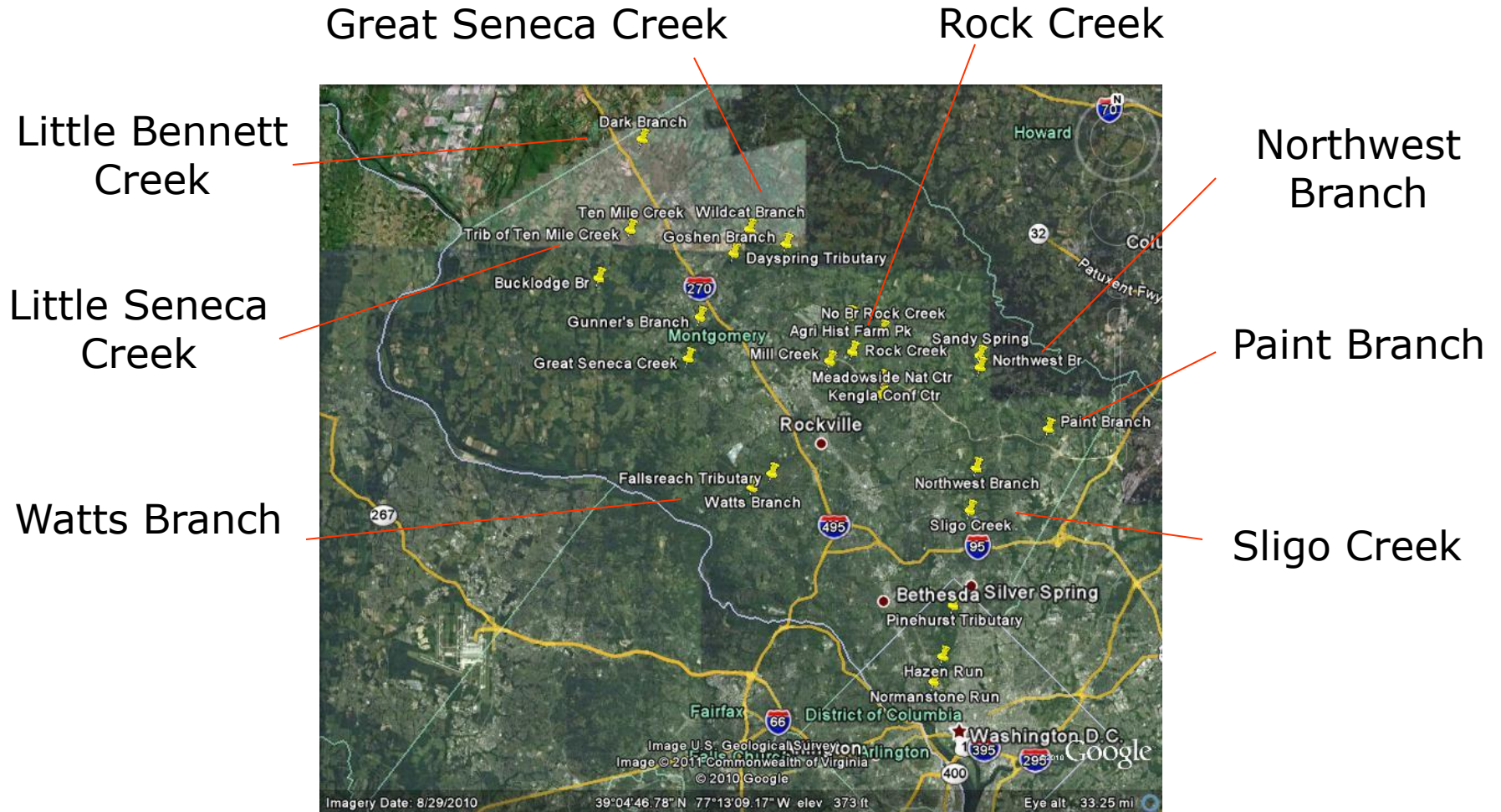
