Wood dynamics in Rocky Mountain streams over 8 years

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Abstract. A monitoring study begun in 1996 is designed to evaluate mobility of wood in 5 channel reaches in Rocky Mountain streams. Only sites with no timber harvest for at least 50 years were included in the study, although one site had a forest fire in 1977. Each channel reach is 40-70 m in length. Initial surveys included channel dimensions and orientation of each piece of wood within the reach. Annual re-surveys then focused just on the wood. Range of values for channel parameters are as follows: bed gradient (0.013-0.096 m/m), bankfull discharge (0.64-3.90 m^3/s), D_{50} (12-22 cm), and wood loading (no. pieces/m^2 channel; 0.02-0.36). Total pieces of wood within each channel reach vary from 11 to 73. Minimum piece size for wood to be measured was 1 m in length and 5 cm in diameter. Average diameter of 16 cm varied little between sites. Each wood piece was categorized as a bridge (resting on both banks; mean length 6.9 m), ramp (resting on one bank; mean length 3.6 m), sunken (partially buried in streambed; mean length 2.2 m), or floater (unattached to bed or banks; mean length 2.7 m). Average yearly mobility (no. of mobile pieces/total no. pieces) ranged from 19% to 32%; this can also be expressed as an average residence time of 3-5 years per piece of wood. Estimates of average yearly mobility from previous studies in comparable channels include 0.8% to 31% for California's Sierra Nevada, 18% in Wyoming, and 18% in northwest Washington. No significant correlations were found between wood mobility by channel reach averaged over the period of the study, and the potential control variables of R/D_{84}, shear stress, channel width, bed gradient, average wood loading, and average bankfull discharge. Annual wood mobility within each reach did not correlate with annual bankfull discharge or wood loading. Wood mobility by piece type indicates that ramps and floaters are significantly more mobile than bridges and sunken pieces. These results indicate that piece mobility is predominantly a function of piece orientation, rather than piece length, piece diameter, or flow and channel parameters.