Nutrient Loading Via Atmospheric Deposition To Marine Corp Base Camp Lejeune (MCBCL), Jacksonville, NC

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The goal of this project was to quantify the spatial and temporal scale of nutrient loading from wet and dry deposition to terrestrial and aquatic ecosystems within the confines of MCBCL. This effort is part of the Defense Coastal/Estuarine Research Program (*http://dcerp.rti.org/*) funded by the DOD Strategic Environmental Research and Development Program, to identify significant ecosystem stressors and develop conceptual/mechanistic ecological models that lead to effective management for the long-term sustainability of military training. Four battery-powered approved Mercury Deposition Network collectors located across MCBCL were used to determine the weekly composition of rainfall. Spatial patterns in weekly rainfall amounts were determined using manual rain gauges and tipping-bucket gauges. Throughfall collectors under the three dominant forested canopies were used to provide an indirect estimate of dry deposition. On an annual basis, relative standard deviation of rainfall amounts were < 10% across MCBCL for 2009 (1730 mm) and 2010 (1560 mm). From July 2009 to December 2010, wet deposition of total N was ~ 8 kg N/ha. Only Na and Cl demonstrated gradients in wet deposition amounts, decreasing moving away from the ocean (36 kg Cl/ha, 19 kg Na/ha) to the furthest point inland (25 kg Cl/ha, 14 kg Na/ha). On an annual basis (October 2009 – November 2010), total N (6-8 kg N/ha/yr) reaching the forest floor is ~ 2x wet deposition, ~55% of which is organic-N. Chloride, Na and sulfate (SO4) demonstrate substantial inputs via dry deposition (64 kg Cl/ha/yr, 50 kg Na/ha/yr, 46 kg SO4/ha/yr). Comparison of wet deposition amounts to a nearby National Trend Network (NTN) collector (NC29; Hofmann Forest, NC) indicated close agreement in seasonal trends of deposition amounts for inorganic N species. Use of thymol as a preservative resulted in 50-80% of inorganic N in rainfall as ammonium-N. Results from this project, and historical NTN deposition records, indicate that wet deposition has contributed ~ 250 metric tons of total N per year to terrestrial and aquatic ecosystems at MCBCL. Under forested canopies, total N reaching the forest floor essentially doubles to ~ 500 metric tons of total N per year.

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