

DETERMINING ATMOSPHERIC DEPOSITION INPUTS TO TWO SMALL WATERSHEDS AT ACADIA NATIONAL PARK

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Two small upland watersheds have been gauged and monitored at Acadia National Park since 1998. Cadillac Brook watershed burned in a wildfire in 1947. Hadlock Brook watershed has been undisturbed for several centuries, and serves as the reference site. Precipitation and throughfall volume and chemistry data have been collected using wet-only and continuously open collectors. Hydrologic and chemical inputs to the sites have been determined for each site.

Differences in watershed and vegetation characteristics control the input of water and major ions to these watersheds. Vegetation type was the dominant control on enhancement of precipitation across the heterogeneous watersheds. Relative annual enhancement of throughfall over wet-only deposition for coniferous stands at Hadlock was 2.0 for NH_4 and NO_3 , 2.7 for SO_4 , 7.1-7.3 for Cl and Na, 6.8 for Ca, 92 for Mg, and 58 for K. Enhancement was similar for mixed stands, intermediate for deciduous stands, and lowest (except Cl and Na) at scrub and open sites. At Cadillac, enhancement was slightly lower for each ion, but the same pattern, coniferous \approx mixed $>$ deciduous $>$ scrub/open, was observed. Seasonal differences were important, with highest deposition in fall and summer; however, wet deposition inputs of Cl and Na were highest in winter.

Elemental stream flux was calculated using discharge data from the U. S. Geological Survey, combined with periodic water chemistry data. The chemical mass balance in the watersheds was determined from stream outputs minus wet inputs, where negative values indicate retention within the watershed. At Cadillac and Hadlock, H, Mg, K, NH_4 , and NO_3 are retained; Ca and SO_4 are lost. Retention of DIN (NO_3 plus NH_4) was 96% at Cadillac and 72% at Hadlock, indicating that differences related to vegetation and/or soils control the relative patterns of retention and release.