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Fundamental river processes and
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Channel Response and Climate Change

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A conceptual model of the geomorphic response of stream channels in the Western United States to climate change is described and the magnitude of potential change and rates of response are quantified. The most direct affect of climate change on channel morphology is through an altered hydrologic regime. This is reflected through the timing, variability and magnitude of flows. These effects are particularly detectable in Mediterranean climates such as California and areas where glacial melt or snowmelt play a significant role in the annual hydrograph. There may also be significant changes in base-flow as recharge of shallow groundwater and altered consumptive uses influence the flow regime. Sediment delivery to alluvial reaches can be affected by the altered hydrology, for example in systems that experience major floods more frequently or due to a reduction of morphologically significant flows. Secondary effects on the river channel include changes in riparian vegetation, either due to the propagation of invasive species or the altered climatic conditions extending the dry season or the hydrologic conditions no longer favoring the establishment of seedlings of some native species. The expected magnitude of changes induced by climate change is compared to other inter-related perturbations to the watershed such as forestry practices, wild fire or dams.