



Figure 2.15: Particle transport. A stream's total sediment load is the total of all sediment particles moving past a defined cross section over a specified time period. Transport rates vary according to the mechanism of transport.

occurs in a watershed and the increased load of sand exceeds the transport capacity of the stream during events that move the sand into the channel.

Stream and Floodplain Stability

A question that normally arises when considering any stream restoration action is "Is it stable now and will it be stable after changes are made?" The answer may be likened to asking an opinion on a movie based on only a few frames from the reel. Although we often view streams based on a limited reference with respect to time, it is important that we consider the long-term changes and trends in channel cross section, longitudinal profile, and plan-form morphology to characterize channel stability.

Achieving channel stability requires that the average tractive stress maintains a stable streambed and streambanks. That

is, the distribution of particle sizes in each section of the stream remains in equilibrium (i.e., new particles deposited are the same size and shape as particles displaced by tractive stress).

Yang (1971) adapted the basic theories described by Leopold to explain the longitudinal profile of rivers, the formation of stream networks, riffles, and pools, and river meandering. All these river characteristics and sediment transport are closely related. Yang (1971) developed the theory of average stream fall and the theory of least rate of energy expenditure, based on the entropy concept. These theories state that during the evolution toward an equilibrium condition, a natural stream chooses its course of flow in such a manner that the rate of potential energy expenditure per unit mass of flow along its course is a minimum.