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## Photochemical and Microbial Transformations of Dissolved Organic Matter in Temperate Streams Associated with Land Use: Molecular Characterization Using Fourier Transform Ion Cyclotron Resonance Mass Spectrometry

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In order to better understand the effects of watershed land use on streamwater dissolved organic matter (DOM), we analyzed DOM from headwater streams draining forest-dominated watersheds (FW) and pasture-dominated watersheds (PW) in the lower Chesapeake Bay region (Virginia, USA). Using Fourier Transform Ion Cyclotron Resonance Mass Spectrometry (FTICR-MS), streamwater DOM was analyzed before and after three different 15-day laboratory incubations: 1) dark, bacterial-only treatment, and 2) bacteria-free light-only treatment, and 3) combined light+bacteria treatment. Non-polar low-molecule-weight (LMW) DOM was selected using C<sub>18</sub> extraction prior to FTICR-MS analysis. Preliminary data show that: 1) the relative abundance of aromatic compounds and black carbon in LMW DOM was greater in FW streams than in

PW streams, whereas the relative contribution from aliphatic compounds was ~18% lower in FW streams than in PW streams; 2) bacterial alterations decreased the relative abundances of aromatic and aliphatic compounds; and 3) aromatic compounds showed a decrease in relative abundance under the influence of photochemical processes, while aliphatic compounds showed an increasing relative abundance. Collectively, our findings show the importance of watershed land use in determining the molecular composition of streamwater DOM and how this composition is altered by light and bacteria.

**Key words:** Watershed, Land Use, DOM, FTICR-MS, Photochemistry, Bacteria

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