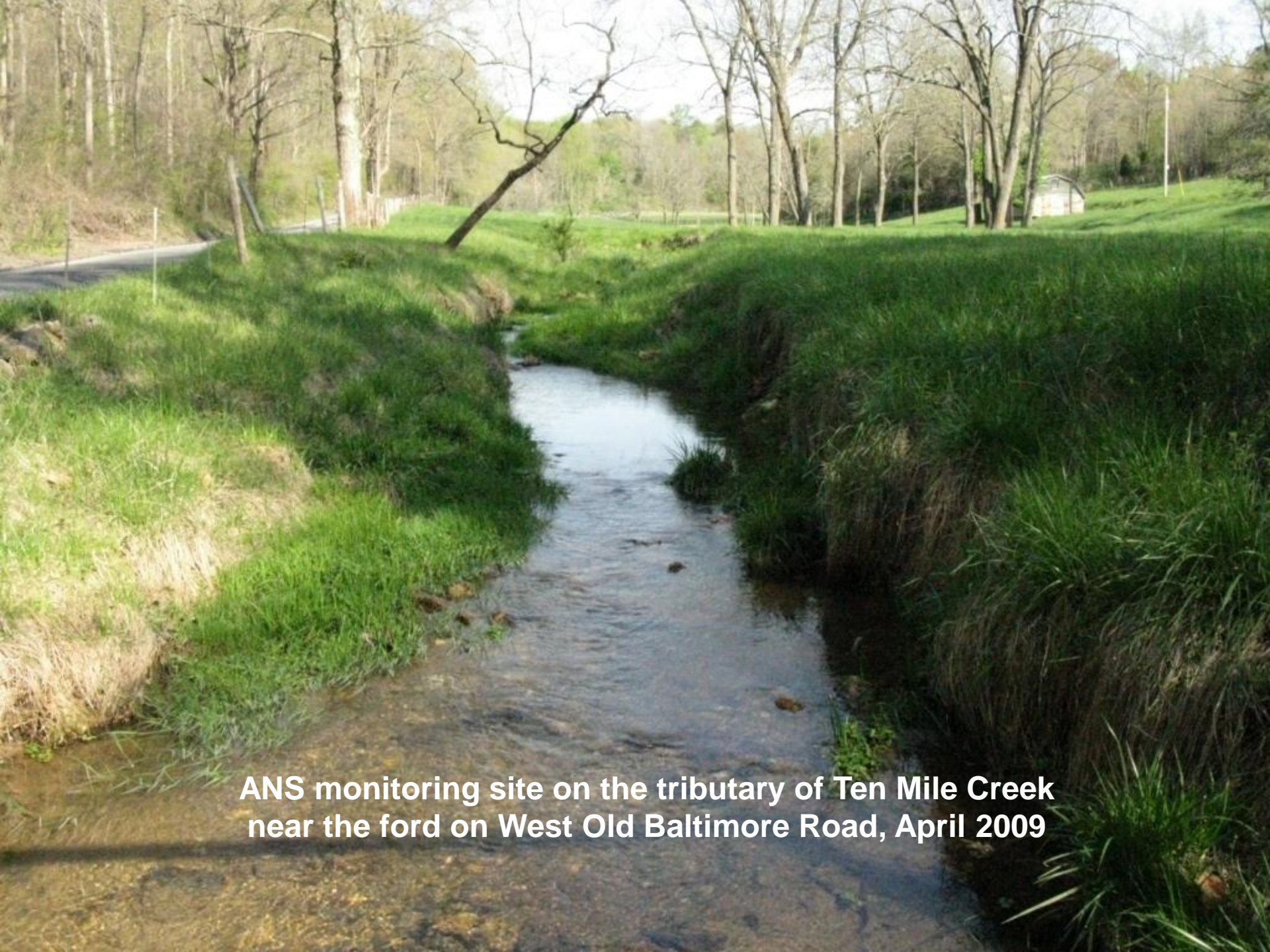


