

MEET A GRASSLAND RESEARCHER **Sarah Gaffney** sagaffney@ucdavis.edu

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What is your study system? What are your primary research goals?

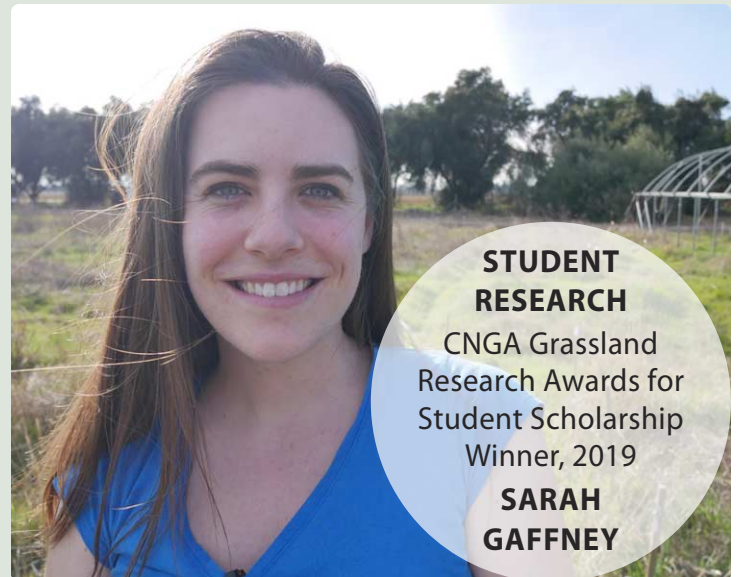
My research is part of a larger long-term field experimental grassland site in Davis, CA, initiated by Drs. Valerie Eviner and Carolyn Malmstrom in 2007. In this experiment, mixes of the three main plant groups of Central Valley grasslands—native perennial grasses (*Stipa pulchra*, *Elymus glaucus*, *E. triticoides*), naturalized exotic annuals (*Avena barbata*, *Bromus hordeaceus*, *B. diandrus*, *Festuca perennis*, *Trifolium subterraneum*), and the noxious weeds medusahead and goatgrass (*E. caput-medusae*, *Aegilops triuncialis*)—were seeded into separate replicated plots and allowed to be naturally invaded by species from other, adjacent mixes over the course of the 12-year experiment.

My research utilizes these long-term plots to better understand how grassland plant communities change over time and what factors influence these trajectories. My main research goal is to explore the importance of priority effects in community development — essentially, how important is species' identity at the start in defining a community's future composition? In relation to native grassland restoration, my research has two main components:

- 1) Is there a time limit to native restoration before the site becomes invaded again? And if so, can we predict whether the naturalized exotic species or noxious weeds will invade and when? I am particularly interested in the potential influence of the recent extreme climatic variation of the 2011–2014 drought that was followed by a historic wet year in 2017. Hopefully our findings can be applied to improve restoration success, especially as many restoration projects lack the funds to monitor post-implementation to determine level of success.
- 2) Does the initial identity of species in the community affect future composition by changing the soil and creating plant-soil feedbacks? Native restoration largely takes place on previously invaded soil, but recent work has shown that exotic grasses can change the soil's biological, physical, or chemical properties. Thus, my second research goal is to identify any potential soil changes induced by long-term exotic grass dominance and determine how native grass establishment and performance might be affected. If native grasses are negatively affected, weed control alone may not be enough for successful native restoration.

Who is your audience?

My audience consists of grassland restoration practitioners and managers, as the main goal of my work is to improve restoration efforts by identifying factors that influence community change over time. I also hope traditional community ecologists who are intrigued in unraveling assembly theory will gain some insight by my work, as it explores community assembly in a uniquely stable, annual-dominated system.



Who has inspired you, including your mentors?

First and foremost, I have been most inspired by my mother, a woman who is constantly fascinated and intrigued by the world around her. She always knows the names of the local trees, wildflowers, and birds, and I loved asking her about them as a child. Her love of learning has been a guiding force in the development of my scientific mindset — she taught me to be curious about my environment and always ask questions.

My two college advisors also inspired my current track. I was lucky to work with Dr. Virginia Hayssen, a mammologist, who taught me the fundamentals of the research process and Dr. Jesse Bellemare, whose love and enthusiasm for plants was infectious.

Another of my major influences was Dana Hawkins, my boss at Aztec Ruins National Monument, whom I helped in her program to restore native diversity to the monument. She taught me about the many challenges faced by practitioners and encouraged me to think critically about solutions, always valuing my opinion. Dana was an invaluable mentor, and my experience with her strongly influenced my decision to go to graduate school and study restoration ecology. I still remember and admire her tenacity and resiliency when challenges arose and am grateful I had a strong female mentor who believed in me.

On the note of strong female mentors, I have been inspired for the last four years by my graduate research advisor, Dr. Valerie Eviner. Her knowledge of California grasslands knows no bounds, and she has been an amazing guide in helping an East Coaster like myself through the complexities of California's grassland ecosystems. I am thankful

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for her perspective on restoration, mentorship, and the constant support she has offered me over the years.

How has or will your research align with the mission of CNGA “to promote, preserve, and restore the diversity of California’s native grasses and grassland ecosystems through education, advocacy, research, and stewardship”?

Our grasslands are incredibly valuable yet are tricky ecosystems to study and challenging to manage. Successful restoration depends upon an understanding of the underlying ecology, and I believe my research will build upon that ecological foundation. My research will hopefully contribute another set of tools to the restoration practitioner’s toolbox by providing insight on how a restored native community may develop over the first ten years and whether soil amelioration may be a necessary part of the restoration process.

Why do you love grasslands?

I am always amazed by the diversity that can be found in California grasslands! I was helping a colleague with botanical surveys last year and was amazed to find 20 species in a single 0.25 x 0.25-m square plot. Granted, a lot of them were exotic, but it’s still incredible. I love going out to places and searching for as many species that I can find, and grasslands are essentially a giant treasure hunt in that regard (check out my personal hobby, wildflower identification, on Instagram @wild.flower.hunter, I would love ID help!).

