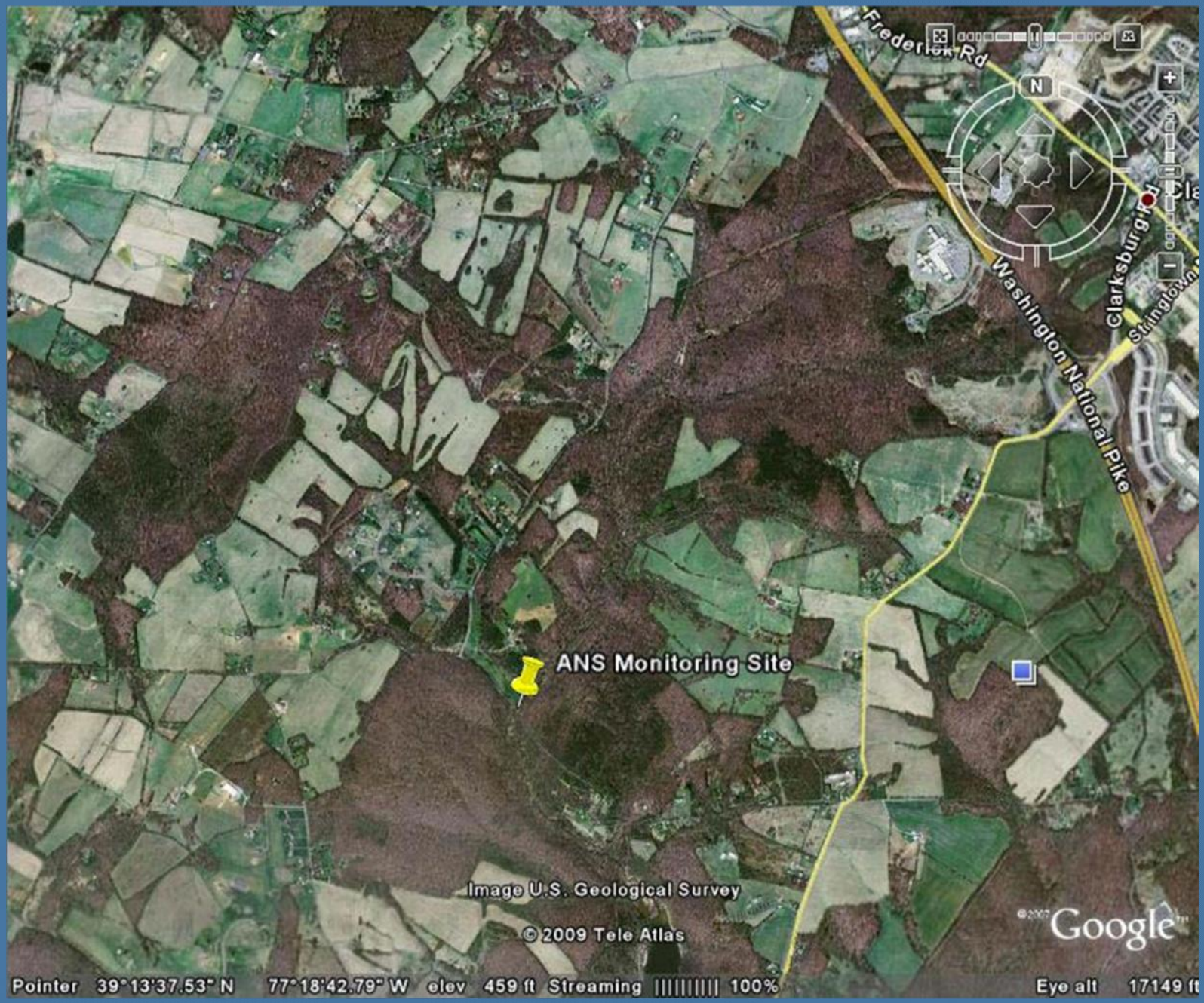
Benthic (Bugs)

