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ABSTRACT TITLE: Low resistance but high resilience of a grassland ecosystem to Dust Bowl magnitude drought

ABSTRACT: Forecasts for increasing intensity and frequency of climate extremes with global climate change suggest that events such as severe droughts will play a greater role in determining future ecosystem function and dynamics. However, the rarity and unpredictability of climate extremes has limited our ability to assess the mechanisms governing their impacts on ecosystems. We experimentally imposed a two-year drought of 1930's Dust Bowl magnitude in a central US grassland and found that ecosystem function (aboveground net primary productivity) was reduced far below any observed level in almost three decades. Differential sensitivity to drought among the co-dominants representing key plant functional types (PFT's; C4 grasses, C3 forbs) led to low ecosystem resistance, and re-ordering of the co-dominant species. Despite altered community composition, recovery in function occurred one year post-drought due to compensation by the C4 grass dominant for the loss of the C3 forb dominant via rapid demographic responses. Thus, while extreme drought led to alterations in abundance of dominant PFT's, this compositional re-ordering enhanced ecosystem resilience.