Incorporating Correlative Modeling into Modifying Restoration Strategies for the Future

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Tallgrass prairie ecosystems in the American Midwest are heavily degraded and require restoration in many midwestern states. One common management tool is the application of a seed-mix of native prairie species following a strategy aimed at creating an ecological gap for the native species to fill (e.g. prescribed burns, herbicide application, etc.). While prairie species are valuable to restore, the seeds are often expensive to add to a seed-mix and in the creation of a species list for this strategy many challenging compromises must be made in deciding which species are most needed relative to their financial cost. It is therefore critical that the species that are included in a given seed-mix be able not only to establish in these systems now, but also to persist in the face of potentially very different future climate scenarios. The degree and direction of climate change-related range shifts has yet to be quantified for many species, and such information would allow for a much more targeted approach to seed-mix construction as well as increased efficacy of this restoration tool into the future. By utilizing a correlative modeling approach in the software MaxEnt, species distribution models (SDMs) can be constructed for each species individually and informed with future climate datasets to give robust predictions of future ranges for many key prairie species. This study aims to quantify the range shifts, contractions, and expansions that each species range undergoes in the face of four global climate model (GCM) projections, and to compare these range shifts between physiologically similar or related species for evidence of comparable movements. From preliminary model construction, it is evident that species that are found primarily East of the Rocky Mountains respond similarly to future climate models while species that are found primarily to the West of the Rocky Mountains respond less dramatically to all future climate GCMs. These data will allow us to prioritize climate change-resilient species in our seed-mixes where restoration is already underway and also to begin to restore key prairie species to areas that may become more suitable in the future.