Adapting reserve networks on the Eyre Peninsula for species conservation under climate change

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Climate change is increasingly seen as a threat to species vulnerability. As the climate changes, the range and extents of habitat suitability for species may grow, shrink or shift and these potential shifts are likely to pose many challenges for species and biodiversity conservation in the future. There is a concern that the current reserve network will be inadequate for future biodiversity conservation. Understanding the vulnerability of species under different climate change predictions is very difficult. However, climate envelope modelling has become an increasingly accepted method to understand the vulnerability and dynamics of species distributions. In this study we used climate envelope modelling to develop habitat suitability models and determine the vulnerability of 298 floral species across the Eyre Peninsula. The habitat suitability models for each species were created for the current climate and three climate scenarios using an ensemble of three individual niche-based models. We then used Zonation, a reserve selection software package, to compare reserve networks under various target conditions and the different climate scenarios. Results show that 11, 37 and 83 percent of all species modelled suffered increased vulnerability and reduced habitat suitability under the mild, medium and severe climate change scenarios respectively. Furthermore, as the vulnerability of species increases, current conservation reserve networks perform poorly providing little protection for the most vulnerable species and reduced protection overall. Some reserves, particularly in the southern latitudes, do become offer increased protection to vulnerable species with warming and drying. However, the majority of reserves provide decreasing conservation benefit for biodiversity. Nonetheless, we demonstrate the importance of various existing conservation reserves and provide various adaptation solutions for future reserves.