Fish

Stream quality is GOOD overall

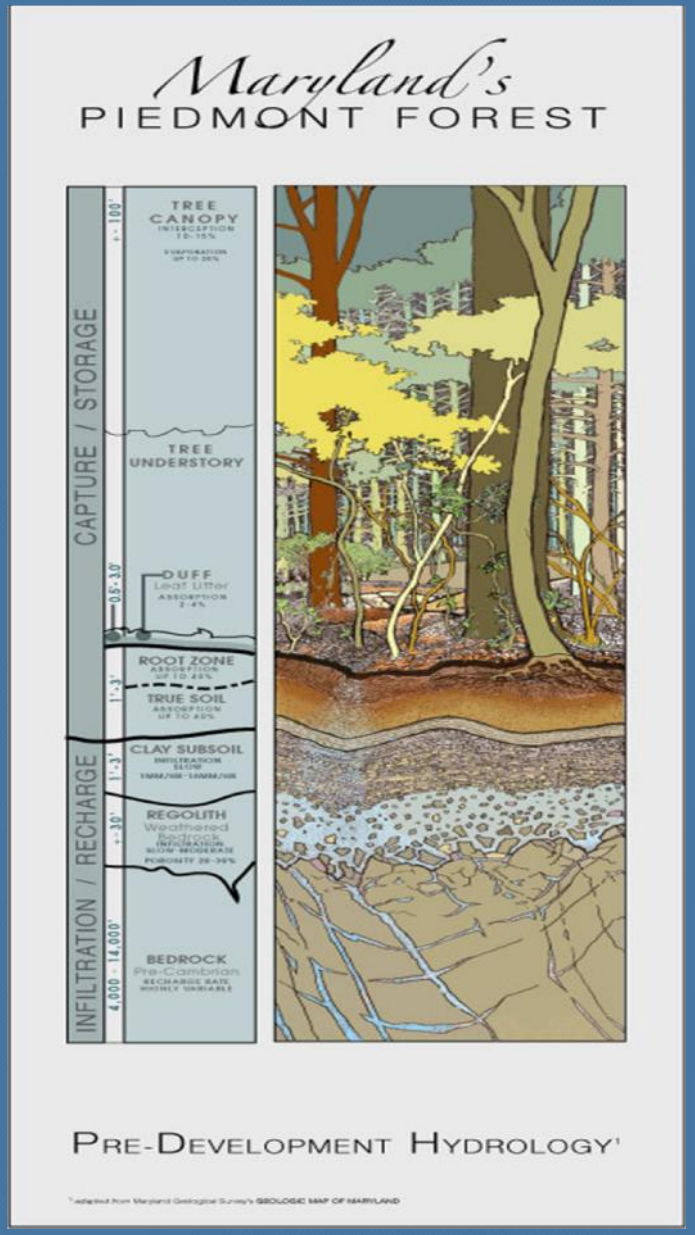


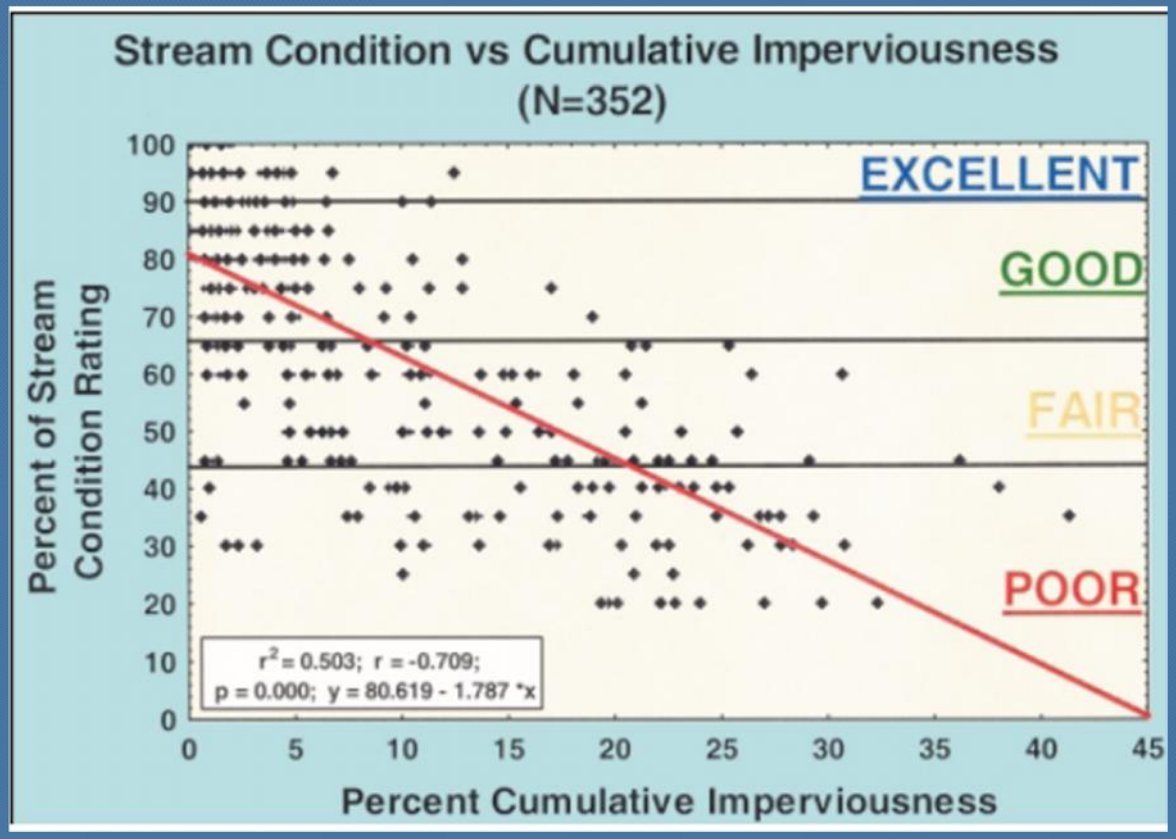
www.montgomeryplanning.org/10milecreek


Frederick Rd
Washington National Pike
Clarksburg Rd
Stringtown
ANS Monitoring Site
Image U.S. Geological Survey
© 2009 Tele Atlas
Google
Pointer 39°13'37.53" N 77°18'42.79" W elev 459 ft Streaming 100%
Eye alt 17149 ft

The 8 Hydrologic Functions of Forests and Trees

1. Canopy Interception
2. Stem Flow
3. Absorption by Leaf Litter (Duff)
4. Soil Infiltration
5. Evapotranspiration
6. Hydraulic Lift/ Redistribution
7. Groundwater Recharge
8. Flood Mitigation and Conveyance of Large Storms





Conditions in the stream including: hydrology (how the water flows); chemistry; temperature; and aquatic life, respond to 3 Prime Factors:

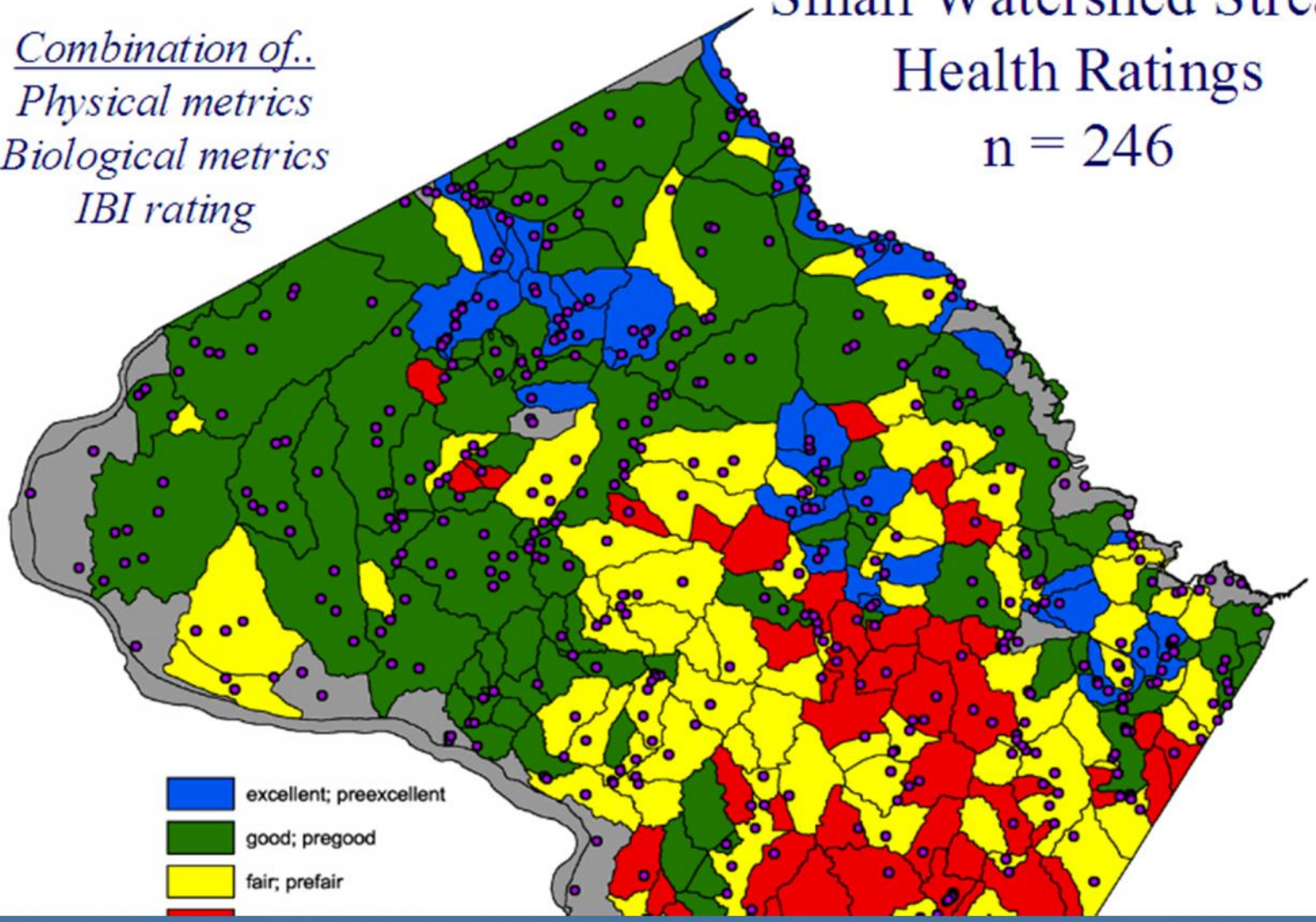
1. Hard (impervious) surfaces
2. Forest cover – or lack thereof
3. Construction and land alteration

Source: Montgomery County stream biological monitoring data.

Montgomery County DEP, Countywide Stream Protection Strategy, 2003 Update. at:
http://www.montgomerycountymd.gov/content/dep/Publications/pdf/CSPS2003.pdf

Small Watershed Stream Health Ratings n = 246

Combination of..
Physical metrics
Biological metrics
IBI rating



Science and Local Experience

- Special Protection Areas
  - Upper Paint Branch*
  - Upper Rock Creek*
  - Piney Branch
  - Clarksburg-area streams

* SPAs where impervious caps were applied.

- Stream Biological Monitoring
  - Countywide since 1998
- Watts Branch – failed drinking water source.

Watershed Science

How to study the effect of "proposed changes" to a watershed in a given area:

1. Choose two paired watersheds.
2. One is the control, the other is the test.
3. Set up monitoring stations and do baseline monitoring of the relevant indicators.
4. Apply the "changes" to the test watershed.
5. Study, over several years, the test and control watersheds for the relevant indicators.
6. Analyze and continue testing as needed.

