

# ECOHYDROLOGY OF A FLOODPLAIN FOREST: RELATIONSHIPS BETWEEN VEGETATION AND GROUNDWATER RESOURCES AT CONGAREE NATIONAL PARK, SOUTH CAROLINA USA

Timothy Callahan, Lauren Senn<sup>1</sup>

The goal of this project was to investigate the relationship between the shallow, unconfined aquifer and woody vegetation at eight sites of the Congaree Observation Well Network at Congaree National Park near Hopkins, South Carolina. Eight piezometers with screens of 1.5-m length (top-of-screen depths ranging from 3.0 to 5.0 m below ground surface) along a 1.8-km cross-valley transect from the foot of a fluvial terrace and terminating near Cedar Creek in the national park. Time series data of groundwater level and temperature have been collected with automated data loggers in the piezometers since 2009. Groundwater response to storm event data from a nearby weather station was used to approximate specific yield of the sub-soils and sediments of the aquifer. White's Method was used to analyze diurnal ET signals for select periods during 2009-2012. Vegetation surveys focused on woody shrub and canopy species growing within a 400 m<sup>2</sup> plot centered on each well. Metrics included basal area index (BAI), biodiversity, and relative abundance. Gross ET estimates ranged from 0.2 to 10 mm per day, depending on season. Vegetation composition was typical of floodplain forest associations as previously described for the site; however, ET and BAI were not correlated. Alternative explanations include the following: 1) local topographic changes in the form of hummocks and hollows may influence groundwater flow; 2) hydrostratigraphic variation may influence the ET signal more than the local vegetation; 3) the effects of local vegetation can only be measured with larger plots. Qualitative analysis of LIDAR elevation data collected along the piezometer transect suggest there may be some relation between hummocks (small hills) and vegetation, but more refined data are needed to quantify this association. We will present extrapolated estimates of ET across the entire floodplain portion of the park and discuss the uncertainties of such data. The details of groundwater dynamics are not well understood in the Congaree River Valley, and neither are the relative scale of evapotranspiration (ET) in the water budget and our intention is provide baseline data for future research, along with information that could help develop management guides for flood control and predictions in these types of watersheds.

<sup>1</sup>Timothy Callahan, Associate Professor, College of Charleston, Charleston, SC 29424

Lauren Senn, Student, Graduate Program in Environmental Studies, College of Charleston, Charleston, SC 29424

*Citation for proceedings:* Stringer, Christina E.; Krauss, Ken W.; Latimer, James S., eds. 2016. Headwaters to estuaries: advances in watershed science and management—Proceedings of the Fifth Interagency Conference on Research in the Watersheds. March 2-5, 2015, North Charleston, South Carolina. e-Gen. Tech. Rep. SRS-211. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 302 p.