**Lay Summary of Accomplishments**

Species diversity is thought to be important in the performance and stability of many ecosystems; the effects of losing diversity are well-studied, and may lead to impacts such as reduced forage production, greater erosion, or sensitivity to drought. However, many experiments are conducted in small plots, rather than the large areas typically targeted in management. Here, we tested the effects of fertilizer addition on plant diversity both in small plots and in larger, field sized areas. Our initial results suggest that the loss of plant species seen in small plots may not translate well to larger areas. Despite this, fertilization may produce changes to the rareness of certain species and their spatial arrangement that can change how these ecosystems operate. While still in progress, these results have important implications for how to link experimental research to land management, as well as how to conserve species diversity more effectively.

**The Issue: In lay terms describe the objectives of the research. Please label your objectives and limit to one sentence each.**

The loss of biodiversity is a key issue in many ecosystems. While scientific research has shown that many changes to the environment – such as overuse of fertilizer, climate change, and invasive species – can reduce biodiversity, there is less understanding of how these effects change when studying a whole ecosystem, rather than a small experimental plot. In this study, we tested how the effects of fertilizer addition on the number of plant species change with how large of an area we sample. In particular, we asked:

1. If the total number of plant species lost in response to fertilization depended on the area of sampling;
2. Whether this effect was consistent when taking into account how abundant different species were, rather than just their presence or absence;
3. If fertilization caused changes in the spatial arrangements of plants (the “clumpiness” of vegetation).

**Research Results: Provide a report of research conducted as part of this project in a form that could be used as a UC Delivers web page. Simple graphs and photographs are helpful.**

*Attached as a separate document*

**If you have any Peer reviewed or non-peer reviewed articles related to this Research, please go to the "DOCUMENTS" tab and UPLOAD them before you Proceed and Submit.**

**The Payoff: How will the results help agriculture, natural resources, or the public?**

Because changes to biodiversity across larger ecosystems are not well understood, this research can be used to help translate experimental results to management areas. Our results also have important implications for how to monitor environmental health: Different choices in how large of an area to observe can over- or under-estimate change in biodiversity, particularly if focusing only on the number of species, rather than their abundances. Most importantly, we can use these results to better understand how to protect biodiversity – how much land must be conserved to prevent plant species from going extinct in response to environmental changes?

**Extension of Results: List scientific or popular articles, web pages, presentations at professional meetings, field days, seminars and other products resulting from this project. Provide an electronic copy or website link for each publication and report.**

 Presentations:

E. Batzer and V. Eviner. 2018. Ecological Society of America Annual Meeting. New Orleans, LA.

Title: Nitrogen enrichment effects on grassland plant diversity are dependent on spatial scale.

E. Batzer and V. Eviner. 2016. California Invasive Plant Council. Yosemite, CA.

Title: Spatial patterns of diversity in California annual grasslands.

PUBLICATIONS:

Field sampling will conclude in Spring/Summer 2019. After final data collection and processing, we aim to publish results in late 2019/2020. Continual updates on publications and reports will be provided to the reserve system.

**Participating Graduate Students: # of graduate students participating in this project?**

1

**Participating Undergraduate Students: # of of undergraduate students participating in this project?**

**Assisting Post-doctoral Scholars: # of post-doctoral scholars who assisted in the project?**

**Peer Reviewed Publications: # of peer reviewed publications?**

**Non-peer Reviewed Publications: # of non-peer reviewed publications?**

**Who Was Involved? Names and titles of students and/or collaborators involved in the research and extension efforts including names of Centers, UCCE and Departmental Units.**

Evan Batzer, University of California Davis

Valerie Eviner, University of California, Davis

Sierra Foothill Research and Extension Center

Hopland Research an Extension Center

McLaughlin Natural Reserve

0 WORDS

Were Center facilities and staff support satisfactory for your project?

Yes  No 

Please comment on the unique aspects of the land, labor and facilities of this Center that were utilized to conduct this research project. Provide suggestions of additional facilities, equipment or personnel that would improve your use of the Center.

The support provided to this project reflected the expertise of Research and Extension Center Staff. Initial project design and setup would have been very difficult without in-depth knowledge about the natural areas located within the reserve. Staff were also able to add context to this work through long-term observation of the site and its natural history.