Vegetation water use in the riparian zone of WS1

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The objectives of our study were 1) to measure and compare summer water use of a dominant angiosperm (red alder, *Alnus rubra*) and gymnosperm (Douglas-fir, *Pseudotsuga menziesii*) in WS 1, and 2) to estimate summer water use by all woody vegetation in the riparian zone, which we defined as a 100m strip centered on the stream. This defined a 12.7 ha study area. We tested the following hypotheses: 1) Maximum water use by red alder (per unit sapwood area) is greater than Douglas-fir, 2) Diurnal variation in sapflow is greater for Douglas-fir than for red alder, and 3) Water use by red alder relative to Douglas-fir should increase through the growing season as atmospheric humidity decreases. We continuously monitored sapflow in seven red alder and seven Douglas-fir from July 1-Sept. 8, 1999 using Granier sensors. The trees were typical of the age and size range for these species in the riparian zone. Average daily sapflow was 1074 kg m⁻² sapwood day⁻¹ and 759 kg m⁻² sapwood day⁻¹ for the red alder and Douglas-fir, respectively. There was no pronounced difference in the diurnal flux patterns between the two species. Average daily sapflow decreased for both species between July and September, but the decrease was much more pronounced for the conifers. To scale water use from our measured trees to the entire riparian area, we established a set of measurement plots in transects normal to the stream bed. In each plot we tallied the species, height, DBH and sapwood depth for every tree over 1 cm DBH, and from these data we estimated the distribution of vegetation and sapwood basal area throughout the study area. The estimated total sapwood basal area was 6.8 and 14.0 m² ha⁻¹ for broadleaf and coniferous species, respectively. Assuming that the water use of red alder and Douglas-fir were representative of these functional groups, we estimated that the broadleaf vegetation averaged 0.73 mm day⁻¹ water use and the conifers averaged 1.06 mm day⁻¹, for a total of 1.80 mm day⁻¹ through the measurement period. Conifers used approximately 65% of the total transpired water in early July; this dropped to about 55% in late August.