

Livestock and precipitation effects to montane vernal pool plant communities

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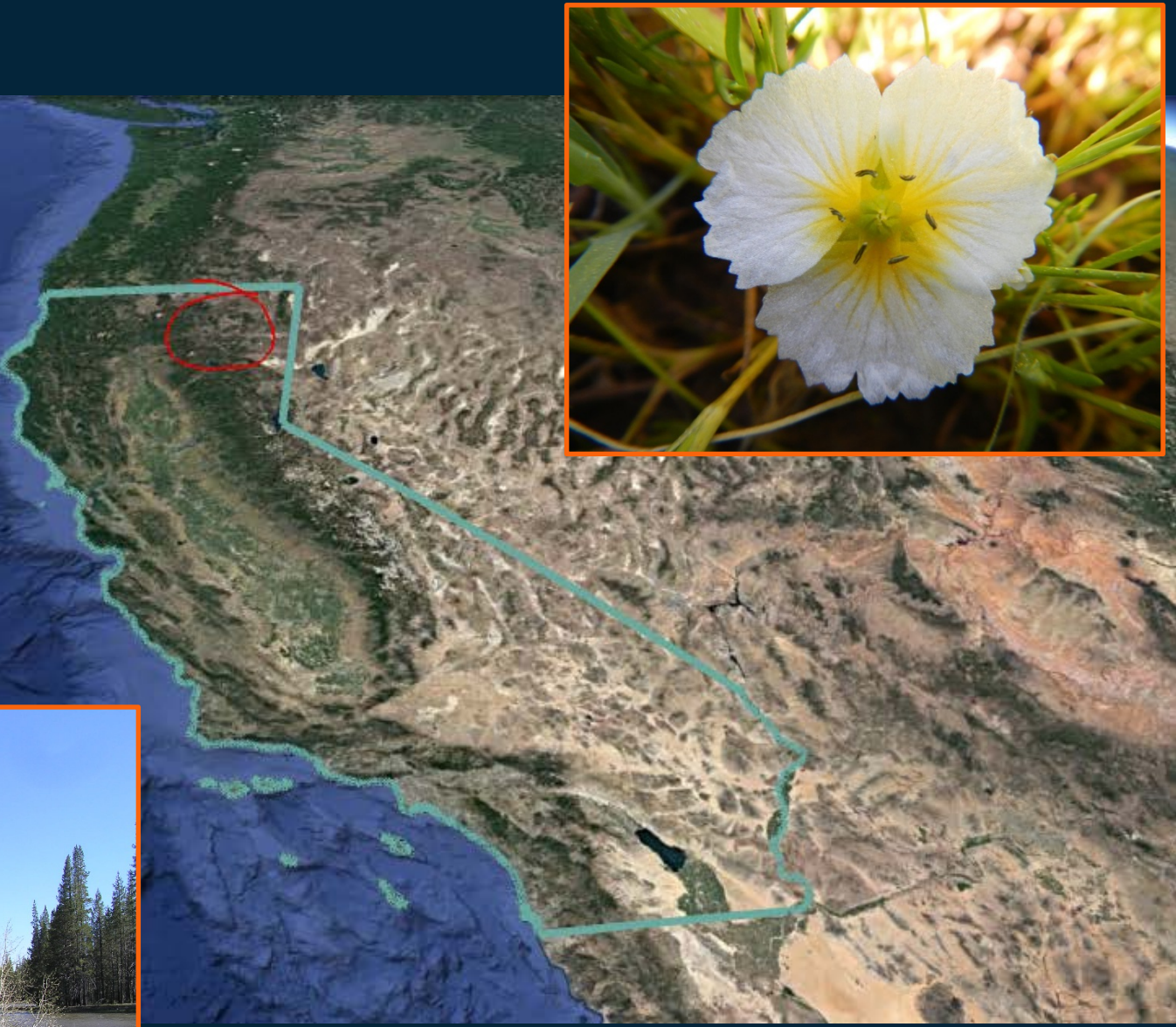
Meredith C. Gosejohan