ANS Water Quality Monitoring Program 22 sites in 8 watersheds across Montgomery County





**ANS monitoring site on the tributary of Ten Mile Creek
near the ford on West Old Baltimore Road, April 2009**



ANS monitoring site on the mainstem of Ten Mile Creek, 2010



We find good diversity, great abundance, and sensitive organisms at Ten Mile Creek



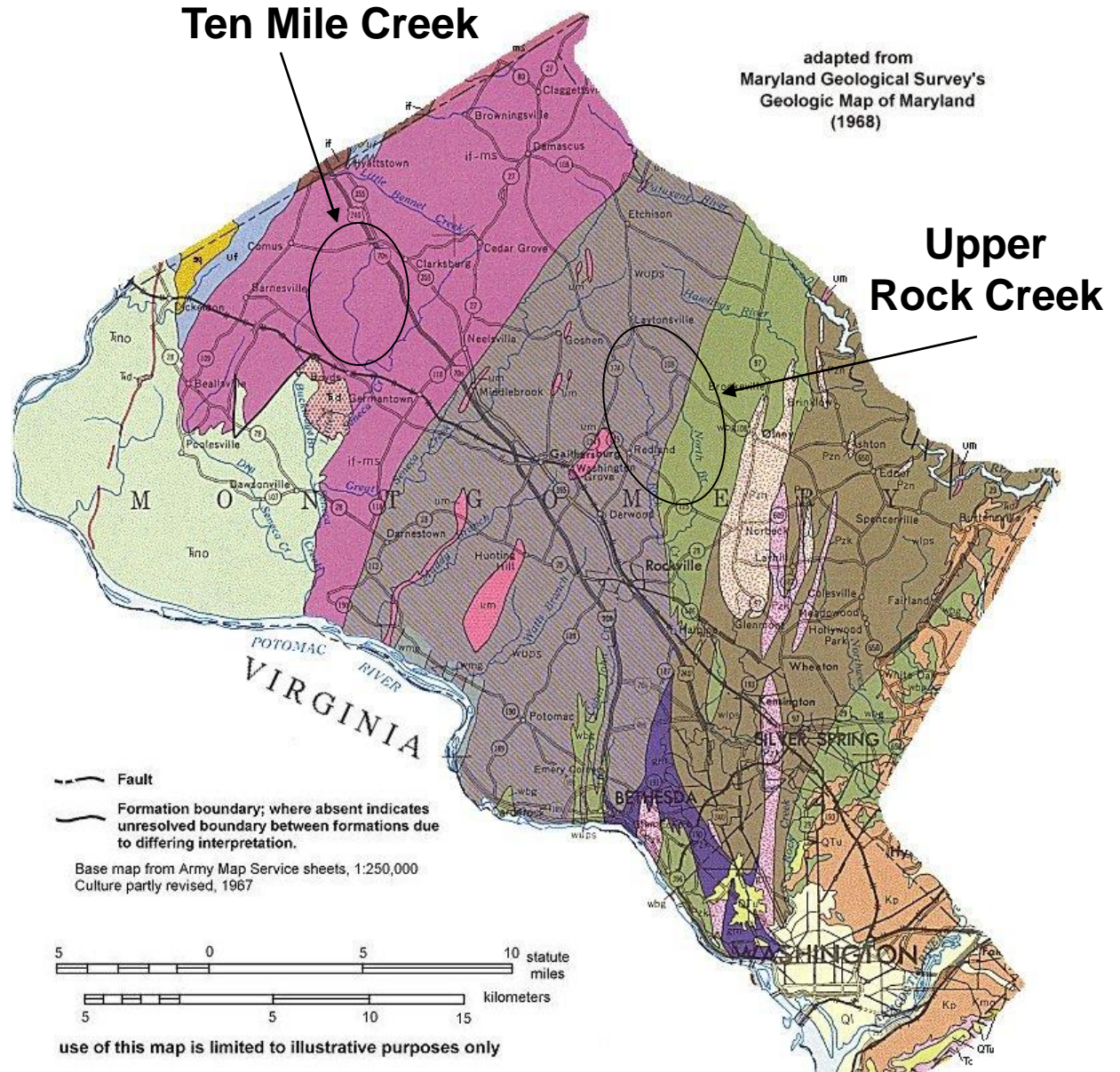
Some of the stoneflies and mayflies we find at Ten Mile Creek