Upper Paint Branch Imperviousness Cap of 8%

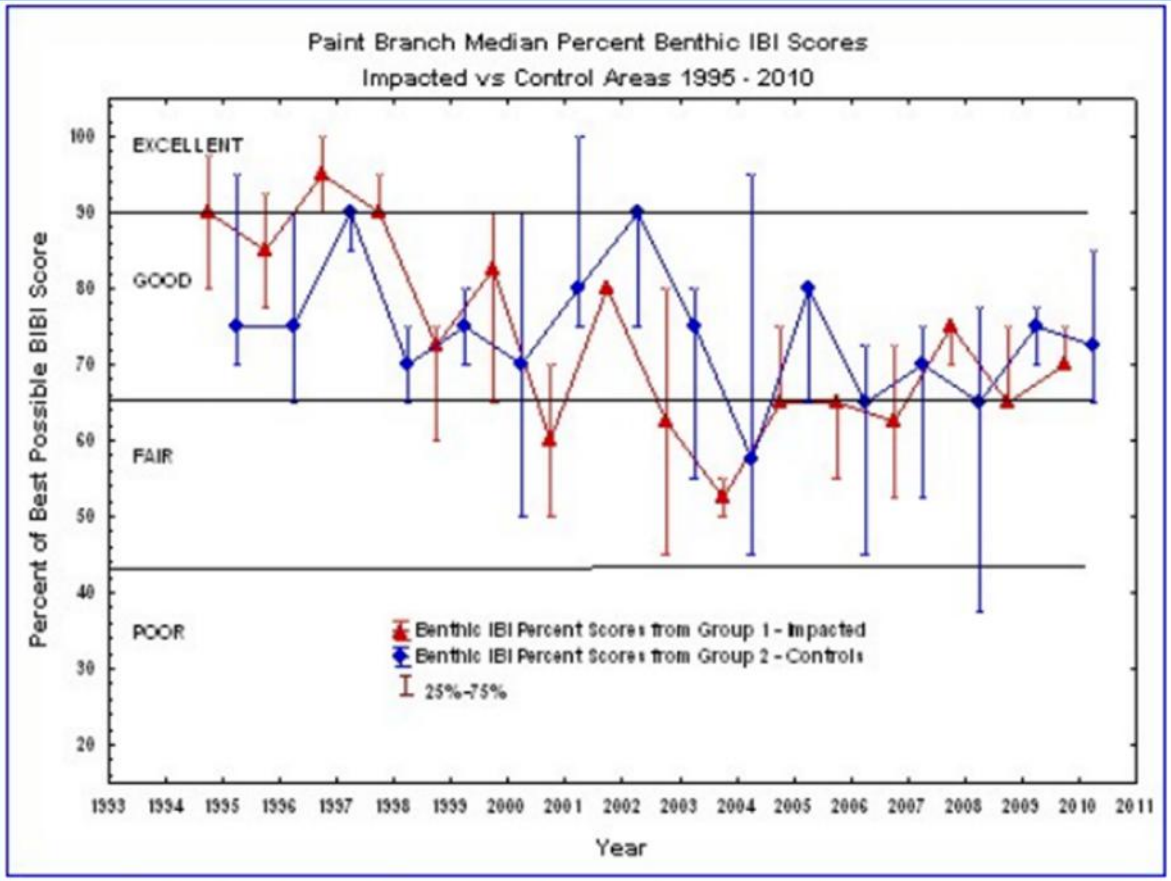


Figure 5.12. Median Benthic IBI Scores for Upper Paint Branch Control and Test Areas.

Environmental Overlay Zone: 8% imperviousness for new developments served by public sewer.

Clarksburg Streams

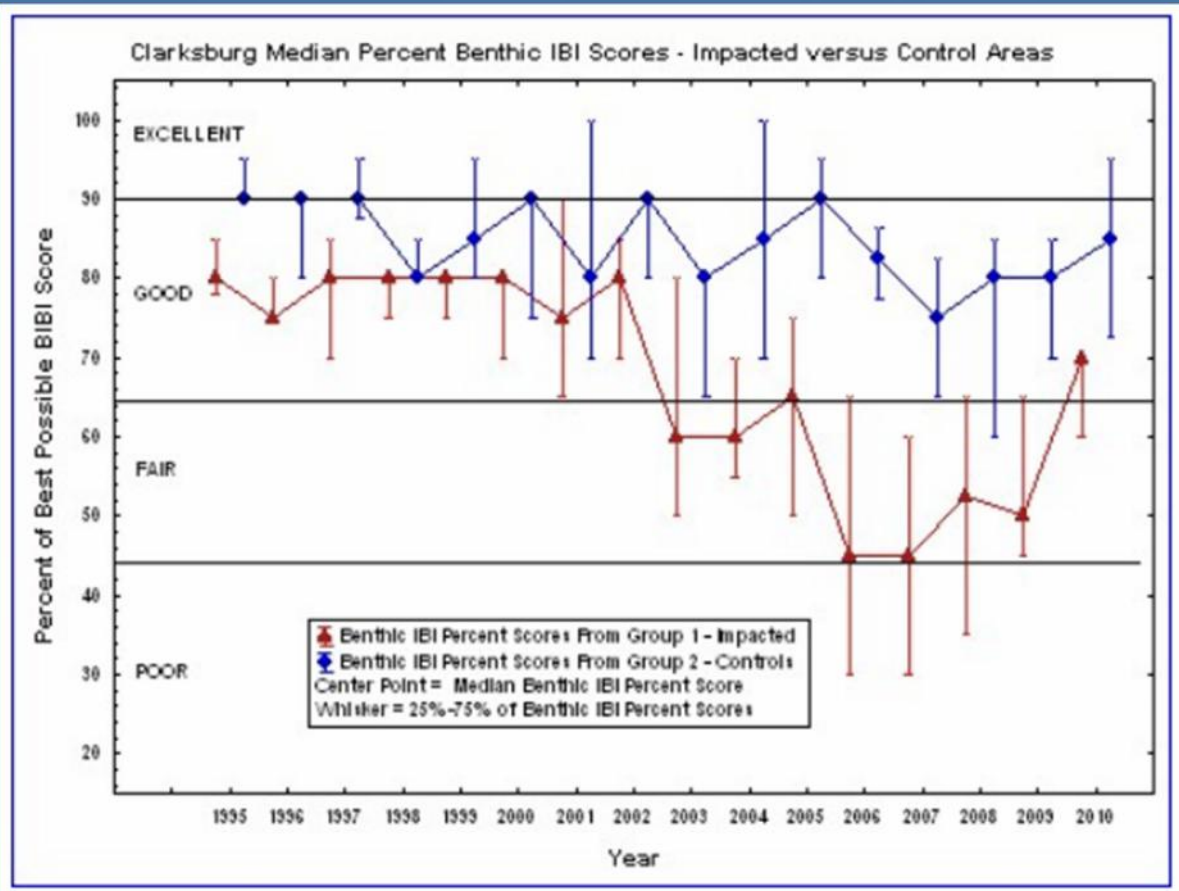
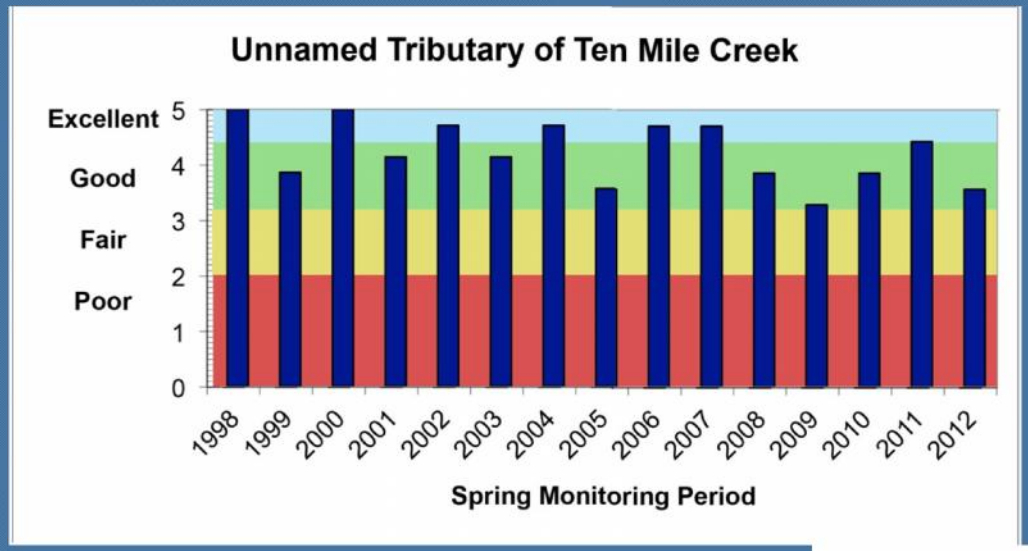
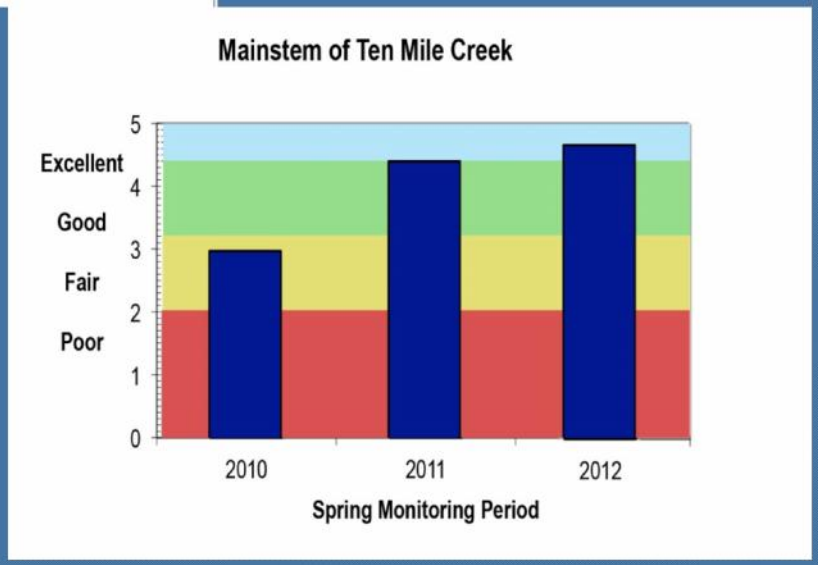