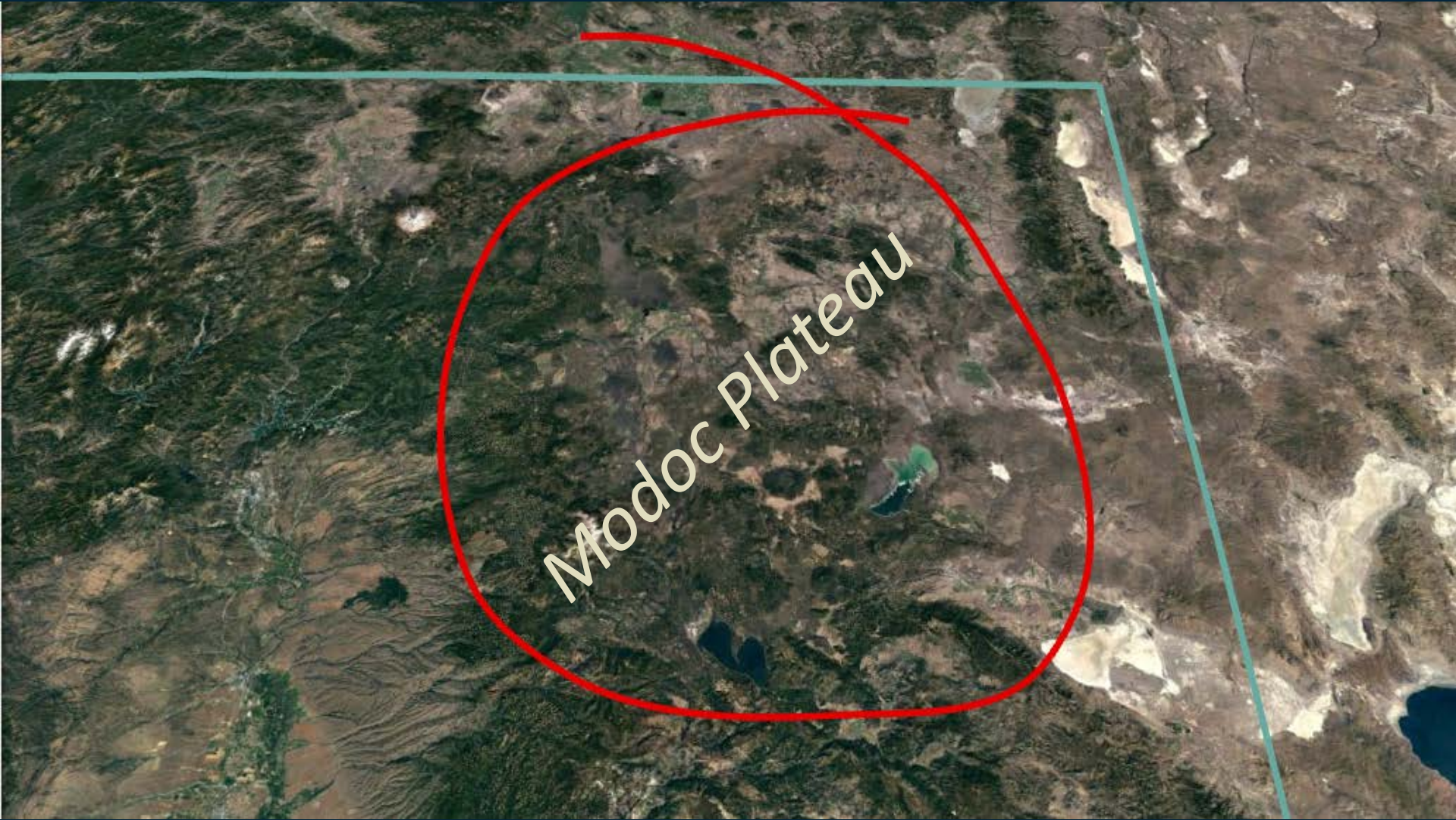
(USDA FS, Lassen National Forest)

(USDA FS, Sierra-Cascade Province Ecology)

(University of Nevada, Reno)