Stream dwellers also depend on healthy, well-functioning forest ecosystems



The model uses Upper Rock Creek to estimate effects of development on Ten Mile Creek, but the watersheds are in different geological zones, have different soils, and very different topography





**ANS monitoring site at
Muncaster Mill Road**

Upper Rock Creek

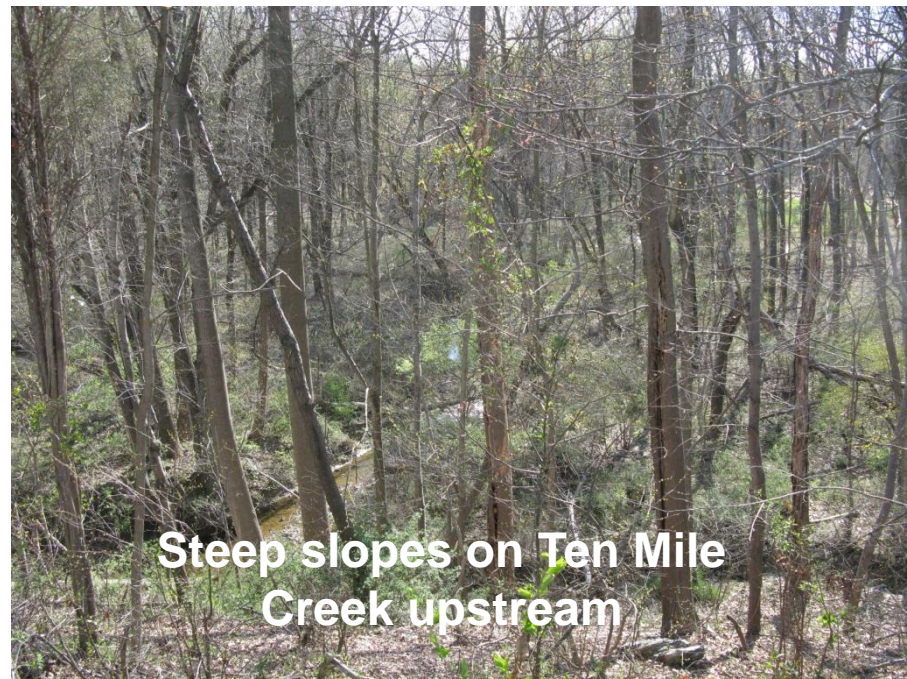


**ANS monitoring site on the
mainstem of Ten Mile Creek**

Ten Mile Creek

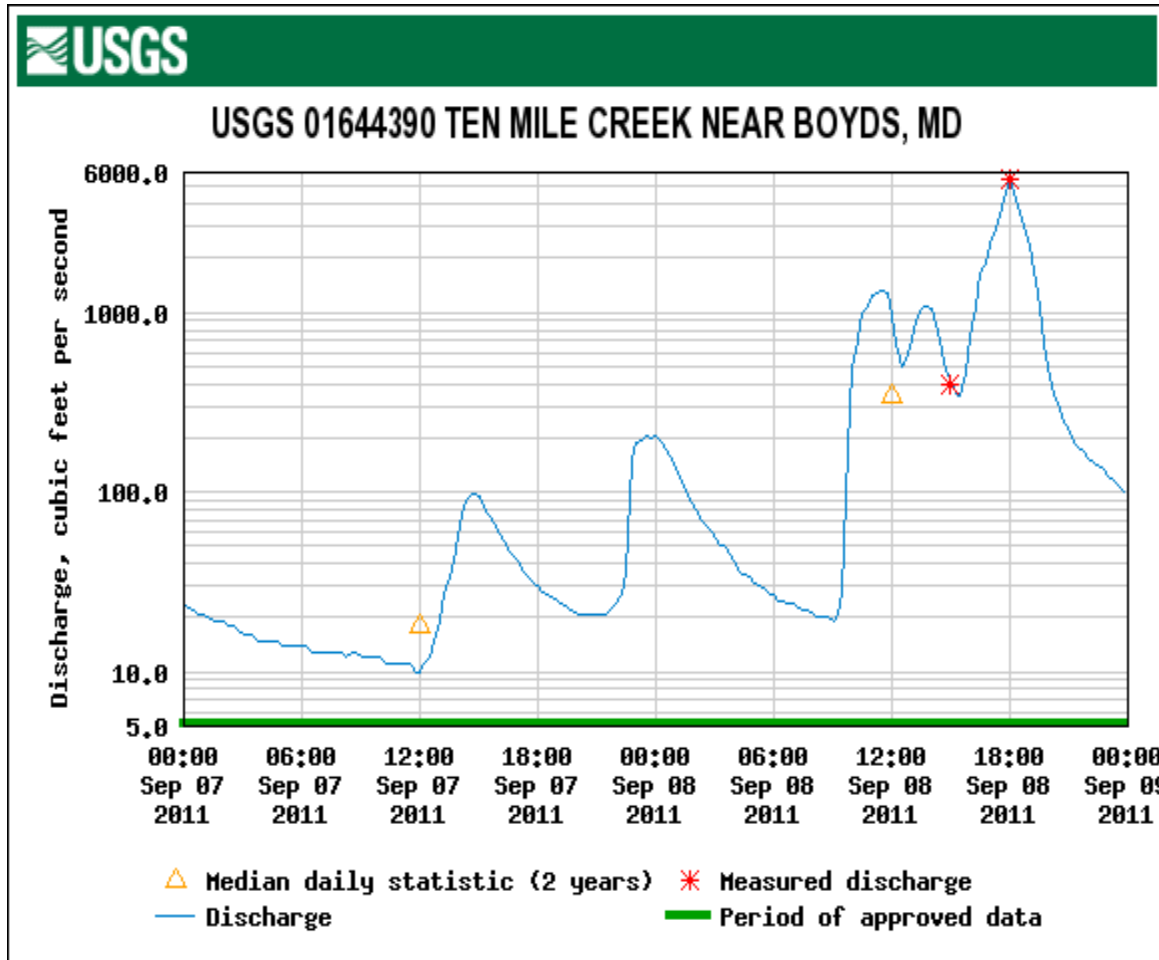


**ANS monitoring site at
Agricultural History Farm Park**



**Steep slopes on Ten Mile
Creek upstream**

Tropical Storm Lee



- Peak discharge of 5,520 cfs
- USGS stream gage overtopped
- 5'-high flood in Mease pasture and Black Hill RP
- “Highest flood since Hurricane Camille”
- Decades-old pasture fence and cattle guard washed away
- Damage to W. Old Baltimore Road
- Banks of both ANS monitoring sites washed out ; massive deposition at both monitoring sites

Effect of Tropical Storm Lee on ANS Ten Mile Creek mainstem site (near LSTM 303B)