Figure 5.10. Median Benthic IBI Scores for Clarksburg Control and Test Areas.

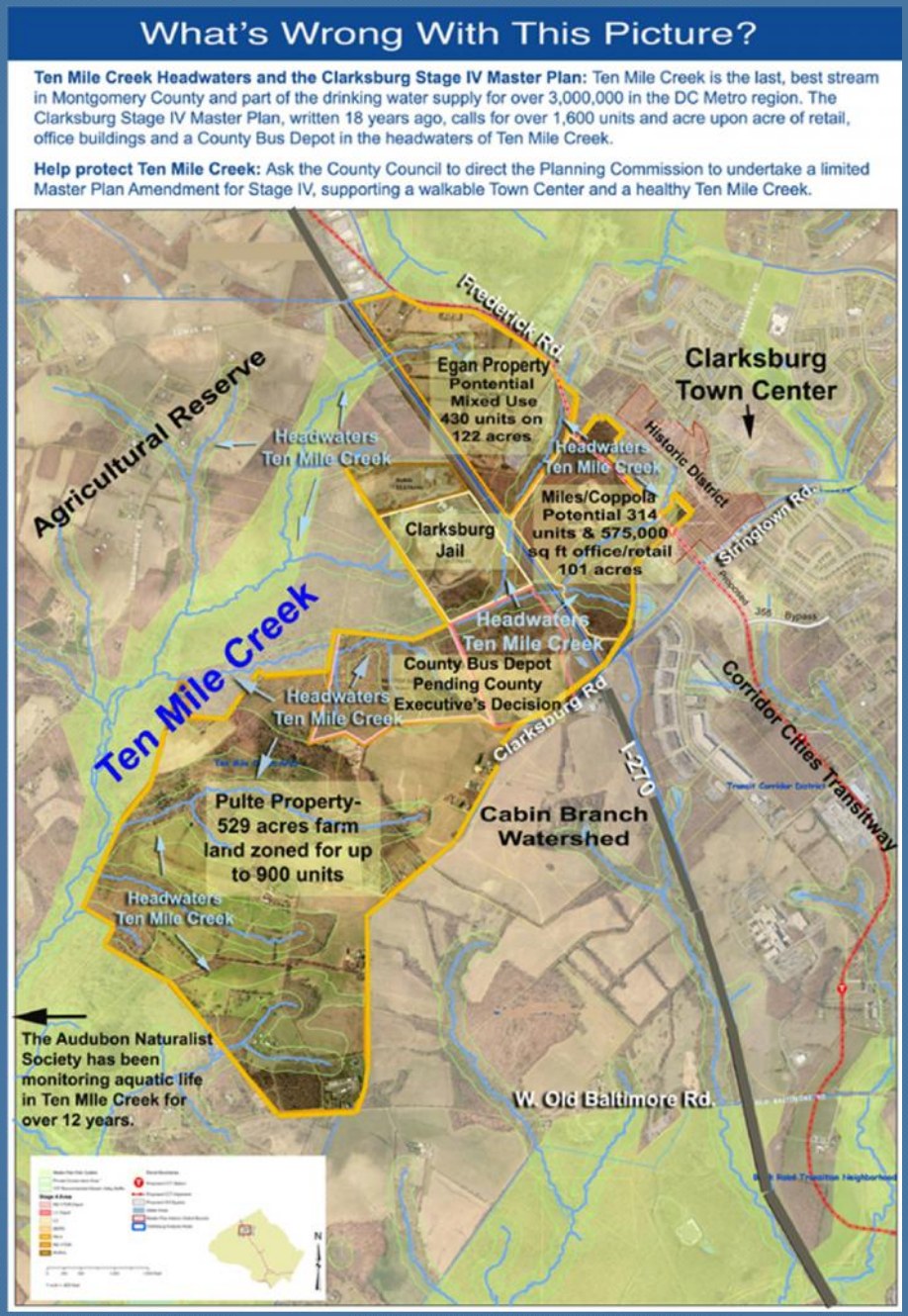
DEP: If sensitive organisms are no longer present or if the habitat no longer supports these more sensitive taxa, the stream condition may not be able to fully improve.



