

Figure 1.) Three primary drivers of structure and function of the shortgrass steppe ecosystem are physiography/ecohydrology, disturbance, and climate. a.) Before settlement for agriculture during the 1800s, the shortgrass steppe ecosystem was dominated by large herbivores, which were both a primary disturbance and controlled plant species diversity by their grazing, especially of the prevalent warm season (C4) grasses blue grama and buffalo grass. The extent to which prairie dogs and fire also created disturbance are less well known, but were likely important ecosystem drivers. The combination of climate, physiography, and disturbances formed the short grass steppe ecosystem, a persisting drought and grazing adapted ecosystem where 90% of biotic interaction and biogeochemical transformations occur belowground. b.) The first settlers removed bison and replaced them with livestock, and began tilled agriculture. Regularly occurring droughts, especially in the 1910s, 1930s, and 1950s led to development of irrigation systems and the change to irrigated agriculture. c.) The current state(s) of the system, with return of tilled lands to grassland, managed under the Crop Reserve Program (CRP) initiated in part to conserve soil. The ecosystem currently exists as a mosaic of land uses. d.) With global change, temperatures have begun to rise and changes in the timing and intensity of precipitation are expected. Known interactions between rising CO₂ concentrations, temperature, and precipitation regimes may lead to several alternative states in the future.

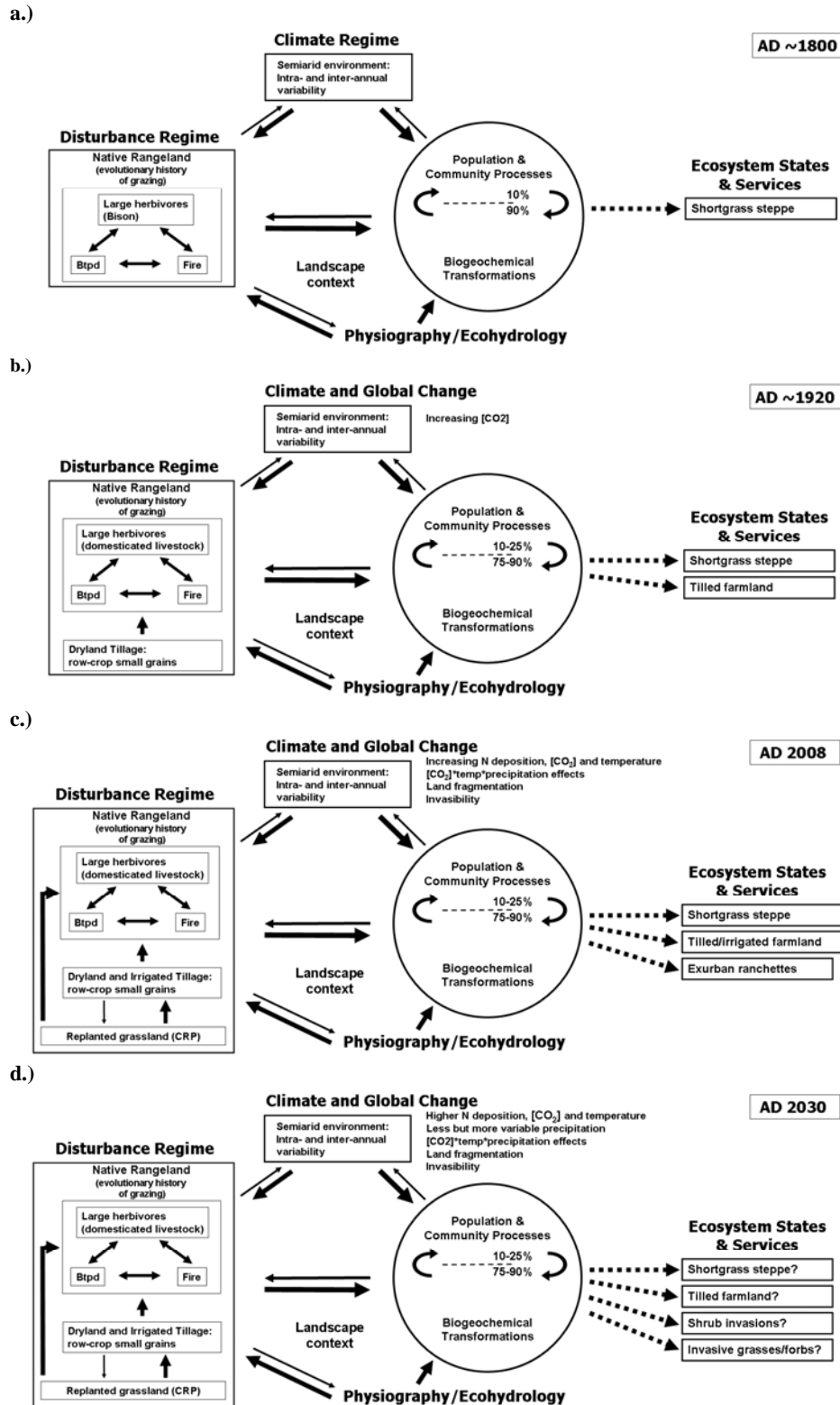


Figure 2.) The shortgrass steppe conceptual diagram outlining research carried out by the SGS-LTER project initiated during the last 27 years (blue) and planned for the future (red). The three ecosystem states depicted on the right represent shortgrass steppe as it existed before settlement (top), the ecosystem under shrub invasions (center), and a warmer/drier regime with more bare ground.

