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Within Canopy Evapotranspiration Processes and Controls within a Western Boreal Plain Aspen Forest, Alberta, Canada

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The Western Boreal Plain (WBP) of North Central Alberta consists of a mosaic of wetlands and aspen (*Populous tremuloides*) dominated uplands. This region operates within a moisture deficit regime where precipitation (*P*) and evapotranspiration (*ET*) are the dominant hydrologic fluxes. Upland *ET* was characterized over three scales during the 2005 and 2006 snow-free seasons. Above canopy (ET_C) and within canopy (ET_B) were examined using the eddy covariance (EC) technique situated at 25.5 m (7.5 m above crown) and 4.0 m above the ground surface respectively. Soil evaporation (E_S) was examined using a closed dynamic chamber system to gather data on surface evaporation for upland soils. ET_C and ET_B were controlled primarily through atmospheric demand (VPD) while ES was controlled by soil moisture (θ). During peak growth periods ET_C averaged 3.08 mm d^{-1} and 3.45 mm d^{-1} in 2005 and 2006 respectively while ET_B averaged 1.56 mm d^{-1} and 1.95 mm d^{-1}. ES was consistent across both snow-free seasons and averaged 0.28 mm hr^{-1} in 2005 and 0.31 mm hr^{-1} in 2006. The nature of *Populous tremuloides* canopies permits ample energy availability within the canopy during the early season green up periods which promotes the development of a lush understory consisting of *Rosa acicularis* and *Viburnum edule*. ET_B fluxes were equal to or greater than the ET_C fluxes once understory development had occurred. Upon crown growth ET_B fluxes were reduced as a reduction in available energy existed. ET_B fluxes ranged from 42 to 56% of ET_C fluxes over the remainder of the snow-free seasons. Vapour pressure deficit (VPD) and soil moisture (θ) displayed strong controls on both ET_C and ET_B fluxes. ET_C fluxes responded to precipitation events as the developed crown intercepted and held available water which contributed to peak ET_C fluxes following precipitation events >10 mm. This indicates the importance of interception in aspen dominated forest canopies of the WBF.