NAME: Scott Bridgham
ORGANIZATION: University of Oregon
PROGRAM AFFILIATION: TES
ABSTRACT TITLE: Consistent shifts in community composition and diversity in response to experimental climate manipulations across a latitudinal gradient in Pacific Northwest prairies

ABSTRACT: Projected changes in climate are expected to have widespread effects on plant community composition and diversity in the coming decades. However, multi-site, multi-factor climate manipulation studies are rare to examine whether observed responses are regionally consistent and whether multiple climate perturbations are interdependent. To investigate climate effects on plant community composition, we implemented a fully factorial climate manipulation of warming (+2.5-3°C) and increased wet-season precipitation (+20%) at three sites across a 520-km latitudinal gradient from southern Oregon to central Washington. All sites were seeded with a nearly identical mix of native grasses and forbs in the fall of 2009 and climate treatments were initiated in 2010. Plant cover was measured in each plot for three consecutive years to address our three hypotheses: (1) under a warmer climate, plant diversity and richness would decrease across sites, but increased precipitation would offset these effects by ameliorating water stress; (2) warming would favor introduced species; and (3) community composition of warmed plots would become more similar to their ambient temperature counterparts in sites further south, but added precipitation would reduce such trends by alleviating drought stress.

Warming altered plant community composition (including functional composition), decreased diversity, and increased total cover with warmed Northern communities becoming more like those found further south over time. In particular, after two full years of warming, annual and introduced cover increased suggesting that the observed biogeographic pattern of plant functional groups in West Coast prairies of the US (invasive annual plant communities in CA and southern OR, perennial plant communities from central OR north) is at least in part due to the direct effects of climate. Additional precipitation during the rainy months did little to alleviate drought stress, and had minimal effects on community structure. Our results suggest that with the increase in drought severity projected for the region, prairies of the Pacific Northwest may face an increase of invasion by annuals, similar to what has been observed in California, resulting in novel species assemblages and shifts in functional composition, which in turn may alter ecosystem functions.