

Is Genetic Management Critical to the Success of Climate Change Adaptation or a Costly Distraction?

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Conservation agencies worldwide are adapting their management plans to incorporate climate change. However, many common adaptation strategies could be unsuccessful and increase species vulnerability by decreasing genetic variation of managed populations. Genetic variation can be critical to the resilience, persistence, and function of populations and ecosystems, yet management actions to enhance genetic diversity can also add significant costs and often have negative perceptions that prevent implementation. I am developing the first comprehensive assessment of the costs, benefits, and risks of a suite of alternative genetic-management strategies for climate change adaptation. First, I will use computer simulations and experiments in two ecosystems to evaluate the benefits of alternative genetic-management strategies for a suite of common management objectives. Second, I will gather practitioners with multiple perspectives in workshops to: (1) survey attitudes towards genetic management, (2) discuss the potential benefits of different genetic-management strategies based on my research and multiple other ongoing research projects, and (3) use a structured decision making framework to identify an optimal genetic-management strategy for 3 diverse case studies: seagrass restoration, managed salt-marsh migration, and subalpine-plant refugia. My research will help determine if supplementing genetic variation is a feasible and beneficial tool to improve long-term outcomes of management in these systems or a costly distraction. Moreover, I will identify key uncertainties that affect decisions about the use of genetic management that will help guide future research in these three ecosystems.