

DENITRIFICATION RATES AND ASSOCIATED SOIL CHARACTERISTICS OF WETLANDS CREATED ON OXIDIZED AND REDUCED MINE SPOIL IN EAST TEXAS

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Recovery of wetland function is the primary goal of wetland creation and restoration. Denitrification is a wetland function and part of the nitrogen (N) biogeochemical cycle in which nitrate (NO_3^-) and nitrite (NO_2^-) forms of N are converted to gaseous forms and lost to the atmosphere. Measurement of denitrification rate may therefore be an important tool for evaluating wetland function. This study examines denitrification rates and associated soil variables on wetlands created after lignite mining in East Texas. Wetlands created on four foot haul-back and mixed overburden mine spoil were selected as study sites. Soil cores were removed from recently-created (age 4-8 years), older-created (age 10 years) and reference (natural) wetlands. Denitrification was quantified using an acetylene (C_2H_2) inhibition/gas chromatography method. Soil texture, pH, total-N, NO_3^- , cation exchange capacity (CEC), total phosphorus (P), volumetric water content and organic matter (OM) content were also measured. Soil character varied by spoil type and by age. Denitrification rate did not differ among wetlands and ranged from $0.2 \text{ kg N ha}^{-1} \text{ yr}^{-1}$ to $105 \text{ kg N ha}^{-1} \text{ yr}^{-1}$. Older-created and recently-created wetlands on oxidized and reduced mine spoil had denitrification rates similar to natural wetlands. Denitrification potential ranged from $23 \text{ kg N ha}^{-1} \text{ yr}^{-1}$ to $302 \text{ kg N ha}^{-1} \text{ yr}^{-1}$ and varied by spoil type. Denitrification appears to function as well in wetlands created on mine spoil as in natural wetlands.

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