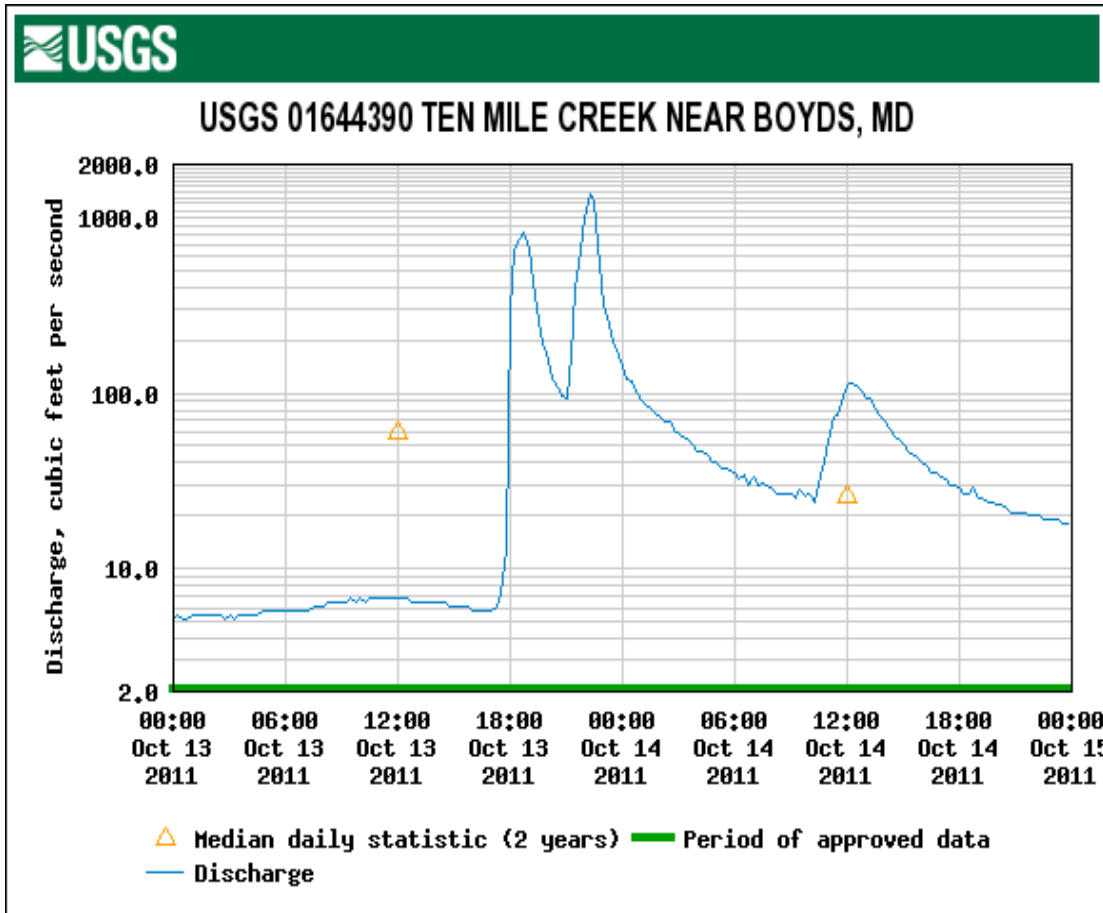


Flood debris on branches 5' above stream bank



Sediment of cobbles, gravel, and sand deposited on the right channel around the island, choking it off

Storm on October 12-13, 2011



- 2.5” of rain, slightly smaller than a 1-year storm

- Rain started at 21:45 on October 12

- 1.17” fell from 16:00-16:55 on October 13

- 0.97” fell from 19:35-20:30 on October 13

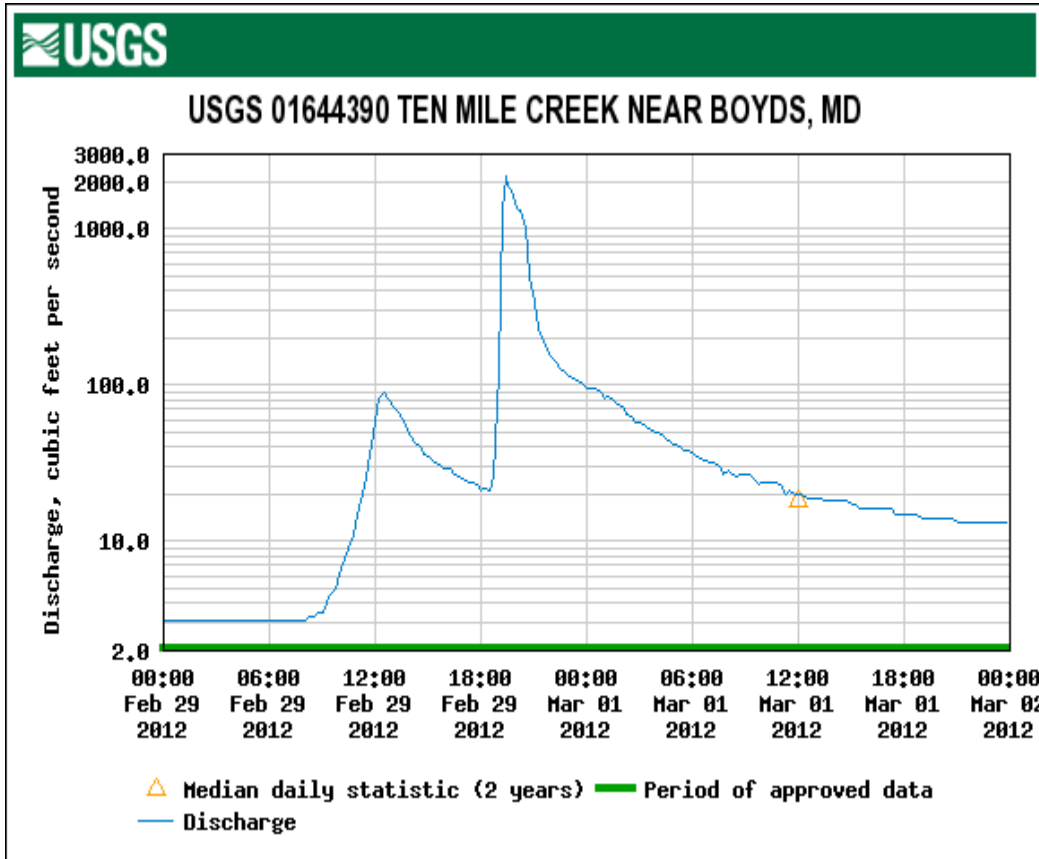
Effect of October 12-13, 2011, storm on ANS Ten Mile Creek tributary site (LSTM 204)



