

UC Merced Environmental Systems Seminar
Wednesday, February 7, 2018
12:30-1:30 pm, COB 113

Winter Drought and Community Change in Californian Grasslands

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(Host: Jay Sexton)

Approximately 70% of total annual rainfall in lowland California falls in the winter months (Dec-Feb), but prolonged dry and warm spells (“winter droughts”) are not uncommon. Winter rainfall is crucial to the germination, survival, and early growth of annual species. At our principal study site in the Inner North Coast Range, a directional decline in winter rainfall from 2000-2016 appeared to drive a decline in grassland species richness across all functional groups. Within the most numerous functional group, native annual forbs, the selective loss of drought-intolerant species during this period was indicated by a decline in the community mean of specific leaf area (SLA). This plant trait has potential significance for ecosystem functions such as nutrient cycling and soil microbial composition.

We used wintertime watering and rainout shelters to test the mechanisms behind and potential reversibility of the climate-driven loss of diversity. Following two full years of these treatments, in spring 2017, watered plots compared with controls showed (1) lower seedling mortality, (2) higher mean SLA of native annual forbs, and (3) higher total and native annual forb cover. Also, in the observational plots, species diversity did not recover after the extremely wet winter of 2016-2017. Our results indicate that winter drought affected diversity via demographic change -- higher mortality, lower growth and seed production -- as opposed to via long-term seed dormancy. Thus, we conclude that the native species component in Californian grasslands is vulnerable under a scenario of heightened rainfall variability.



Dr. Susan Harrison is a professor in the Environmental Science and Policy Department. Her teaching currently includes Principles of Ecology at both the undergraduate and graduate levels. Her research seeks to understand the large-scale (biogeographic, evolutionary) and small-scale (ecological) forces controlling the diversity of plant communities. In recent years her interests have turned toward understanding the effects of natural climatic variability and anthropogenic climate change. She received her B.S. (Zoology) 1983, M.S. (Ecology) from the University of California, Davis and Ph.D. (Biology 1989) from Stanford University. She has held positions including Research Associate, Center for Conservation Biology, Stanford (1986 - 1989); Postdoctoral Fellow, Morrison Institute for Population and Resource Studies, Stanford (1989); Postdoctoral Researcher, Centre for Population Biology, Imperial College at Silwood Park, England (1990 - 1991). She joined UC Davis in 1991. Awards include International Recognition of

Professional Excellence Award (International Ecology Institute, Oldendorf, Germany), 1996; Fellow, California Academy of Sciences, 2004; Fellow, Ecological Society of America, 2013.