

Amphibians as Indicators of Headwater Processes in Northern California Forests: What Are They Telling Us and Why Should We Listen?¹

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Amphibians are recognized for their sensitivity to environmental perturbations and for the advantages they offer as metrics of environmental health. Our research on headwater amphibians in the Klamath-Siskiyou and North Coast Bioregions spans nearly twenty years. Clear biotic patterns have emerged from our combination of broadscale retrospective studies and finer scale natural experiments. These patterns indicate that the species composition and relative abundances of headwater-adapted amphibians, respond directly to changes in headwater processes that determine fine sediment loads, water temperatures, and the forming of stream channel habitats and sorting of streambed substrates that are influenced by amounts of large woody debris. I review five studies that demonstrate the connections between amphibian diversity and abundance and key headwater processes. The notion that monitoring biota as metrics of changes in headwater stream processes is too difficult because of extreme background noise is a fallacy. Amphibians respond directly to perturbations in these processes, and thresholds for negative responses by these species can be determined. While responses of anadromous species are difficult to link directly with changes in headwater processes because of the challenge of separating out the influences of time at sea, headwater amphibians are resident, long-lived, and numerous in healthy streams. Consequently they can provide a direct metric of stream health and an excellent surrogate for salmonids because they occupy a higher position in the stream continuum such that when headwater processes are managed to promote thriving amphibian populations, the downstream fish and their habitats will also likely thrive.

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