Habitat Modeling for *Opuntia* species in the southeastern United States

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Accurate predictive (statistical) models for *Opuntia* habitat are expected to facilitate efforts at locating and monitoring the progress of *Cactoblastis cactorum* invasion in the southeastern US, where *Opuntia* tend to be very patchily distributed across the landscape. Our objective in the present work was to use geospatial data to predict *Opuntia* presence via logistic regression, with the assistance of geographic information systems (GIS). In pursuing this avenue of work, two factors are critical in determining the most desirable habitat model: the means of quantifying a "best" model and the spatial scale at which this effort is conducted. Model selection can consist of identifying either the model that best fits the available data (e.g., likelihood approaches) or the one that provides the most accurate prediction of future presences of the target species (e.g., Cohen's kappa and True Skill Statistic). Two examples presented here, using *O. humifusa* var. *humifusa* and *O. humifusa* var. *caespitosa*, suggested that results of model fit assessment and model accuracy assessment may be similar, and that the degree of similarity was higher when the spatial extent of the study area covered a few counties in Mississippi (approximately 14,800 km^2), versus a state-wide analysis (approximately 125,000 km^2). Analyses conducted at the smaller spatial scale also provided substantially more robust results in terms of model fit and model accuracy, with identical assessment criteria for the best models in both approaches. We plan to follow these exercises with additional validation of models developed at even smaller spatial extents (approx. 2000-3000 km^2) for both of these *Opuntia* varieties.