Ten Mile Creek
Montgomery County’s Healthiest Waterway

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Audubon Naturalist Society 3.2013
Ten Mile Creek

1) Maps
2) Science
3) Policy & Local Experience
   – High Quality Waters Protection
4) Conclusions & recommendations
Stream Quality Conditions 2001-2005

Stream quality condition of stations monitored from 2001-2005*

Legend
- Drainage Areas
- Streams
- Water Feature
- Watershed Boundary

Average Narrative
- Excellent
- Good
- Fair
- Poor
- Not Monitored

*Horspen Branch was monitored in 2000
Combination of...
Physical metrics
Biological metrics
IBI rating

Small Watershed Stream Health Ratings
n = 246
Existing Land Cover

- Forest: 46%
- Imperviousness: 4%

Legend:
- Stream
- Forest Conservation Easement
- Forest Interior
- Forest
- Impervious Features
- Subwatersheds
- Study Area

www.montgomeryplanning.org/10milecreek
Aquatic Habitat & Biology

Benthic (Bugs)
Fish

Stream quality is GOOD overall

Legend
- Stream
- Subwatersheds
- Average of Stream Condition
  - Excellent
  - Fair
  - Good

www.montgomeryplanning.org/10milecreek
Map by Dolores Milmoe of ANS 2012.
ANS volunteers and staff engaged in monitoring biological indicators of water quality at Ten Mile Creek.

April 2009 – salamander eggs found underneath a rock in the middle of the Ten Mile Creek mainstem.
What does science tell us about how sensitive, biologically diverse streams respond to development?

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
Scientists have documented the relationship between land cover conditions, especially imperviousness, and stream quality for the past 30 years, with some of the most prominent databases generated in Maryland and Montgomery County. In 2008, the National Research Council stormwater committee found that “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.)

Klein’s 1978 paper was followed by Schueler’s 1994 analysis of the available national data on the imperviousness – stream quality relationship; and in 2009 Schueler published a second, 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.”

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, Cathi Wiss and Diane Cameron for Audubon Naturalist Society

Ten Mile Creek – Studies and Data Reports


Land Cover Conditions: Imperviousness


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


Land Cover Conditions: Imperviousness and Forest Cover


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).

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.audubonbaltimore.org/images/conference/10/3agentCartoonTenMileCreekBasedOnWatershedScience.pdf


Low Impact Development/ Environmental Site Design Watershed Level studies.

King, Pern S. ‘Tod tral is a too l for Stream and Wetland Restoration at Semp Quarry of Combatant Veterans. Soil Sci. 21:1099-1079 (1933).

Loreggia, Richard, Water Quality Functions of Asian Forest Buffers in Chesapeake Bay Watersheds. Loreggia et al. in 100 Tonne of Asian Forest Buffers in Chesapeake Bay Watersheds (2003).


Wehr, Christopher J. The urban stream and riparian ecosystem: How we know and what we need to know. http://www.epa.gov/epawater/owow/c11as/urban_rivers.html
Hard (impervious) surfaces

Source:
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
Using IKONOS imagery to assess impervious surface area, riparian buffers and stream health in the Mid-Atlantic Region.
Forest cover – or lack thereof

Booth, Derek B, Forest Cover, Impervious-Surface Area, and the Mitigation of Stormwater Impacts, Center for Urban Water Resources Management, (URL)
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. Conveyance of Large Storms
Construction and land alteration

Source: Mont.Co. DEP
Special Protection Area
Report
Ten Mile Creek & High Quality Waters Policy and Local Experience

• 1994 Clarksburg Master Plan
• 2009-2010 Ad Hoc Water Quality Working Group – Majority Report
• Special Protection Areas: Upper Paint Branch and Upper Rock Creek each have Imperviousness Caps of 8% via Environmental Overlay Zones – and Open – Vegetated Space minimum targets ~ 65%.
• 2012 Council Decision to direct the Planning Dept. to do a LMPA for Ten Mile Creek.
The Montgomery County Council’s October 13, 2009 Resolution (# 16-1149) that established the Ad-Hoc Water Quality Working Group included Item 7, which states:

- Since the approval of the 1994 Clarksburg Master Plan, Montgomery County has gained experience in protecting streams using land cover requirements, including limiting impervious surfaces and maintaining riparian and upland forest cover, in the Upper Paint Branch and Upper Rock Creek Special Protection Areas and in the Sandy Spring/Ashton Rural Neighborhood Cluster Zone in Upper Northwest Branch. Key to the establishment of these land-cover-based watershed protection approaches was the County’s recognition of the importance of headwater stream systems. These systems provide the foundation for a stable flow of water, including through maintenance of groundwater recharge levels.
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.
Audubon Naturalist Society & Montgomery Countryside Alliance

What do we do?
Education
Advocacy
Stewardship
Citizen Science

ANS water quality monitors hunt for aquatic life to evaluate the health of streams in our region.
How Have We Helped Ten Mile Creek?

- 15 yrs. WQ monitoring
- Science Literature Research
- Organizing, outreach, advocacy
- Education of County leaders
- Video – communication
- Leading hikes in TMC
Conclusions

1) Land use and land cover affect water quality.

2) In order to implement the Council’s charge to protect Ten Mile Creek while allowing some development, the Limited MP Amendment must specify land cover conditions.

3) ESD measures and practices are necessary, but not sufficient to protect Ten Mile Creek, since ESD practices alone do not accomplish the land cover conditions required to maintain high quality streams.

3) The published science indicates that Ten Mile Creek needs:
   - Imperviousness limit set between 4% to 6% total watershed imperviousness
   - Specific subwatershed Imp. limits
   - Forest Cover Minima: 77% for the stream buffers and 50% for the overall watershed – for maintenance of an Excellent IBI score.
   - Limits on construction activities including cut-and-fill and terraforming
   - Protections of springs, seeps, zero-order streams

4) The science, policy, law, and experience are there. *What we need is the political will to do the right thing.*
Recommendations to the Montgomery County Water Quality Advisory Group

1. Support protecting Ten Mile Creek through science-based performance standards for development projects, including limits on imperviousness and construction, and minimum levels of forest cover.

2. Express this support via letters to PB, Council.
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