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Using Ecological Niche Modeling to Predict the Response of Hydrocotyle Bonariensis to Global Climate Change

Rachel Bonner

Laura K. Dease

Elizabeth A. Hughston

ABSTRACT

Using ecological niche modeling to predict the response of *Hydrocotyle bonariensis* to global climate change

Rachel E. Bonner, Laura K. Dease, Elizabeth A. Hughston, Justin C. Bagley
Department of Biology, Jacksonville State University, Jacksonville, AL 36265

Coastal dune habitats provide valuable ecosystem services but are declining globally due to the interacting effects of multiple stressors, including global climate change (GCC). To explore the potential severity of the effects of GCC on dune plant communities of the Northern Gulf of Mexico and surrounding areas, we modeled the fundamental bioclimatic niche of a dune plant species, largeleaf pennywort (*Hydrocotyle bonariensis* Comm. ex Lam.), in this region. We then projected its niche to estimate habitat suitability under current and future environmental conditions. Occurrence records were mined from the Global Biodiversity Information Facility, cleaned, then thinned by spatial filtering, and WorldClim bioclimatic variables (30 arc-second resolution) were used as environmental data layers during analyses. Niche modeling was conducted using MaxEnt, and the model was projected onto a potentially accessible area (M) for the species defined by a 200-km buffer zone around the filtered occurrence points. Results suggested that our model had high predictive performance (AUC ≥ 0.9) and the projections indicated that the distribution of suitable habitat for *H. bonariensis* in the study region will likely be greatly reduced by GCC over the coming decades. Unlike other foredune plant species, *H. bonariensis* is known from non-dune habitats (e.g. estuaries, sandy coastal plains) up to moderate elevations; accordingly, our models strikingly predict potential refugial areas for this species in Central Mexico and the northern Yucatán Peninsula. Additional analyses of codistributed dune plants in the study area are needed to test the generality of these findings for dune plant communities.

Keywords: climate change; ecological niche modeling; foredune; Gulf of Mexico; North America; plants