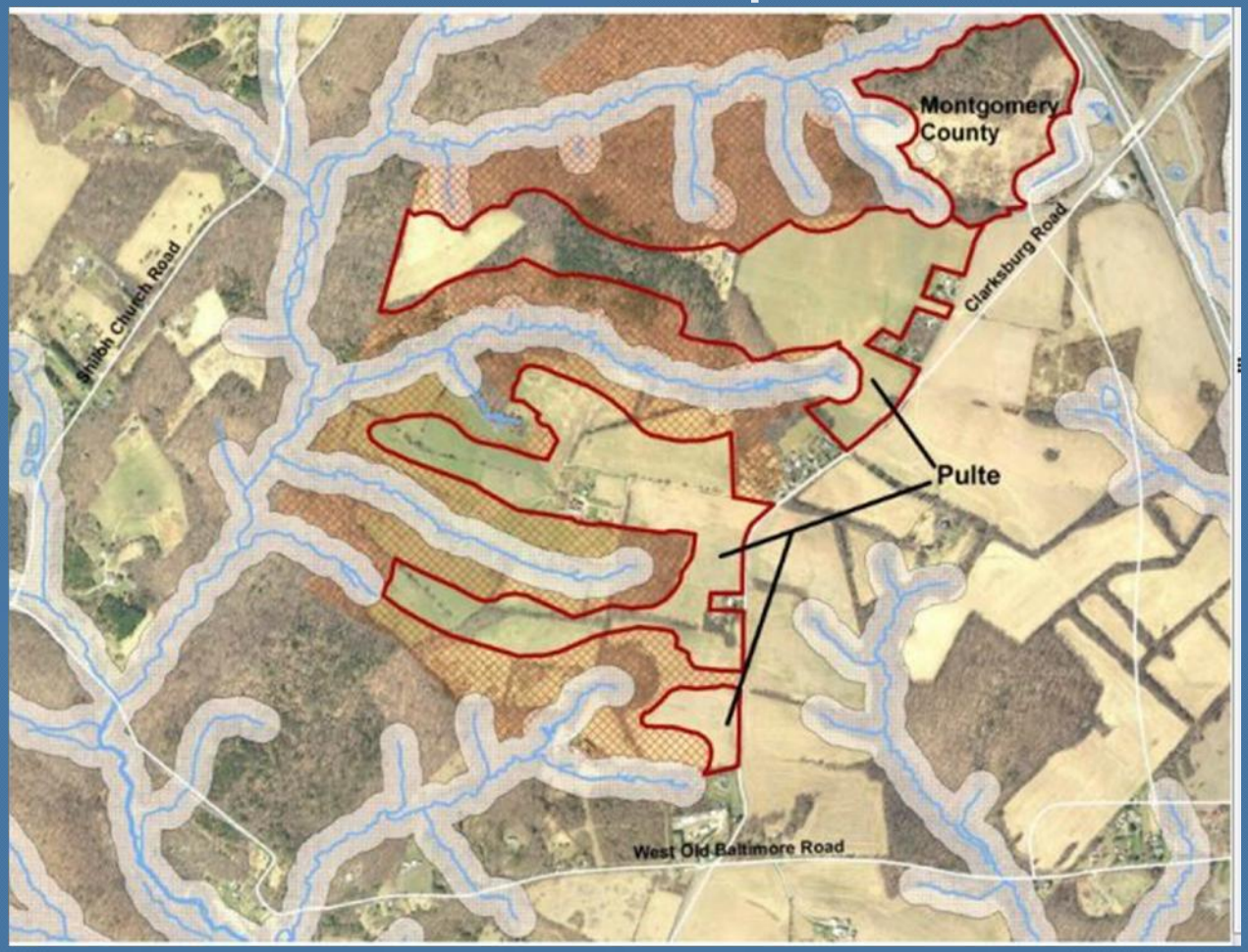
Audubon Naturalist Society
Water quality monitoring data
For Ten Mile Creek
1998-2012.



Map by Dolores Milmoe of ANS 2012.

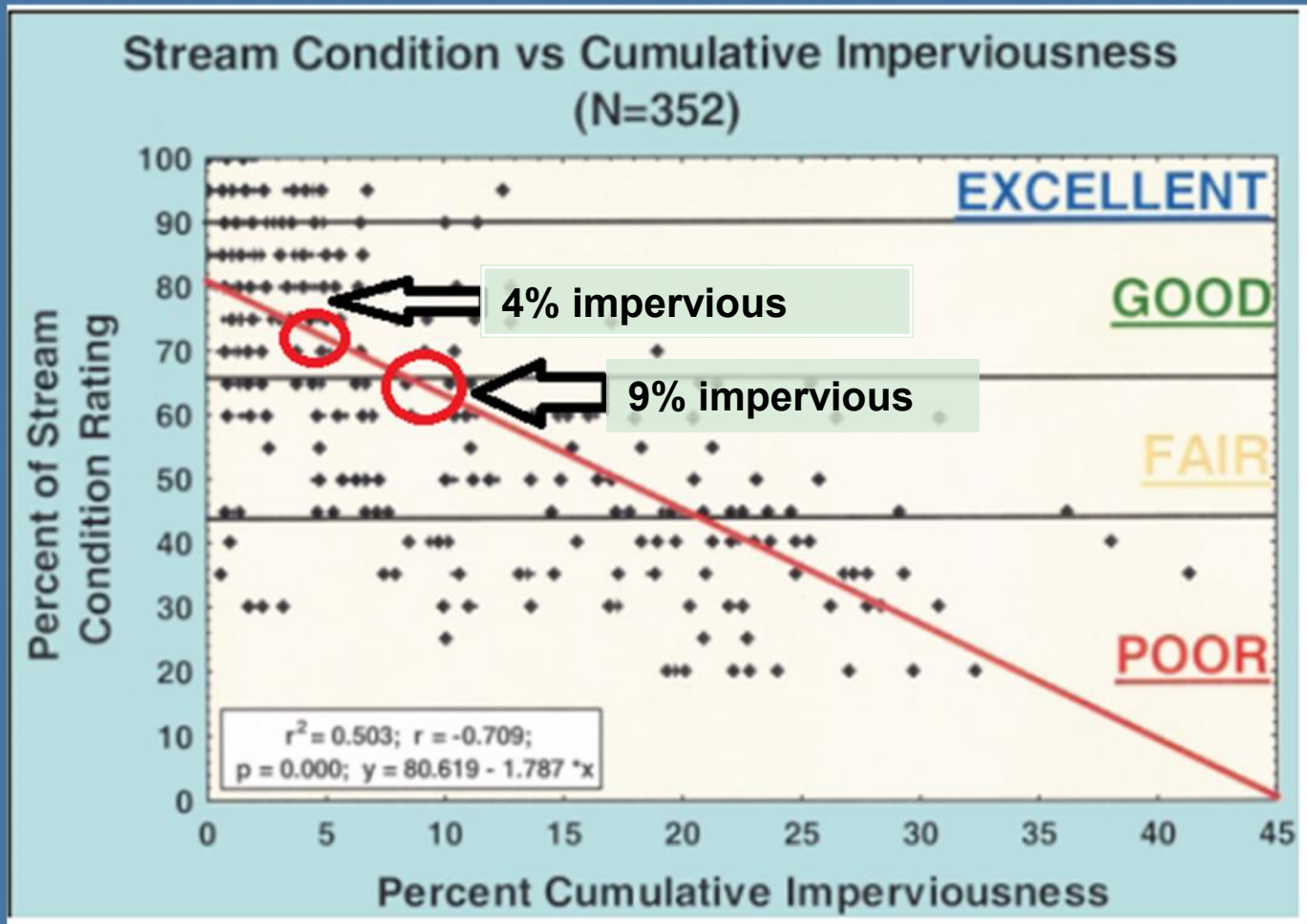


Ten Mile Creek subwatersheds 110 and 111 – the most sensitive and now slated for the heaviest impact.



