Paired Watershed Experiments in the Piedmont of North Carolina
Hill Demonstration Forest

Background:
In 2007, the USDA Forest Service partnered with North Carolina State University, North Carolina Forest Service, and North Carolina Department of Agriculture and Consumer Services to refine what we understand about forestry best management practices (BMPs) and hydrological processes in small headwater catchments in the Piedmont of North Carolina. Our studies have resulted in important discoveries in forest hydrology in this region. We found forest vegetation plays a more significant role in affecting water balances and mean nitrate peak concentrations in this region than either the coastal plains or mountains due to the unique climate and topography in the Piedmont. In addition, when BMPs are used properly they are effective at protecting water quality in the region.

However, the question regarding the effects of species conversion on hydrological processes in Piedmont forests remains an open one. In addition, the amount of water loss (transpiration rate) by specific trees at the watershed scale is less understood in the Piedmont than in other areas.

Ongoing Research:

- Variability of tree transpiration along a soil moisture gradient
- Transpiration by common trees in North Carolina
- Converting hardwood stand to pine stand reduces water yield in watersheds in North Carolina
- Storm hydrologic characteristics in forested watersheds
- Storage, Reactivity, and Bioavailability of Mercury in Managed Forests

Completed Studies:

- Boggs, Johnny; Sun, Ge; McNulty, Steven. 2017. The effects of stream crossings on total suspended sediment in North Carolina Piedmont forests. Journal of Forestry: 12 pages. DOI:10.5849/jof.2016-059 (PDF)
- Boggs, J., G. Sun, and S. McNulty. 2015. Effects of timber harvest on water quantity and quality in small watersheds in the Piedmont of North Carolina. Journal of Forestry 114(1):27-40 (PDF)
- Boggs, J., G. Sun, J.-C. Domec, S.G. McNulty, and E. Treasure. 2015. Clearcutting upland forest alters transpiration of residual trees in the riparian buffer zone. Hydrological Processes 29:497-499 (PDF)
- Dreps, C.; James, A.L.; Sun, G.; Boggs, J. 2014. Water balances of two Piedmont headwater catchments: implications for regional hydrologic landscape classification. Journal of the American Water Resources Association 50(4):1063-1079(PDF)

- Boggs, Johnny; Sun, Ge; Jones, David; McNulty, Steven G. 2013. Effect of soils on water quantity and quality in Piedmont forested headwater watersheds of North Carolina. Journal of the American Water Resources Association (JAWRA) 49(1):132-150 (PDF)

- Boggs, J.L.; Sun, G.; McNulty, S.G.; Swartley, W.; Treasure E.; Summer, W. 2009. Temporal and spatial variability in North Carolina piedmont stream temperature. In: AWRA 2009 Spring Specialty Conference 7p (PDF)

- Boggs, J.L.; Sun, G., Summer, W.; McNulty, S.G.; Swartley, W.; Treasure, E. 2008. Effectiveness of streamside management zones on water quality: pretreatment measurements. In: AWRA Summer Specialty Conference June 30 - July 2: 1-6 (PDF)