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Morphometric and Textural Characteristics of Natural Levees from Two Modern Fluvial Systems

To address possible causes of morphologic and textural variability in natural levees, field studies were conducted in modern floodplains of the upper Columbia River, B.C., and the lower Saskatchewan River at Cumberland Marshes, Saskatchewan. Two-dimensional morphometry was examined in 14 surveyed profiles of levee pairs and their associated channels. Grain-size distributions were analyzed in 190 samples collected from 95 borings.

Stage of channel development, non-uniform deposition of sand-sized sediment, floodbasin width, and secondary flow routes all contribute to the morphologic variability of levees. Levees along early-stage channels receive significant amounts of sand during floods and are relatively steep and narrow. Levees bordering well-developed channels and adjoining narrower floodbasins are commonly steeper and narrower than levees adjoining wider floodbasins. Along inactive channels, levee slopes are reduced by fine-grained flood deposits supplied by nearby active channels.

Levee deposits consist predominantly of fine silt to fine sand, are coarsest near the channel, and fine laterally towards the adjacent floodbasin. Vertical variations in sediment textures reflect levee evolution through time. Coarsening-upward levees form by bank migration and avulsive discharge increases. Fining-upward levees result from progressive channel abandonment. Poorly developed or undiscernable vertical grain-size trends may form (1) in distal portions of levees dominated by finer sediments or (2) under conditions of stable channels.