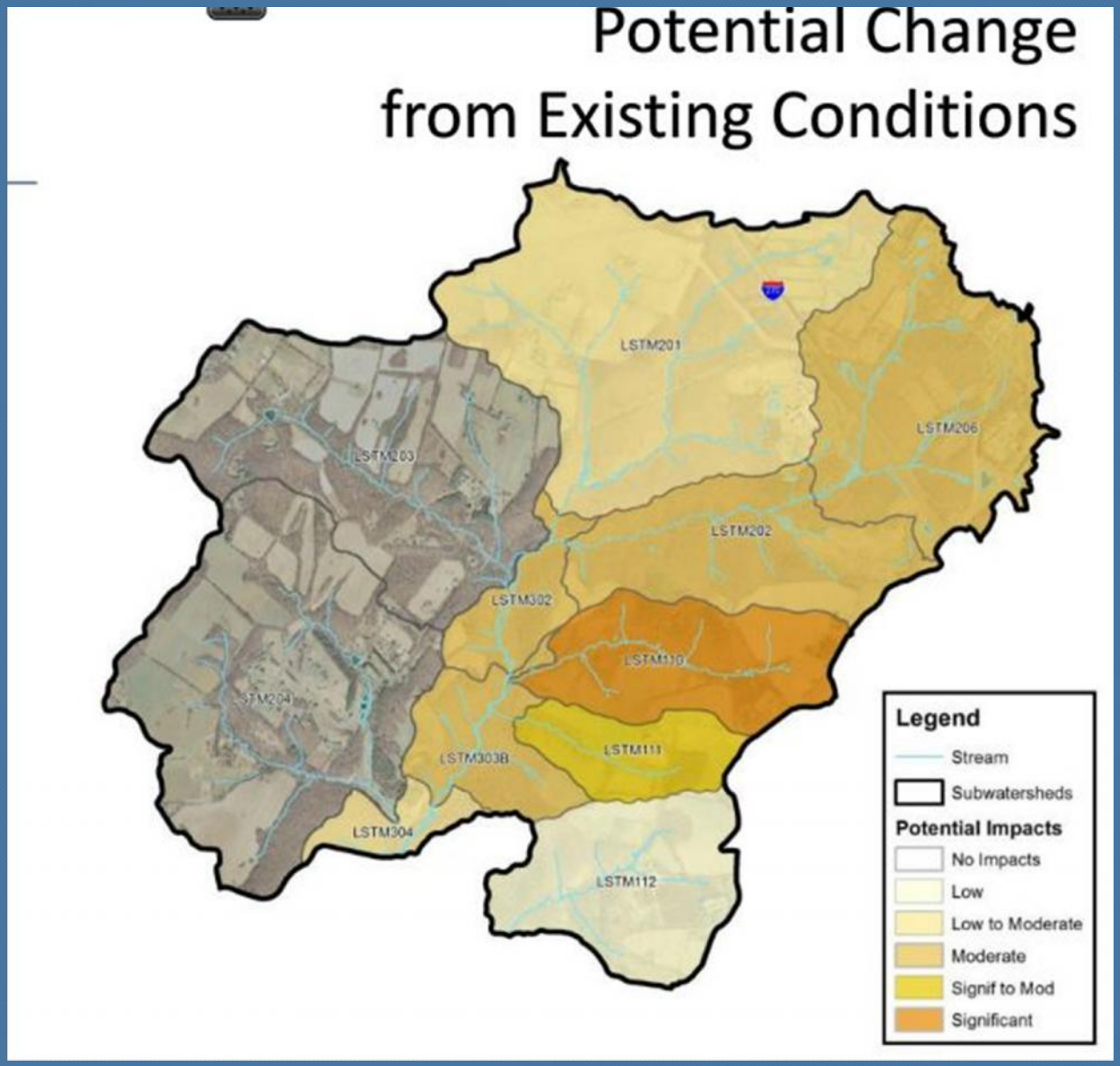
Source:

Montgomery County DEP, Countywide Stream Protection Strategy, 2003 Update. at:
http://www.montgomerycountymd.gov/content/dep/Publications/pdf/CSPS2003.pdf



Full buildout
Of the 1994
Clarksburg
Master Plan
Would bring Ten
Mile Creek
watershed to
9% average
Imperviousness,
which correlates
to a stream
condition of **Fair.**

Potential Change from Existing Conditions



Construction impacts of hilltop leveling – in prior Clarksburg developments – LIDAR images

Source: Mont.Co. DEP Special Protection Area Report

Ad-Hoc WQ Working Group
2010 – comments of Keith Van Ness, DEP and Rick Brush, DPS

- Keith Van Ness: Construction and land alteration Clarksburg stages 1 – 3 did include ESD practices: swales; permeable pavements; rooftop disconnections.

  Comment: But admittedly, these things were not enough.

  Rick Brush: when the sewer lines were put in, the streams started to degrade. The underground stormwater drainage pipes diverted and intercepted the groundwater adversely.

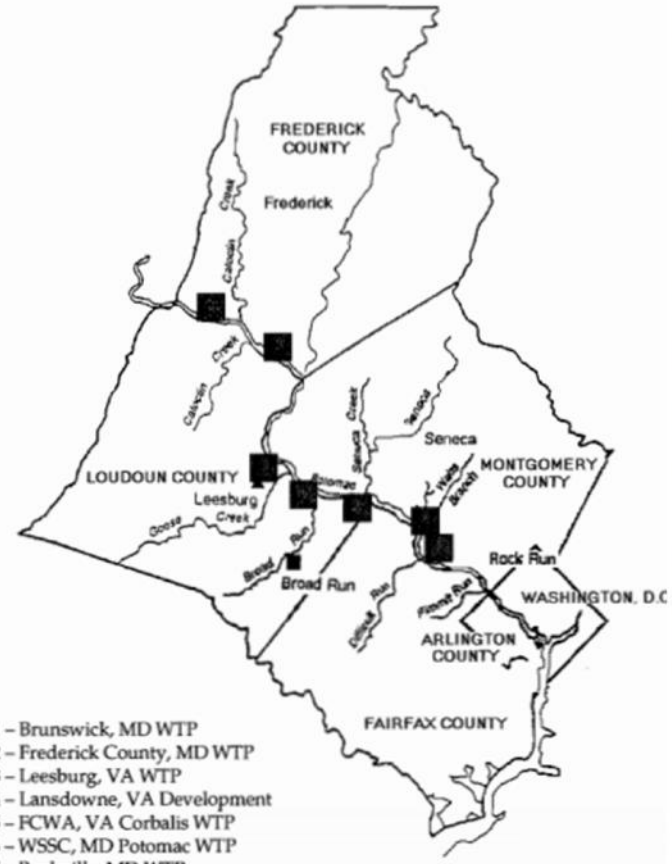
10 Mile Creek
Limited
Amendment

Water Quality

www.montgomeryplanning.org/10milecreek

Ten Mile Creek Is the cleanest Tributary to Little Seneca Reservoir – a Backup drinking water supply for 3 million people. Let's protect Ten Mile Creek and thus help to keep the water in Little Seneca Reservoir clean.

FIGURE 2.
Intakes Evaluated for this Study (There are other intakes not shown)



New pipe bypasses dirty Watts Branch, but future is murky

Wednesday, Oct. 18, 2006

by Peggy Vaughn
Staff Writer

Nothing can be done in the short term to improve the water quality of the debris-filled Watts Branch, so constructing a new water intake pipe in the Potomac River to deliver cleaner water to the Potomac Water Filtration Plant just makes good sense, according to WSSC officials.

Washington Suburban Sanitation Commission officials outlined tentative plans for the plant located on River Road just north of the C&O Canal National Historic Park at an Oct. 11 meeting of the West Montgomery County Citizen's Association.

The pipe is needed, WSSC officials said, because even with aggressive changes in storm water management, it would take until 2020 to see a 15 percent improvement in water quality in the Watts Branch.

Black squares = Water Treatment Plants on the mid-Potomac.

National Research Council: Land Cover and Stream Quality

- 30 years of scientific studies
- Prominent databases generated in Maryland and Montgomery County.
- 2008 National Research Council report: "**There is a direct relationship between land cover and the biological condition of downstream receiving waters.** The possibility for the highest levels of aquatic biological condition exists only with very light urban transformation of the landscape." (emphasis in the original.)

- Schueler, Fraley-McNeal and Cappiella, 2009 updated meta-analysis of 65 published studies, confirming that as imperviousness increases, stream quality decreases.

- **The Impervious Cover Model indicates that as watershed imperviousness increases from 5% to 10%, stream quality transitions from "sensitive" to "impacted."**

National Research Council (2008), Committee on Reducing Stormwater Discharges to Receiving Waters. *Urban Stormwater Management in the United States* p. 195.

Additional Key Reports and Papers related to Ten Mile Creek; Urbanization Impacts on Streams; and Low Impact Development Studies
3/2013

Submitted to Mark Symborski and Mary Dolan
by Mary Rojas, Ava Manglik, Cathy Wiss and Diane Cameron for Audubon Naturalist Society

Ten Mile Creek – Studies and Data Reports

Wiss, Cathy (2012). Audubon Naturalist Society Monitoring at Ten Mile Creek. Narrative with data reports on monitoring at Ten Mile Creek, 1997-2012, including macroinvertebrates and temperature.

