GENOMICS IN RARE SPECIES CONSERVATION: TEASING APART EVOLUTIONARY HISTORY AND ADAPTATION

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Species evolutionary potential is tightly linked to both the amount and distribution of genetic variation available through which natural selection may act. Indeed, the genetic consequences of isolation and population size may be exacerbated in rare species, limiting species' ability to adapt to ongoing change. Thus, in a rapidly changing environment, maintenance of genetic variation within and across populations becomes an increasingly important target for species conservation. Here, we discuss the importance of understanding species' evolutionary history, and the role different evolutionary processes may play influencing neutral and adaptive processes both across space and time. We discuss the importance of these data to establishing conservation collections and designing species management strategies that preserve species' evolutionary potential. Providing a case study, we focus on Torrey pine (*Pinus torreyana* Parry) a critically endangered pine endemic to California. The combination of small population size, extremely low genetic variation, and abiotic and biotic challenges associated with climate change indicate Torrey pine may have reduced evolutionary potential to adapt to change. Thus, Torrey pine may be a potential candidate for inter-population genetic rescue. Pairing genomic data with phenotypic data from natural populations and common garden experiments, Torrey pine provides an ideal system to evaluate the contribution of demographic history, gene flow, and natural selection to population differences. These data become essential to considering potential risks associated with management decisions and identifying short and longer-term conservation strategies necessary to preserve species' evolutionary potential.