

**THE FATE OF LARGE SEDIMENT INPUTS IN RIVERS:
IMPLICATIONS FOR WATERSHED AND WATERWAY
MANAGEMENT**

*Lisle, Thomas E., USDA Forest Service, Pacific Southwest
Research Station, Arcata, CA 95521 (TS#13)*

Valued resources in and along stream channels are commonly many river miles downstream of large sediment inputs such as landslides. Evaluating and predicting the arrival, severity, and duration of sediment impacts thus requires an understanding of how river channels digest elevated sediment loads. Here I focus on the routing of pulses of excess bed material that originate from large sediment inputs and are reworked by modest floods. Such pulses are commonly recognized as zones of aggradation in alluvial channels.

Recent numerical modeling, experimentation, and field studies show that dispersion dominates over translation in the evolution of bed material pulses in gravel bed channels. Significant translation occurs under competent flows having low Froude numbers, which are uncharacteristic of gravel bed channels. Translation is also favored if pulse material is finer than ambient bed material, but sandy pulses in gravel bed channels are still predominantly dispersive. However, streamwise variations in valley-bottom and channel topography can locally promote deep deposition in downstream reaches.

New conceptual models of pulse evolution, as well as a predictive numerical model, can now be used to predict patterns of deposition downstream of large sediment pulses. This can be especially valuable in planning for releases of sediment stored behind decommissioned dams. The resulting pulses can be expected to create the least severe impacts imaginable among various pulse-evolution scenarios: Zones of highest excess sediment should remain near the dam and gradually decay as the sediment wedge spreads and thins downstream. In watersheds with dispersed sediment sources, elevated sediment loads in downstream reaches can be expected to be pervasive, persistent, and subtle. Sediment-related cumulative watershed effects can be expected to be common and difficult to attribute because of long, overlapping sediment pulses.