A screening tool for assessing channel sensitivity to hydromodification in southern California

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Abstract. Until recently, streamflow alteration associated with urban development in southern California has typically gone unmitigated and resulted in significant channel adjustments such as incision and/or widening with far-reaching effects on adjacent land and throughout drainage networks (both up and downstream). We developed a field-calibrated screening tool to assess channel susceptibility to hydromodification – changes in the delivery of water and sediment via the conversion of land from undeveloped to urban. The screening tool is structured as a decision tree with a transparent, process-based flow of logic. The decision tree provides qualitative sensitivity ratings of low, medium, or high through a combination of relatively simple but quantitative input parameters that are both field and geographic information system-derived. The screening rating foreshadows the level of data collection, modeling, and ultimate mitigation efforts that can be expected for a particular stream segment type and geomorphic setting. The unique geologic setting and dynamic nature of streams in southern California required consideration of incision, braiding, and other complex channel responses. Logistic regression thresholds, which were one component of the tool, suggest that these systems may be more sensitive than those in other regions of the U.S., even for equivalent bed material sizes, valley slopes, bank heights/angles, and so forth. Some potential explanations include the semi-arid climate (and typically little bank vegetation), erodible soils, flashy flow regime, and high sediment loads.

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