- Banks washed out, undercut; sediment deposited downstream
- Berm between stream and road washed out
- 30” deep pool in the ford – a Mercedes was submerged in it for 3 hours



Storm on February 29, 2012



- 2” rain – less than a “1-year storm”

- 4 stormwater ponds along Rt. 355 were overtopped

- USGS stream gage recorded rise in discharge from 119 cfs to 2,180 cfs in 25 minutes

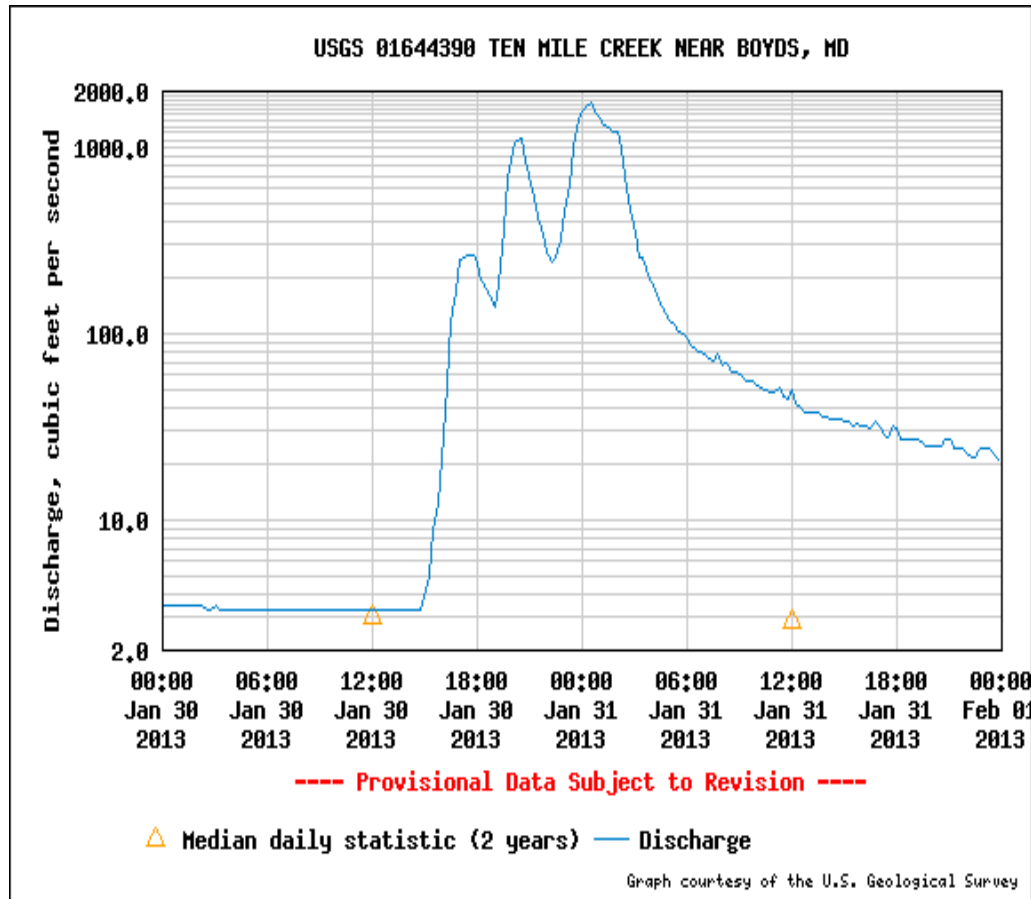
- 5'-flood in Mease pasture and Black Hill Regional Park

