

Stream Amphibians as Metrics of Ecosystem Stress: a Case Study from California's Redwoods Revisited¹

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Abstract

Highway construction of the Redwood National Park bypass resulted in a storm-driven accidental infusion of exposed sediments into pristine streams in Prairie Creek Redwoods State Park, California in October 1989. We evaluated impacts of this ecosystem stress on three amphibians, larval tailed frogs (*Ascaphus truei*), coastal giant salamanders (*Dicamptodon tenebrosus*), and southern torrent salamanders (*Rhyacotriton variegatus*), by comparing densities by mesohabitat type in five sediment-impacted with five unimpacted streams. Impacted streams had six-fold higher pool bowl sediment loads and significantly lower densities of giant and torrent salamanders in most mesohabitats in impacted streams. Larval tailed frog densities were lower in the impacted stream set just in faster water, the only habitats where they occurred (riffles and step runs). In the winter of 1995, a large storm caused a second influx of sediments into all 10 streams. This created a gradient of disturbance, allowing us to examine the effects of repeated disturbances on this aquatic amphibian community. During the intervening 6 years, pool bowl sediment loads had increased 14-fold in the previously unimpacted and 3-fold in the previously impacted streams. Larval tailed frogs and torrent salamanders had declined further in both sets, and now no significant differences in overall densities were found; however, densities did vary by mesohabitat type. In contrast, giant salamander densities increased in both sets, but less so in the impacted streams, with numbers now greater in the faster mesohabitats of both sets. Of the three amphibians, giant salamanders were the most resistant to these extreme erosion events, whereas the other two species were accurate quantifiers of disturbance intensity, indicating their value as metrics of resilience in the redwood ecosystem.

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