

Monthly Water Budgets at Panola Mountain Research Watershed, Georgia with some Implications for Climatic Change

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Reference: McDowell RJ, CA Pruitt, RA Bahn (eds.), *Proceedings of the 2015 Georgia Water Resources Conference*, April 28-29, 2015, University of Georgia, Athens.

Abstract. Seasonal climatic variations have a pronounced effect on watershed water budgets in Georgia; in winter, a large portion of precipitation recharges ground-water while in summer, much is evapotranspired. Monthly water budgets were estimated at Panola Mountain Research Watershed, a small 41-hectare forested watershed near Atlanta, Georgia, from 1985 through 2011 to quantify the effects of climatic variability. A watershed storage-base flow relation was developed by combining a stream base flow-recession analysis with a watershed water budget. Through this, storage was calculated from base flow and actual evapotranspiration (ET) was estimated by differences in the remaining components of the water budget. Actual ET averaged 40 mm/month during the dormant season (November – February) and 88 mm/month during the growing season (April – September). Average monthly storage increased by 27 mm/month during the dormant season and declined by 14 mm/month during the growing season. Variation in base-flow storage ranged 430 mm over the study period, with an average interannual range of 247 mm. Annual water yields—the proportion of stream runoff to precipitation—ranged from 9.7-46%. Water limited conditions for vegetative growth were identified by periods when potential ET greatly exceeded actual ET and typically occurred during the late summer months when precipitation and storage were both low. Variability in precipitation and watershed storage led to large inter-annual fluctuations in water budgets, and demonstrate possible impacts of climatic changes in the seasonal quantity of precipitation and the frequency and duration of droughts on water budgets and water availability.