

Report as of FY2006 for 2006VA105G: "Grant No. 06HQGR0189 Microtopography Effects on Vegetative and Biogeochemical Patterns in Created Wetlands: A Comparative Study to Provide Guidance for Wetland Creation and Restoration"

Publications

- unclassified:
 - None

Report Follows

Progress report for USGS

Changwoo Ahn, PI
Environmental Science and Policy
George Mason University

This project involves two-year study of four created wetlands with varying ages, namely Loudoun County Mitigation Bank (LCMB), North Fork mitigation bank, Bull Run mitigation bank, and Airlie wetland, and a reference natural wetland at Battlefield Park, all in northern Virginia. It includes the study of microtopographic variability, soil biogeochemistry, and vegetation characteristics. For the first growing season of the study period, the study began at the newest created wetland – the LCMB – in May 2007.

Site description

The construction of the LCMB, which involved grading and disking using heavy machineries, was started in July and completed in August 2006. Hydro seeding of hydrophytic plants seed-mix within the wetlands and planting of woody vegetation within the wetlands and upland buffers were completed by December 2006. The LCMB is located in Loudoun County, Virginia in the floodplain of Goose Creek and Big Branch, a tributary of Goose Creek, and covers an area of 35 acres on a 200-acre parcel of wetlands bank easement owned by others. This site encompasses 9.5 acres of palustrine-forested wetlands, 4 acres of enhanced and preserved existing wetlands, 11 acres of reforested uplands, and 7.5 acres of preserved existing forest.

Experimental design

The LCMB is comprised of three wetland cells; however, this study is performed in cells: 1 and 2 (Figure 1). Six 10m x 10m plots are laid out in each cell; three plots were disked by heavy machinery while three plots remained undisked prior to seeding (hydrophytic vegetation) and planting (woody vegetation) (Figure 1). Each disked plot is laid adjacent to the undisked plot to reduce variability in other environmental variables as much as possible. All plots are permanently marked.

Microtopography

Microtopography measurements were taken in all the 12 study plots using a Sokkia SET4110 total station between mid-May and mid-June 2007. The total station measures three-dimensional coordinate positions with sub-millimeter precision on elevation measurements at the distances used (Sokkia Co., 1997). Field measurements were taken along a set of tangentially-conjoined circular transects; these were laid out as 0.5m-, 1m-, 2m-, and 4m- diameter using crosslinked polyethylene (PEX) tubing hoops. Each set of circular transects was randomly placed within the 10m x 10m plots; however, transects were always laid out to have first reading (0 cm) in south direction to maintain consistency (Figure 2). Measurements were taken at 10 cm intervals along the 0.5m-, 1m-, and 2m- diameter circular transect paths, and at 20 cm intervals along the 4m- diameter circular transect path. Coordinate data were recorded to the nearest millimeter. Field measurements within all plots were performed during relatively drier period, except plots D and DD which were in saturated soil conditions. Care was taken not to disturb the microtopography along these circular transect paths.

Other study sites

Microtopography measurements also began at the North Fork Mitigation bank – a created wetland at seventh growing season. The North Fork Mitigation Wetland Bank is located in Prince William County, Virginia. Created in the pastureland, this wetland mitigation bank includes 7 acres of open water, 76 acres of wetlands and 42 acres of upland buffer. This wetland includes a “Main Pod”, overbank flow area, four tiers, and vernal pools (Figure 1), and is mainly dependent on Broad Run stream, precipitation, and surface runoff for its hydrology. Six 10m x 10m plots are laid out in this site: 4 in the Main Pod and 2 in the vernal pool.

Microtopography measurement is expected to be completed in all sites, including Bull Run mitigation bank (4 plots), Airlie wetland (4 plots), and Battlefield Park reference wetland (4 plots) by the end of June 2007. Fieldwork pertinent to vegetation and soil for this growing season is expected to be completed for all sites in July and August.

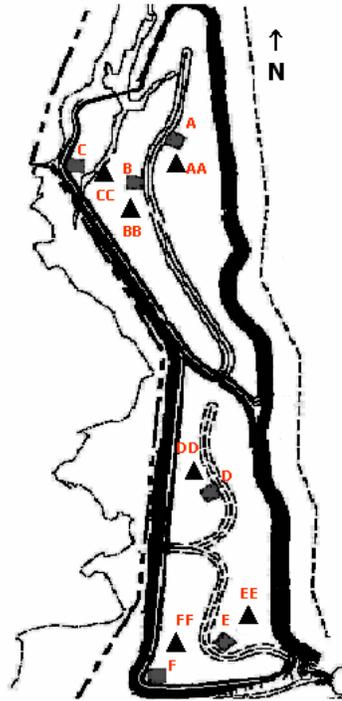


Figure 1. Permanent plot (10m x 10m) locations for microtopography study in cell 1 and cell 2 at LCMB. Each cell has 3 disked and 3 nondisked plots, totaling 12 plots. Triangles (AA-FF) are disked and squares (A-F) are nondisked.

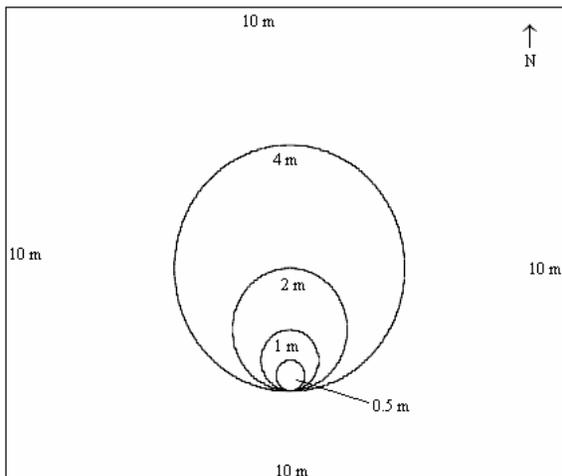


Figure 2. Nested circular transect layout. Plot size and transects diameters indicated.

