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The role of river regulation on floodplain sedimentation: the Nechako River, British Columbia, Canada

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This presentation describes the quantity and composition of fine sediment deposited on a floodplain of the Nechako River at the town of Vanderhoof, central British Columbia, Canada, following a seven week inundation event. Peak river discharge during this time was estimated at a 30-year return period. This related to a record high snowpack of 164% of normal within the Nechako basin, coupled with extensive logging operations due to widespread Mountain Pine Beetle infestation. River discharge remained close to the peak volume for a prolonged duration, as a result of high natural river flows, and large reservoir releases for flood alleviation at the Nechako Reservoir. The latter are controlled by Alcan Inc.; a major aluminium producer and manufacturer. Fine sediment deposition across the floodplain varied according to distance from the main river channel and flow paths determined by the local floodplain topography. The maximum total sediment deposition over the inundation period was ca. 15.96 kg m^{-2} at a point adjacent to the main channel, which equated to a mean daily accretion rate of ca. 0.33 kg m^{-2} day^{-1}. This reflects the typically low turbidity of the Nechako River. Deposition rates generally decreased with distance from the main channel, although this relationship was not linear, due to the influence of topography. Absolute (dispersed) particle size exhibited a similar spatial pattern. Adjacent to the channel, more than 83% of the deposited sediment was composed of particles $<63\mu$m in size, and this proportion increased with distance from the main channel. Median absolute particle size exhibited a significant polynomial relationship (R^2 = 0.68) with the mass of sediment deposition across the floodplain, indicating that median absolute particle

size generally decreased as the rate of sediment deposition decreased with distance from the main channel. It follows that the specific surface area of deposited sediment generally increased as the deposition rate decreased (a significant polynomial relationship of $R^2 = 0.65$). There were no apparent spatial trends in the proportional organic content of the deposited sediment. The variations in particle size characteristics reflect the importance of floodplain topography as a control on spatial flow velocity and fine sediment deposition. In turn, this has potential implications for the transport and fate of nutrients and contaminants associated with fine sediment, in a catchment impacted by artificial flow regimes, municipal treated waste water discharges, agriculture and forestry.