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LETTER

Biased data reduce efficiency and effectiveness of conservation reserve networks

Joanna Grand,[1]* Michael P. Cummings,[2] Tony G. Rebelo,[3] Taylor H. Ricketts[4] and Maile C. Neel[1]

[1]Department of Plant Science and Landscape Architecture, University of Maryland, College Park, MD 20742, USA

[2]Center for Bioinformatics and Computational Biology, University of Maryland, College Park, MD 20742, USA

[3]South African National Biodiversity Institute, Private Bag X101, Pretoria 0001, South Africa

Abstract

Complementarity-based reserve selection algorithms efficiently prioritize sites for biodiversity conservation, but they are data-intensive and most regions lack accurate distribution maps for the majority of species. We explored implications of basing conservation planning decisions on incomplete and biased data using occurrence records of the plant family Proteaceae in South Africa. Treating this high-quality database as 'complete', we introduced three realistic sampling biases characteristic of biodiversity databases: a detectability sampling bias and two forms of roads sampling bias. We then compared reserve networks constructed using complete, biased, and randomly sampled data. All forms of biased sampling performed worse than both the complete data set and equal-effort random sampling. Biased sampling failed to detect a median of 1–5% of species, and resulted in reserve networks that were 9–17% larger than those designed with complete data. Spatial congruence and the correlation of irreplaceability scores between reserve networks selected with biased and complete data were low. Thus, reserve networks based on biased data require more area to protect fewer species and identify different locations than those selected with randomly sampled or complete data.