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Title: Genetics solutions to climate change and invasive species in restoration

Abstract. Based on findings from PVER, Cibola and other restoration sites using the same genotypes of cottonwoods and willows, our findings show that different tree genotypes and populations differ in the communities they support as well as fundamental traits associated with biodiversity, competition with invasive species, and tolerance to increasing temperatures associated with warming climates. These genetics-based differences are so pronounced that they can easily affect the long-term success of a restoration project. Just as genetics has been used in agriculture to increase crop yield, our findings show that the natural genetic variation in wildland species can be used to maintain foundational plant species where they might otherwise go locally extinct, support greater biodiversity with less acreage, and better compete with invasive species. I develop some of our findings using the newly funded Southwest Experimental Garden Array (SEGA) and describe how land managers in federal, state and private agencies are participating and utilizing our findings to mitigate the effects of climate change and invasive species.