AWRA 2011 ANNUAL WATER RESOURCES CONFERENCE
Albuquerque, New Mexico
November 7-10, 2011

URBAN FLOODPLAIN MANAGEMENT: IMPROVING PROCESS UNDERSTANDING OF URBAN BOTTOMLAND HARDWOOD FORESTS

Jason Hubbart *

ABSTRACT: Despite interest in restoration of wetland ecosystems, there is little guidance for rehabilitation of forested urban floodplains. Bottomland hardwood forest (BHF) conversion in the 19th and 20th centuries drastically altered the hydrology of streams, floodplains, and remnant BHF. Previous floodplain conversion coupled to urbanization often results in increased frequency of peak flows, altered microclimates and reduced biodiversity. Stream channels typically broaden and deepen leading to increased channel instability, accelerated erosion, and loss of floodplain function. This study provides baseline data describing urban floodplain woody vegetation and soil characteristic relationships in lower Hinkson Creek, a 303(d)-listed impaired stream located in Columbia, Missouri. A case study was initiated in the spring of 2010 comparing a remnant BHF and an agricultural floodplain site. The study design included 120 m^2 grids to measure leaf area index (LAI, BHF=3.1), surface infiltration capacity, and soil characteristics by the soil core method at depths of 0, 15, 30, 50, 75 and 100 cm (n = 302). Dominant tree species composition, basal area, and leaf area index (LAI) of the bottomland hardwood forest (BHF) site was quantified. 372 mm of precipitation fell from July 1 to August 31 2010 in Columbia, which received more than 1346 mm of precipitation in 2010. Results indicate average dry bulk density (n=150) was 1.10 (SD = 0.10) and 1.03 (SD = 0.10) in agricultural and BHF sites, respectively. Porosity (n=150) was 0.56 (SD = 0.04) and 0.59 (SD = 0.04) in agricultural and BHF sites, respectively. Average infiltration capacity was 44 cm/hr (SD = 38 cm/hr) and 59 cm/hr (SD = 54 cm/hr) in agricultural and BHF sites, respectively. Depth integrated calculations of equivalent depth of soil water (EDSW) were significantly different (CI = 99%) 33.3 cm/m (SD = 2.24 cm/m) and 36.9 cm/m (SD = 2.68 cm/m) in the agricultural and BHF sites respectively. Results demonstrate the potential benefit of sustaining or re-establishing floodplain forests to enhance storage capacity, attenuation, and consumptive water use, thus reducing flooding and mitigating stormwater runoff problems in rapidly developing urban environments.

* Assistant Professor of Forest Hydrology, University of Missouri, 203-Q ABNR Building, Columbia, MO 65211 USA, Phone: 573-884-7732, Email: hubbartj@missouri.edu