- Damage to W. Old Balto Rd. and foot trail in Black Hill Park



**Floodwaters covered the bridge in Black Hill Regional Park
The footpath had to be rebuilt**

Storm on January 30-31, 2013 (greater than a 2-year storm)



- 5.08” of rain fell in 2 waves
- Peak discharge of 1,760 cfs
- Mainstem “went on a rampage” at Norman Mease’s farm
- Massive amounts of sediment deposited around the island in the mainstem
- The tributary did not rise at all, but flooding from the mainstem washed out the banks of the tributary and widened it
- The road was damaged
- The tributary is now <2’ from W. Old Baltimore Road



Deposition around the island and in the pool



Right channel around the island is now filled with sediment

Effects of January 30-31, 2013 storm



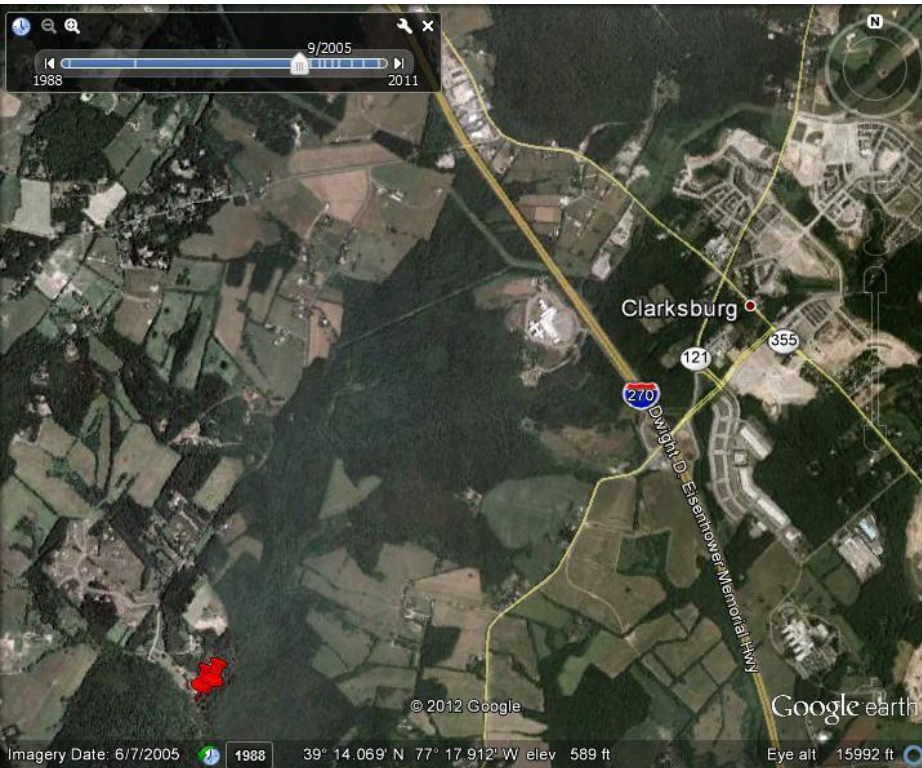
Tributary widened, now very close to road



Dead pickerel frog

Development in Clarksburg, 2005-2011

Development of Stringtown Road and Snowden Farm Parkway began in 2006, followed by Woodcrest and Gateway Commons (2007-2010) and the widening of route 355 (fall 2012)



Watershed mostly forested in 2005

