PROBLEM STATEMENT Kneitel lab research assesses environmental variation and disturbance effects on species diversity and ecosystem function in seasonal wetlands



Figure 1: California vernal pools transition between aquatic and terrestrial habitat (A). It supports high biodiversity and many endemic and endangered species, including (B) tadpole shrimp and (C) plants.

BACKGROUND

California vernal pools are an important and unique part of California's landscape. Vernal pools are seasonal wetlands that fill during the winter (aquatic phase) and dry by late spring (flower phase) that support many endangered species (Fig. 1). It has been reduced to 3-10% of its original extent because of habitat conversion to agriculture and urbanization. The research occurs throughout California and in other Mediterraneanclimate regions. It focuses on bridging basic ecology and conservation and include topics: latitudinal diversity gradients, metacommunity ecology, food webs, and disturbance ecology. Specifically, studies have focused on the effects of nutrients, livestock, species interactions (competition, predation, and parasites), climate change, fire retardants, and hydrology variation.

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SUMMARY OF WORK

Kneitel lab research has included dozens of undergraduate and graduate students. The lab collaborates with international researchers, companies, and regional, state and federal agencies. Projects connect environmental variables, water quality, and the biological community. Below are examples from recent studies addressing climate change effects (Fig. 2) and biogeographic patterns across all California (Fig. 3).





IMPACT ON COMMUNITY

California vernal pools (and vernal pools worldwide) support high biodiversity with many unique animals and plants. While they also provide important ecosystem functions, this habitat has been greatly reduced and is less studied than permanent waterbodies. The Kneitel lab is elucidating the complex interactions among the organisms and their environment to strengthen our understanding and management of these freshwater ecosystems. Over the past decade, our work has highlighted the importance of climate change, disturbances, and human activities on the functioning of these ecosystems. This research has been supported by many federal grants (e.g., NSF and USFWS) and resulted in dozens of conference talks and over 15 publications in top tier journals.





Figure 3: Aquatic invertebrate biodiversity increases as you head from southern to northern California (Kneitel 2016).