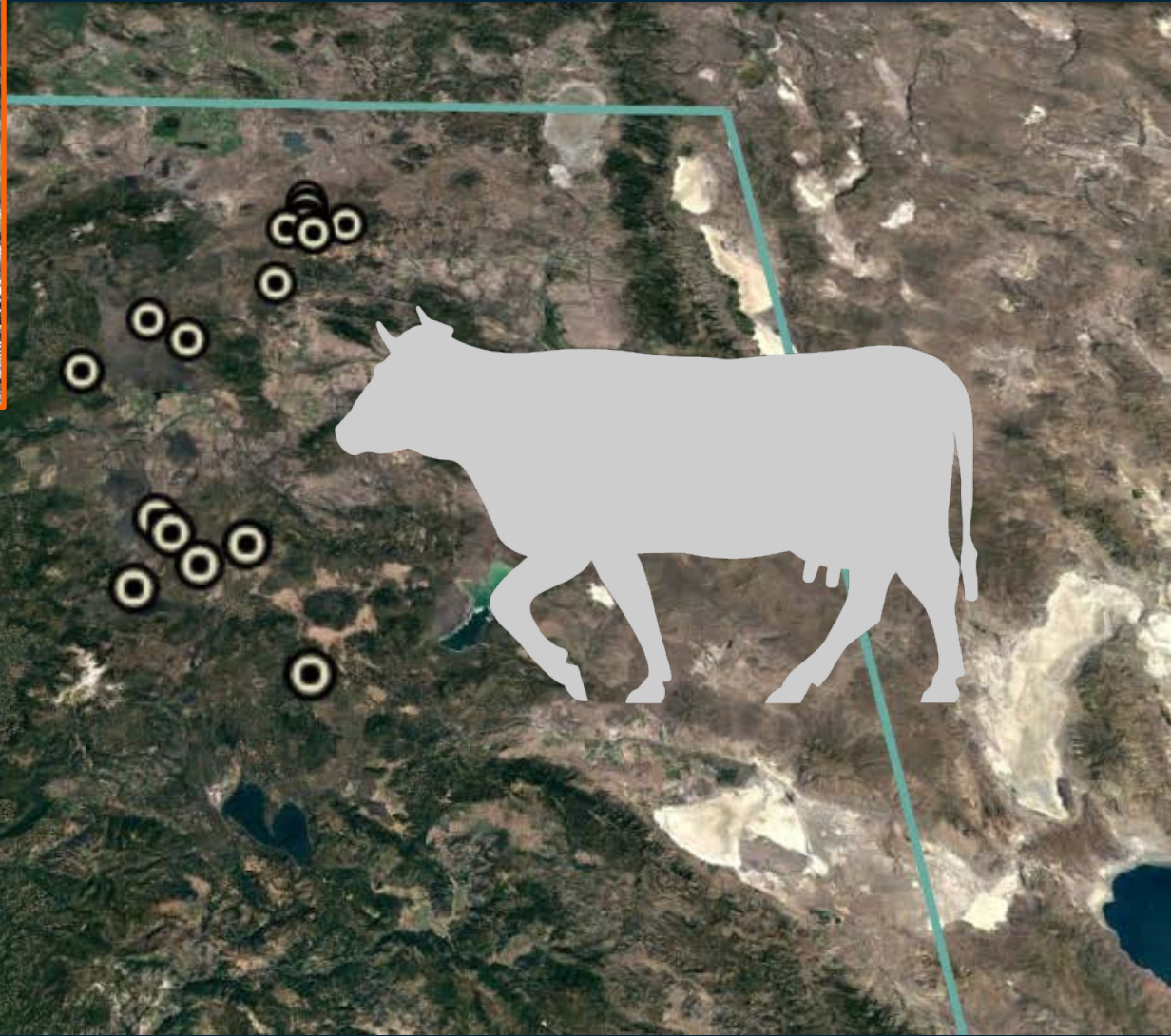






Modoc Plateau

Orcuttia tenuis



Modoc Plateau pools



few invasives or introduced species

introduced grasses dominant



high elevation:
fill as snow melts

low elevation:
filled by
winter-spring rains



grazed between
Jun-Aug



grazed between
Nov-May



Central Valley pools



