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The influence of historical forestry practices and climate forcing on the sediment retention function of wetlands and their ability to protect downstream aquatic ecosystems

K.A. Caley and P.N. Owens

Environmental Science Program and Quesnel River Research Centre, University of Northern British Columbia, Prince George, British Columbia, V2N4Z9, Canada (owensp@unbc.ca)

Information is currently lacking regarding the variability of a wetland's sediment storage function over time, and the impacts of increased sediment delivery to this function. To address this issue, two wetlands in the Quesnel River Basin in central British Columbia, whose surrounding catchments were logged, were studied. Sediment cores were collected in 2009 from both wetlands, as well as their adjacent lakes, to determine the relative proportion of sediment retained by each feature prior to, during and after forestry practices. Analysis of radionuclides (Pb-210 and Cs-137) was undertaken to determine core chronology and sedimentation rates. Other proxy indicators (magnetic susceptibility, loss-on-ignition, particle size distribution, C:N ratio and geochemical indicators) were used to assess wetland filtration over time, and to trace the movement of allochthonous sediment through the catchment. Climate data were also used to examine whether fluctuations in sedimentation rates are better explained by climatic factors (e.g. precipitation, temperature). Results suggest that there were periods of increased sedimentation associated with both forestry practices and climate forcing (e.g. Pacific Decadal Oscillation, PDO). Despite increases in sediment delivery due to forestry practices and climate changes the wetlands performed important buffering functions, thereby protecting downstream aquatic ecosystems.