Land Cover Conditions: Imperviousness

California Environmental Protection Agency (2009) The Impacts of Imperviousness on Aquatic Ecosystems: An Annotated Bibliography of the effects of a key stressor of urbanization on the aquatic ecosystem. Integrated Risk Assessment Branch, Office of Environmental Health Assessment. http://oehha.ca.gov/ecotox/pdf/ICbiblio0309.pdf

Maryland Department of Natural Resources (undated) Impacts of Impervious Cover on Maryland Streams. Stream Health Fact Sheet. http://www.dnr.state.md.us/streams/pdfs/ImperviousFactSheet.pdf

Maryland Department of Natural Resources (2012), River/Stream Management Strategy, Guiding Principles. http://www.dnr.state.md.us/streams/pdfs/RiverStream_MgtStrat_GuidingPrinciples_092612.pdf

Schueler, Thomas R, Fraley-McNeal, L. and Cappiella, L. (2009) Is Impervious Cover Still Important? Review of Recent Research, *Journal of Hydrologic Engineering*, ASCE April 2009, pp. 309-315. http://clear.uconn.edu/projects/tmdl/library/papers/Schueler-etal_2009.pdf

Land Cover Conditions: Imperviousness and Forest Cover

Goetz, Scott J, et al. (2004) Integrated Analysis of Ecosystem Interactions With Land Use Change: The Chesapeake Bay Watershed. *Ecosystems and Land Use Change, Geophysical Monograph 153. American Geophysical Union.* ftp://ftp.whrc.org/Mid-Atlantic/GOETZ-PUBS/Goetz-2004-ChapmanBook.pdf

Goetz, Scott J, IKONOS imagery for resource management: Tree cover, impervious surfaces, and riparian buffer analyses in the mid-Atlantic region, (2003), *Remote Sensing of the Environment* 88, pp. 195-208. GoetzRemSensEnv.03

Goetz, Scott J, et al., (undated –estimated 2004-2005) Using IKONOS Imagery to Assess Impervious Surface Area, Riparian Buffers and Stream Health in the Mid-Atlantic Region, powerpoint presentation. http://calval.cr.usgs.gov/JACIE_files/JACIE04/files/3Goetz5.pdf

Land Cover Conditions: Forest Cover and the Hydrologic Role of Forest Soils

Cameron, Diane, Implementing the Stormwater Management Act of 2007: Defining Pre-Development Forest Hydrology in the Maryland Piedmont and Beyond, (August 2011).

Carmean, Willard H, The Structure of Forest Soils, The Ohio Journal of Science, 57(3) (1957), https://kb.osu.edu/dspace/bitstream/handle/1811/4444/V57N03_165.pdf;jsessionid=4F76488015D37564293DAF853FA155C1?sequence=1

Hursh, Charles R, Water Storage Limitations in Forest Soil Profiles, Soil Science Society of America, Proceedings, Vol. 8, (1944) http://coweeta.uga.edu/publications/797.pdf

Land Use and Land Disturbance: Impacts to Aquatic Ecosystems of Construction Activities, Land and Stream Disturbance and use of Earth-Moving Vehicles.

Cameron, Diane, Protecting Ten Mile Creek Based on Watershed Science and Local Experience, (February 2010), http://www.audubonnaturalist.org/images/conservation/2010FebCameronTenMileCreekRptAdHocWQWrkGrp.pdf

J.H. Gregory, M.D. Dukes, P.H. Jones, and G.L. Miller, *Effect of urban soil compaction on infiltration rate*. Journal of Soil and Water Conservation 61:3, 117-124 (2006) http://abe.ufl.edu/mdukes/pdf/stormwater/Gregor-et-%20al-JSWC-compaction-article.pdf

EPA (Darnell et al) (1976) Impacts of Construction Activities in Wetlands of the United States. Contract No. 68-01-2452. U.S. Environmental Protection Agency, Corvallis Environmental Research Laboratory. http://books.google.com/books?hl=en&lr=&id=8PCM9cG_yoC&oi=fnd&pg=PR3&dq=construction+impacts+on+sensitive+streams&ots=eArNzzIfzp&sig=oTAhfLMx_TgvTtfq_7OjRA2VDfQ#v=onepage&q&f=false

Felton, G. (circa 2007) Research Review of Nitrogen Losses from Turfgrass. Powerpoint Presentation by Gary Felton, Associate Professor, University of Maryland Agricultural Extension.

Fennessey,L. (undated) Hydrologic Budgets for Development Scale Areas in Pennsylvania. http://www.ppp.psu.edu/services/eng-resources/balance-paper.pdf

Keys, E.L. (undated) Relationship of Forest Destruction and Soil Disturbance to Increased Flooding in the Suburban North Carolina Piedmont. conference paper. http://www.ces.ncsu.edu/fletcher/programs/nursery/metria/metria03/m312.pdf

Meyer, J. L., et al., (2003) *Where rivers are born: The scientific imperative for defending small streams and wetlands.* Washington, DC: Sierra Club and American Rivers. http://webspace.ship.edu/cjwolt/main/WRAB.pdf (Pamphlet describing principles for general audience).

O'Driscoll et al. (2010). Urbanization Effects on Watershed Hydrology and In-Stream Processes in the Southern United States. *Water 2010*, pp 605-648. www.mdpi.com/2073-4441/2/3/605/pdf

Public Service Commission of Wisconsin (2011) *Environmental Impacts of Transmission Lines*. See pp. 21-26. http://psc.wi.gov/thelibrary/publications/electric/electric10.pdf

Tullos, D.D. et al. (2009) Analysis of functional traits in reconfigured channels: Implications for the bioassessment and disturbance of river restoration. Journal of the North American Benthological Society. 28:1, 80-92. http://rivers.bee.oregonstate.edu/sites/default/files/tullos_penrose_jennings_cope_2008.pdf

Woltemade, Christopher J., 2010. Impact of Residential Soil Disturbance on Infiltration Rate and Stormwater Runoff. *Journal of the American Water Resources Association* (JAWRA) 46(4): 700-711.

http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2010.00442.x/abstract?deniedAccessCustomisedMessage=&userIsAuthenticated=false

Low-Impact Development/ Environmental Site Design Watershed-Level studies.

King, Ryan S, How Novel is too Novel? Stream Community Thresholds at Exceptionally Low Levels of Catchment Urbanization, Ecol Appl 21.1659-1678 (1)

Lowrance, Richard, Water Quality Functions of Riparian Forest Buffers in Chesapeake Bay Watersheds, Lowrance et al WQ Functions of Riparian Forest Buffers in Chesapeake Bay Watersheds (1)

Selbig, S.R. and Bannerman, R.T. (2008) A comparison of runoff quantity and quality from two small basins undergoing implementation of conventional-and low-impact-development (LID) strategies: Cross Plains, Wisconsin, water years 1999-2005: US Geological Survey Scientific Investigations Report 2008-5008, 57 p.

Walsh, Christopher J, The urban stream syndrome: current knowledge and the search for a cure, http://clear.uconn.edu/projects/TMDL/library/papers/Walsh_etal_2005.pdf

GOETZ ET AL. 273

Figure 4. Small watershed stream health rankings in relation to impervious surface cover, watershed tree cover, and riparian buffer zone tree cover.

