

Pacific Southwest Research Station

Sierra Nevada Research Center

Determining the Effects of Livestock Grazing on Yosemite Toads (*Bufo canorus*) and their Habitat: An Adaptive Management Study

The Research:

This study is a collaborative effort between the USDA Forest Service, Pacific Southwest Research Station, Sierra Nevada Research Center, the Universities of California at Davis and Berkeley and USDA Forest Service, Region 5. The overall objective of this study is to understand the effects of varying levels of livestock grazing on Yosemite toad populations and habitats.

The Yosemite toad (*Bufo canorus*) is endemic to the Sierra Nevada mountain range from Alpine County south to Fresno County at elevations from between 1950 and 3450 m (6400 to 11,300 ft). Yosemite toads are typically associated with high montane and subalpine wet meadows and shallow lake shores surrounded by forests of lodgepole pine or whitebark pines. Yosemite toads are believed to have declined or disappeared from at least 50% of known localities during the later part of the 20th century. Long-term monitoring data at Tioga Pass indicates large declines in local populations since the early 1980's although the cause for this decline is unclear. Yosemite toads are a Species of Special Concern in California, a Forest Service Region 5 sensitive species, and a candidate species for federal listing under the Endangered Species Act.

Because of their association with shallow water areas in montane meadows, suspected factors in the decline of Yosemite toads include: livestock grazing, airborne chemical toxins, disease, and climatic shifts and variability (especially temperature and precipitation). Preliminary evidence suggests that livestock use of wet meadow habitats may affect Yosemite toads through:

- (1) changes to meadow stream hydrology and bank stability (increased down-cutting and head-cutting)
- (2) changes to water quality
- (3) changes in micro-topography of egg deposition and larval rearing areas.

The extent of these potential effects and their relationship to toad population survival and persistence has not been quantified.

The results of this study will provide guidance to land managers who are faced with decisions regarding human and livestock use of montane meadows and to better understand the role that livestock grazing may be playing in the decline of the Yosemite toad.



Photo: Rob Grasso



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Our Mission:

Sierra Nevada Ecosystems are complex and our knowledge of them is incomplete. As a result, the long term outcome of any given land and resource management strategy is uncertain. We will provide assistance to land managers and policy makers by addressing this management dilemma through targeted research, emphasizing an integrated, ecoregional approach to examine particular physical, ecological, and socio-economic issues, across a range of appropriate spatial and temporal scales specific to each issue.

This unit will represent the collective research expertise and interests of scientists located in Fresno, Davis and Albany as well as other scientists within the Pacific Southwest Research Station. With a full spectrum of research, from long term, fundamental research to short-term, tactical applications, this Center is intended to support conservation, restoration, and sustainable utilization of the lands within the Sierra Nevada ecoregion.



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Objectives:

USDA Forest Service Region 5 staff formulated two key questions to guide this research. This study is designed to answer these questions as well as improve our understanding of ecological associations of the Yosemite Toad.

1. Does livestock grazing under Forest/Sierra Nevada Forest Plan Amendment Riparian Standards and Guidelines (2004) as represented by the following four treatments have a measurable effect on Yosemite toad populations?
 - Grazing in accordance with current utilization and stream bank disturbance standards across the entire meadow.
 - Exclusion of livestock in wet areas within a meadow.
 - No Grazing within the meadow.
 - Ungrazed meadows (not grazed within recent history)
2. What are the effects of livestock grazing intensity on the key habitat components that affect survival and recruitment of Yosemite toad populations?

The study includes an extensive (Forest and geographic range wide) analysis and an intensive experimental component.

Application of Research Results:

Results of the study will be presented to Forest Service Regional office and National Forest staff. Once particular phases of the study are complete, we will provide an analysis of effects of grazing treatments and standards and guidelines on Yosemite toad populations and habitat and recommendations for future livestock grazing management.

Location:

The extensive scale, correlative component of the study will utilize existing environmental and toad population data and strategically collected new data from sites throughout the range of the toad that represent a both a gradient of recent and historic livestock grazing levels and a gradient of Yosemite toad occupancy levels. The experimental component of the study will take place on at least 15 meadows in active livestock grazing allotments and 5 adjacent ungrazed meadows on the Sierra and Stanislaus National Forests.



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