1. Who inhabits the vernal pools of the Modoc Plateau?



2. What are the effects of livestock grazing?

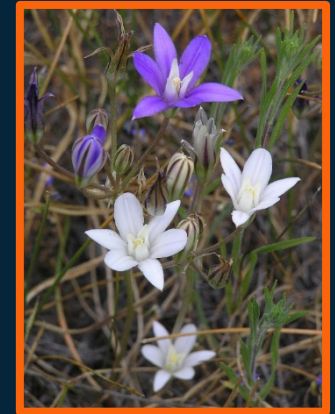


3. What are the effects of inter-site and inter-year variation in precipitation?

sampling design



sampling design



- 16 fenced plots (1-20 yrs)
- 15 unfenced plots
- Sampled 2009, 2010, 2011

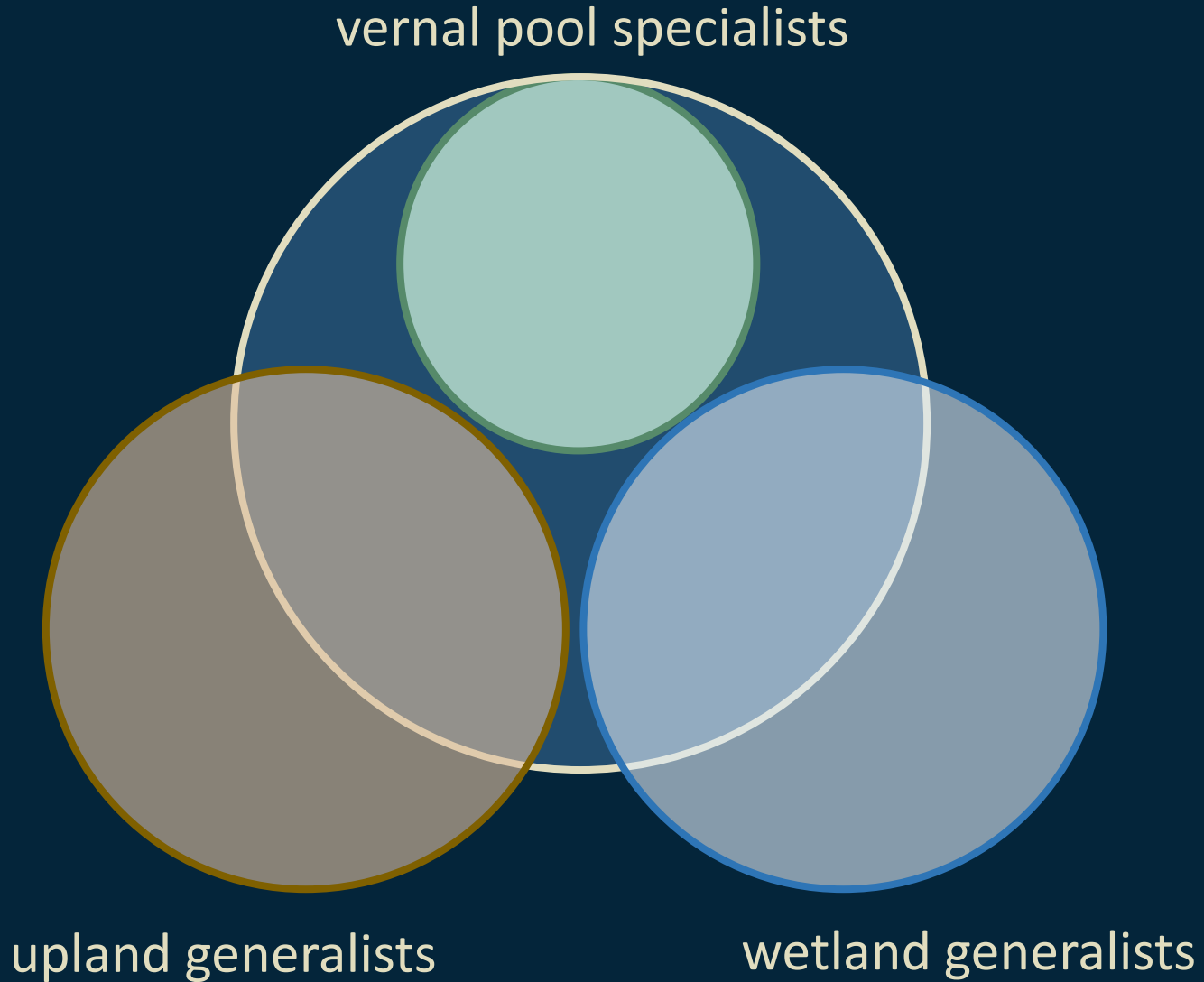
fenced



unfenced



vernal pool functional groups



vernal pool functional groups

vernal pool specialists

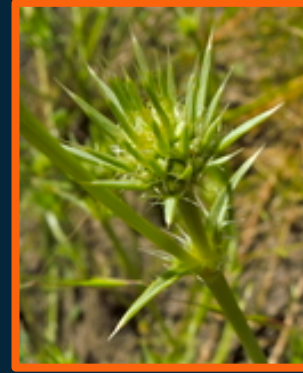
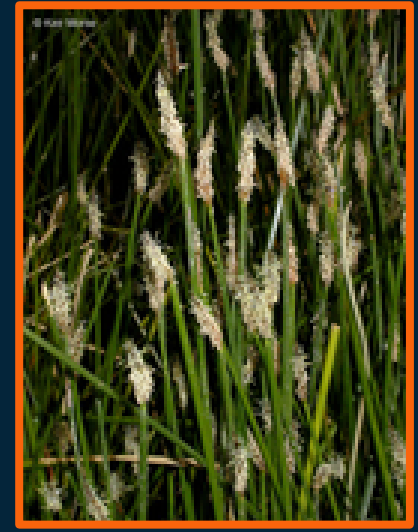
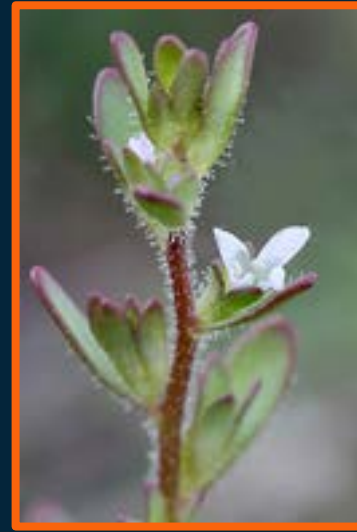
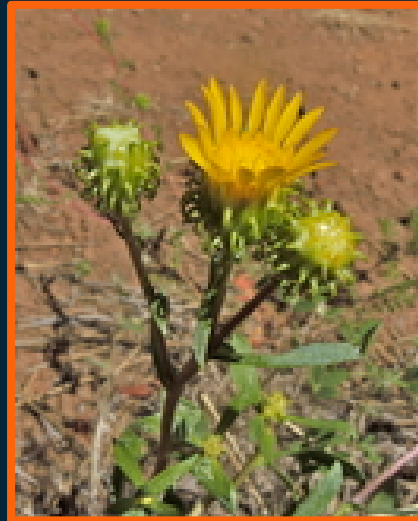


