

ABSTRACT

GULLIES AND SEDIMENT DELIVERY AT CASPAR CREEK, MENDOCINO COUNTY, CALIFORNIA

Nicholas J. Dewey

The Caspar Creek watershed, in coastal Northern California, features many gullies in its tributary valleys that deliver sediment directly into the perennial channel network. These gullies may help explain rates of sediment delivery in the watershed.

Sediment production from gullies responds to pulses in runoff. Resistant elements observed at headcut lips appear to slow the rate of headcut retreat temporarily until the elements are undercut. Headcut retreat occurs at both a gradual rate ($0-15 \text{ cm yr}^{-1}$) in most headcuts and at a high rate ($>1 \text{ m yr}^{-1}$) in a few. Banks, like headcuts, can fail suddenly or retreat gradually, and have an average retreat rate of 1.8 cm yr^{-1} in the observed cross sections. The amount of exposed vertical bank area in the watershed suggests that bank erosion may generate an important component of the sediment produced from gullies.

Gullying appears to have been accelerated after first-cycle logging, which occurred between 1860 and 1905. Erosion in the gullies is ongoing. Measured rates of headcut and bank retreat can account for more sediment than is exported past gaging stations. The gullies are large enough and young enough that their development would have generated a significant amount of sediment during their lifetime.

The impact of gullies on a catchment-scale sediment budget is enhanced by their ability to route sediment efficiently out of the watershed. A short-term (decadal scale)

sediment budget indicates that colluvial and alluvial deposits are likely to be accumulating sediment within subwatersheds, even as gullies evacuate sediment that has been in storage for thousands of years along the valley axes.