PHYSIOLOGICAL APPROACHES TO SPECIES CONSERVATION AND RESTORATION

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Physiological processes link genotypic and phenotypic expression. As such, understanding the physiological response of individuals and species to environmental variation is important to achieve desired management objectives. Global change, e.g., climate change, land-use change, invasive species, fire suppression, urbanization, has intensified the need for species conservation and ecosystem restoration under changing and often novel conditions. Because of global change, current or historical species-site information are less reliable as a guide for conservation. Rather, predicting the best locations and environmental conditions to attempt restoration or conservation might be accomplished through understanding species-level physiological responses. At the level of the individual (within species), specific genotypes that exhibit desired physiological traits will need to be identified and selected based on their expected suitability to current and future conditions. Increased hybridization between shortleaf pine (*Pinus echinata*) and loblolly pine (*P. taeda*) is likely a response of global change (in particular fire suppression and climate change) and is affecting species identity, morphological and physiological traits, and possibly the future resilience of southern pine forests. The hybrids exhibit faster growth like loblolly pine, greater drought tolerance like shortleaf pine, intermediate sprouting ability following topkill, and lack a strong basal crook (a shortleaf pine adaptation to protect dormant buds from fire). A complete understanding of the physiological and morphological differences between the hybrids and the parent species will allow for more effective practices to maintain shortleaf pine stands and to focus conservation and restoration efforts on sites with the highest likelihood of success.