photo © John Doyen



upland generalists

photos © Keir Morse and © John Doyen

wetland generalists

photos © Debra Cook and © Keir Morse

vernal pool functional groups

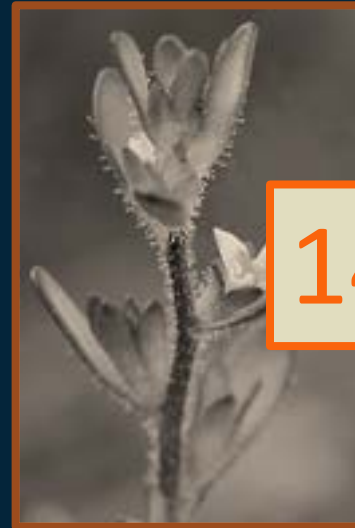
average cover

vernal pool specialists



1 %

upland generalists



14 %

wetland generalists

plant community structure



- fencing duration
- bare ground
- litter
- hoofprints



- seasonal precip
- delta precip

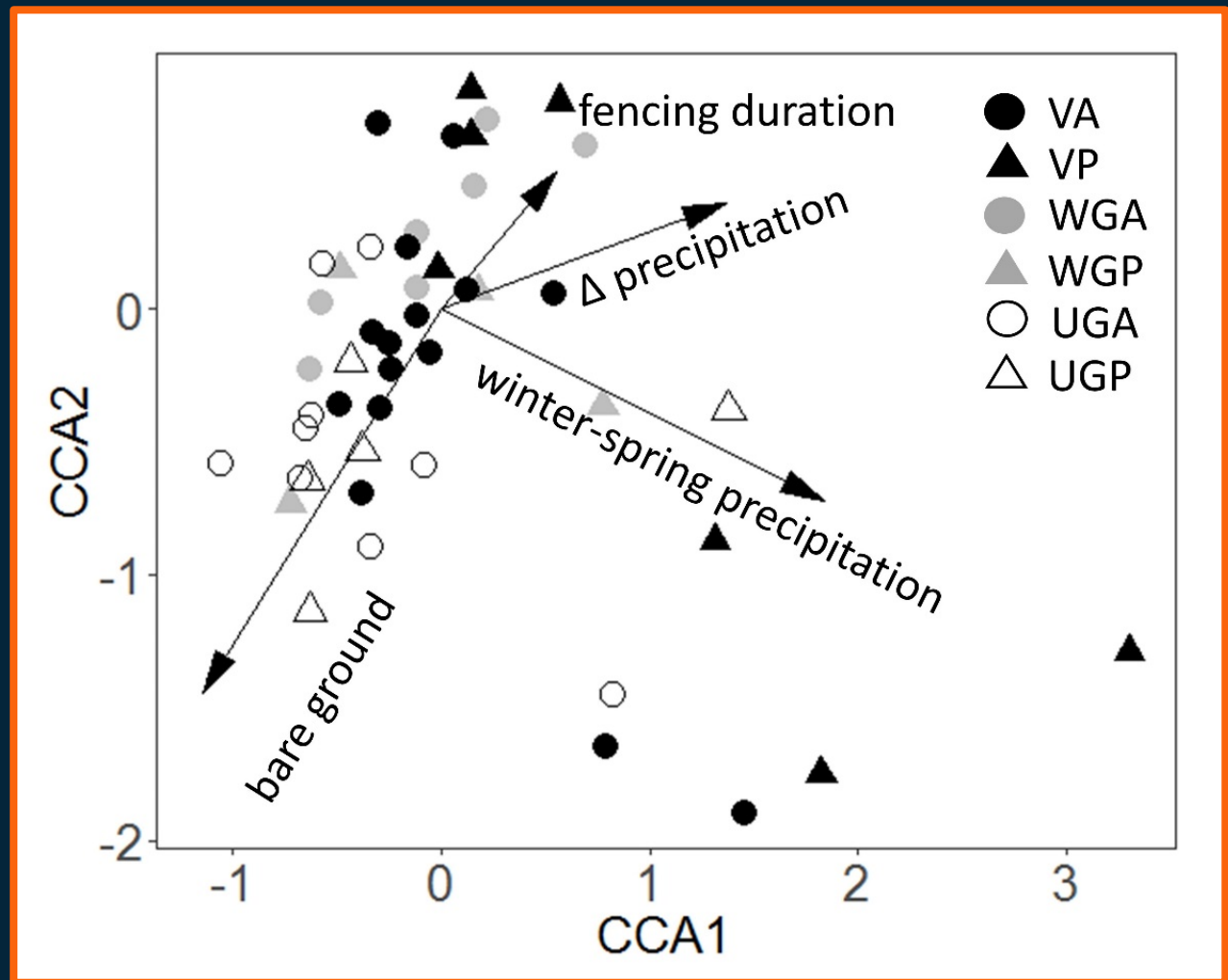
plant community structure



- fencing duration
- bare ground
- X litter
- X hoofprints

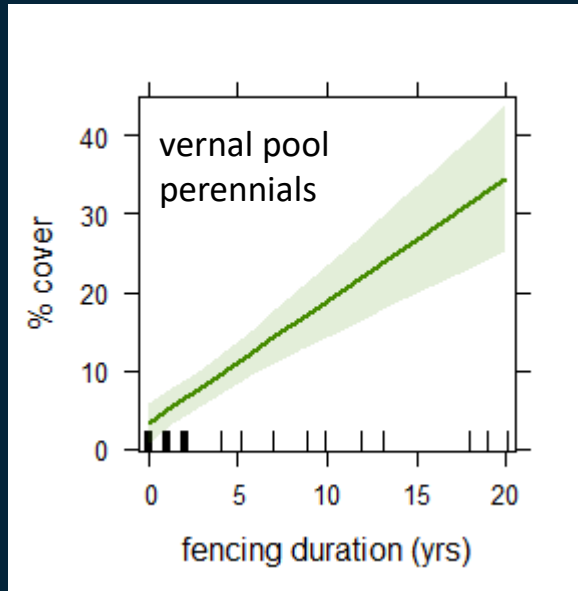


- seasonal precip
- delta precip

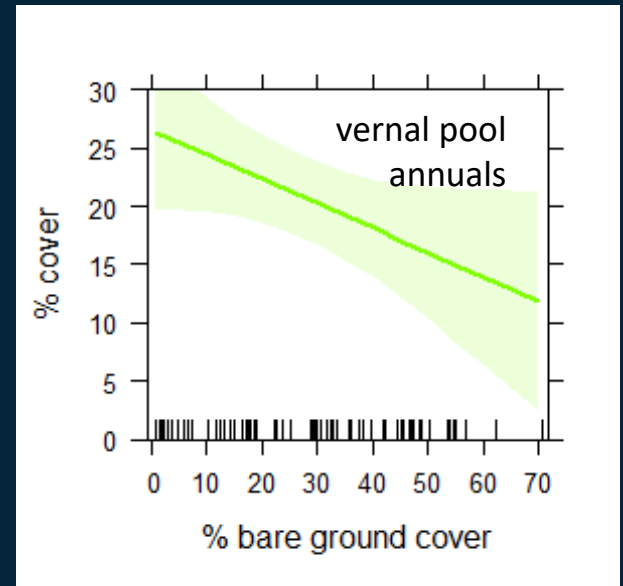
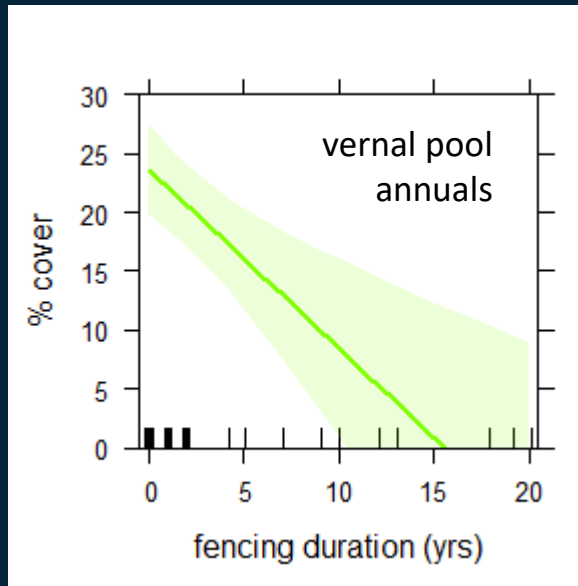