GOETZ ET AL. 273

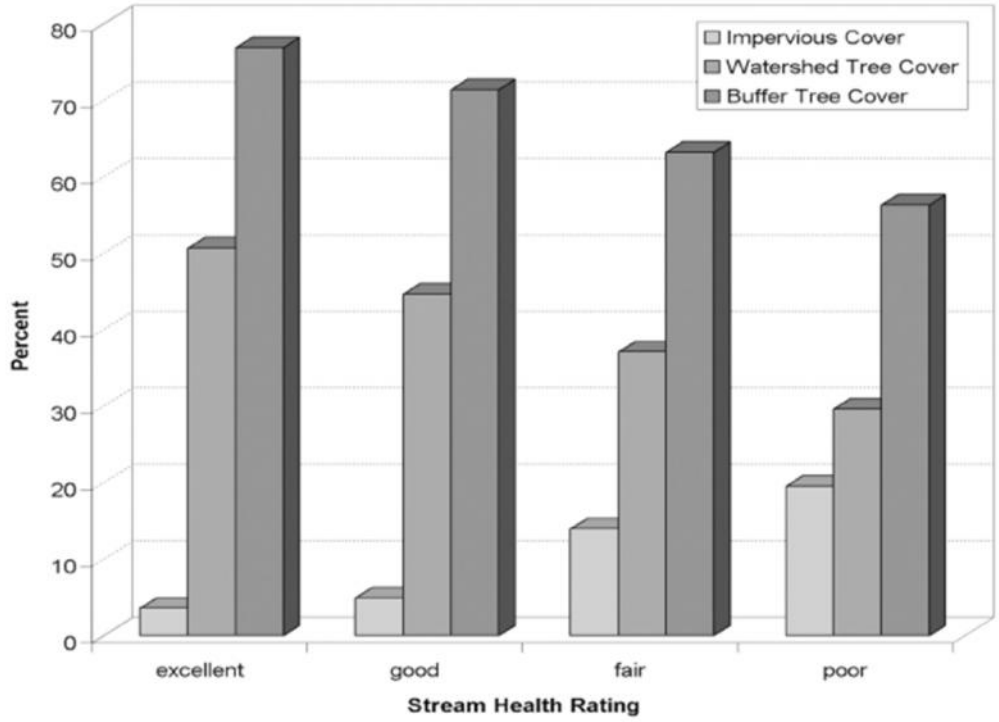
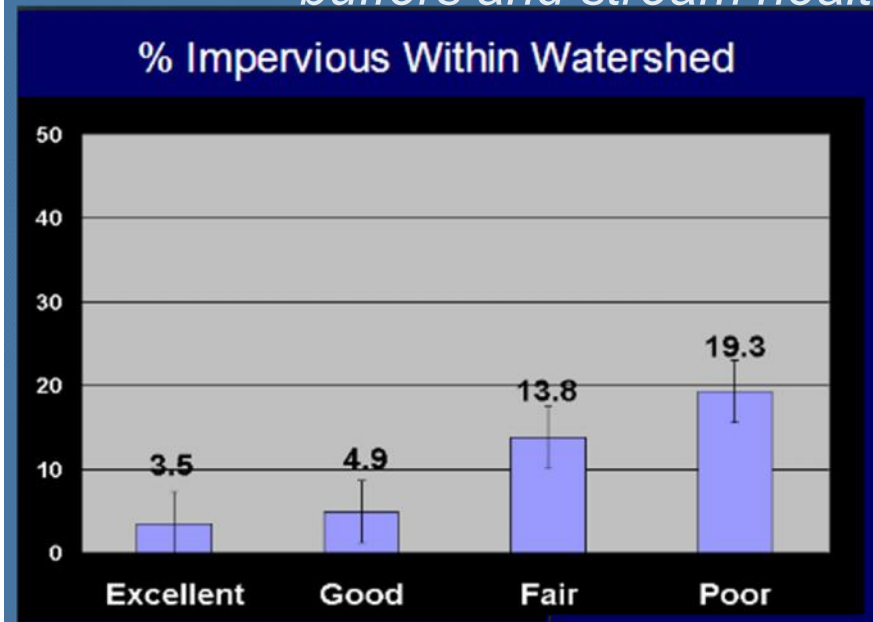


Figure 4. Small watershed stream health rankings in relation to impervious surface cover, watershed tree cover, and riparian buffer zone tree cover.

Goetz, Scott J, et al. (2004) Integrated Analysis of Ecosystem Interactions With Land Use Change: The Chesapeake Bay Watershed. *Ecosystems and Land Use Change, Geophysical Monograph 153. American Geophysical Union*. ftp://ftp.whrc.org/Mid-Atlantic/GOETZ-PUBS/Goetz-2004-ChapmanBook.pdf

Source: Goetz, Jantz et al. ppt. circa 2004

Using IKONOS imagery to assess impervious surface area, riparian buffers and stream health in the Mid-Atlantic Region.

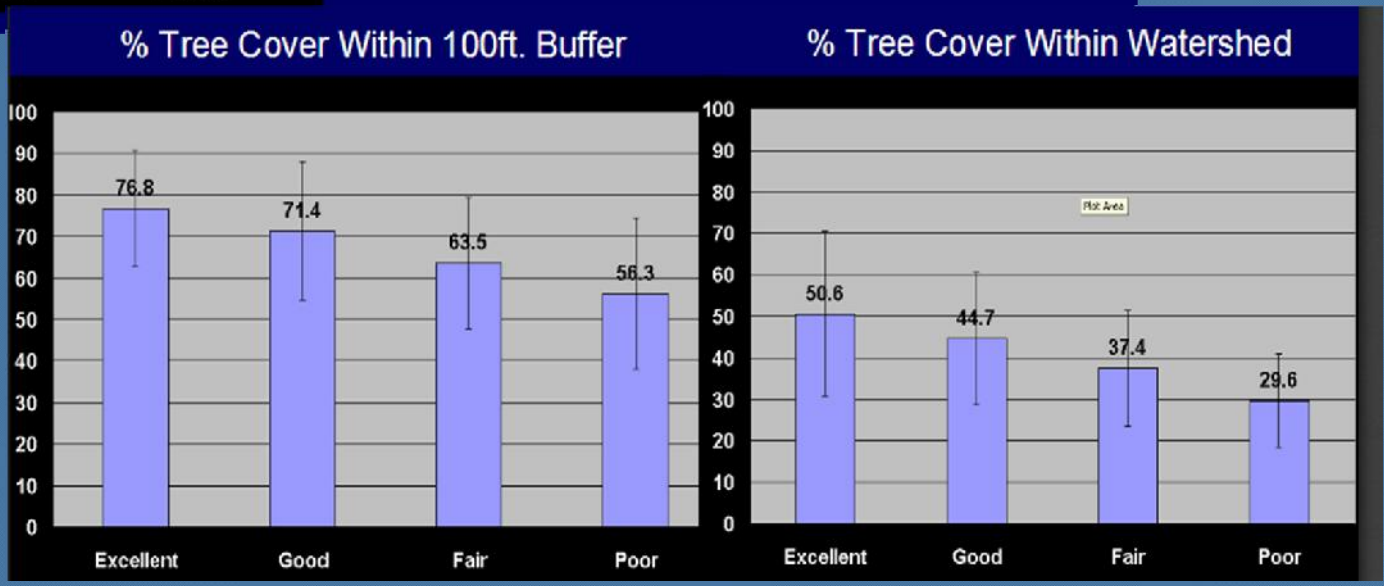


Across all watersheds there is a significant *decrease* in stream health rating with:

1) more impervious cover

2) fewer trees in buffer

3) less tree cover in watershed



Alternative Scenario with Assumptions

- Alternative Scenario
  - 6% imperviousness cap
  - Forest cover minimums: 50% overall, 75% in the stream buffers.
  - Applied to Ten Mile Creek overall.
  - Apply the best established science to ensure protection of sensitive subwatersheds 110 and 111.
  - Environmental Overlay Zones.
  - Will mean a reduction in total units and densities.

Ad-Hoc Water Quality Working Group July 2010 Report.
Majority Report: Rick Brush, Mark Pfefferle, Steve Shofar, Diane Cameron, John Cook.

The Environmental Site Design provisions included in the Option 2 report are important and necessary, but not sufficient, to protect the high quality water and sensitive contributing watershed of Ten Mile Creek. They are insufficient because the forest buffer, stormwater and sediment controls included in the Option 2 approach have not been proven to prevent the disruption of infiltration and groundwater flows, and other destructive impacts, associated with the densities currently planned for Stage 4.

- **The only scientifically-proven way to prevent (not just possibly lessen) this host of impairments is to minimize the construction of infrastructure projects in the Ten Mile Creek watershed, and to apply protective conservative land cover requirements through a limited Master Plan amendment.**

Conclusions and Recommendations

- Montgomery County has successfully protected other high-quality, sensitive streams using scientifically-proven land cover requirements including imperviousness caps.
- Claims that the Buildout of the 1994 Clarksburg Master Plan densities will not damage Ten Mile Creek and its tributaries are not founded in the published science.
- Let's not experiment with unproven stormwater practices when it comes to protecting our most sensitive, high-quality streams.
- Consider alternative scenarios - dial back on the intensity of development and total units allowed in Ten Mile Creek's watershed.
- Apply the locally-proven, science-based watershed protection method: an imperviousness cap of 6%.