vernal pool specialists

perennials

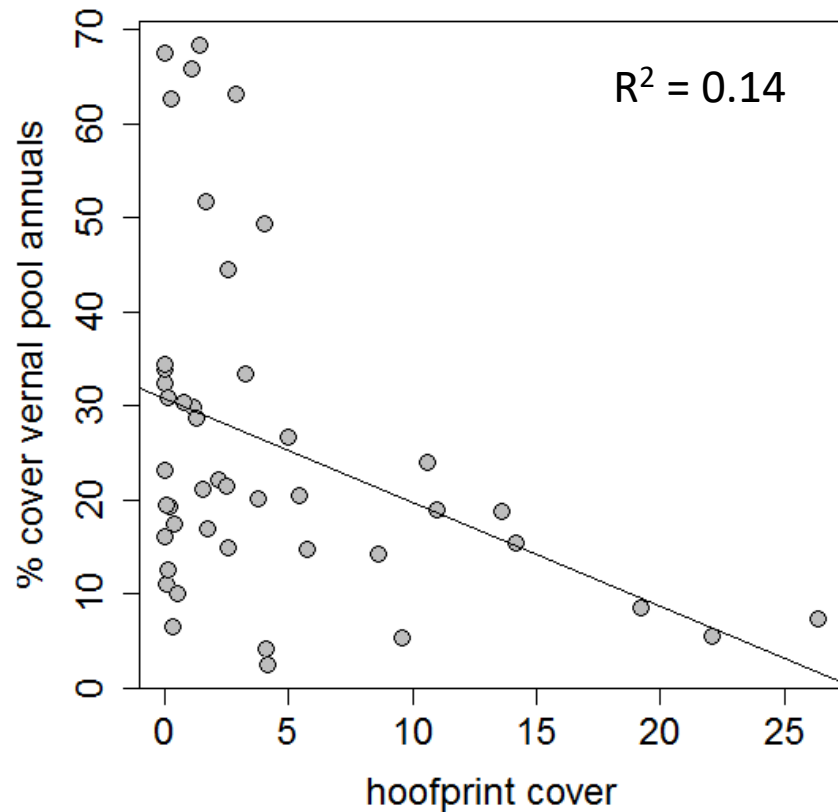


annuals



Is grazing always beneficial to annuals?

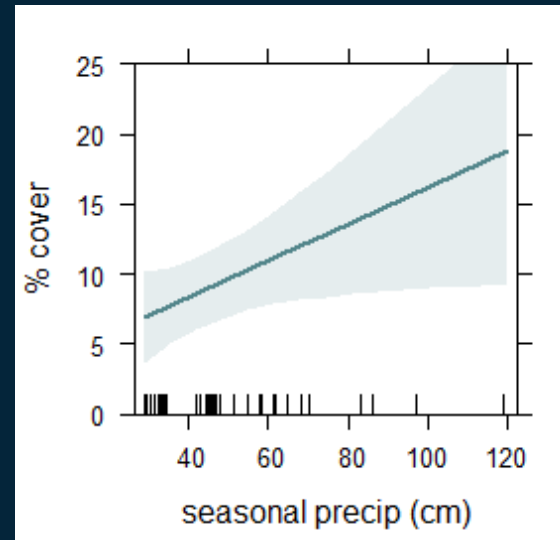
Not necessarily



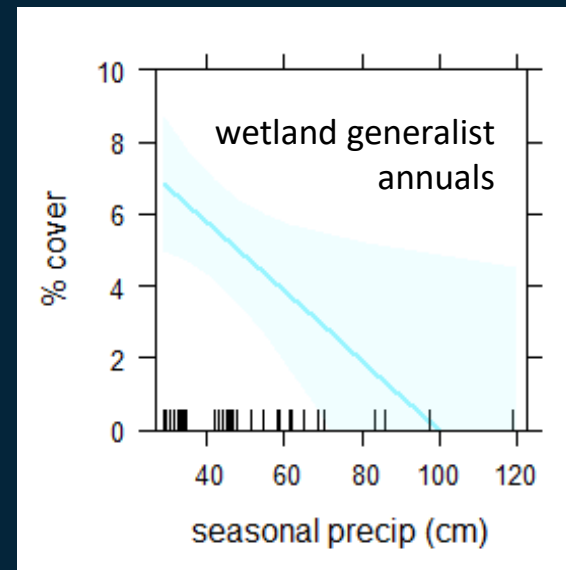


wetland generalists

perennials



annuals



Key Findings

livestock exclosure associated with:

→ lower cover of **annual** vernal pool specialists



→ higher cover of **perennial** vernal pool specialists



Key Findings

- Stronger grazing effects to vernal pool specialists than wetland generalists
(evolutionary grazing history?)
- Cover of wetland generalists positively associated with precipitation



Management and Future Direction

- Reintroduce livestock grazing (late-season) at fenced pools where cover of vernal pool annuals is low
- Early-season grazing may be detrimental to vernal pool annuals
- Consider vernal pool perennials! Vary grazing management.



Questions?



Thanks to: CA Dept of Fish and Wildlife, Lassen National Forest, Nevada Agricultural Experiment Station, U. of Nevada Reno, Alturas BLM, CNPS, Northern California Botanists, Allison Sanger, Forest Gauna, Don Lepley, Mike Dolan, Judy Perkins, Jennie Wheeler, Adam Negrin, Taro Narahashi, Margaret Diehl, Lauren Alnwick-Pfund, Ian Grinter, Derek Young, Evelyn Wenk, John Oloffson, Barbara Raymond, Kirsten Pasero, and Jenny Jayo.