

Determining the Utility of Using GAP Species Models to Define a Conservation Reserve System: Summary Report

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The Michigan GAP (MIGAP) project produced 327 terrestrial vertebrate predicted habitat models by relating habitat associations from expert knowledge of species/habitat relationships to a landscape level land-cover map. These models, however, have not been evaluated in terms of what they can contribute to reserve network design or the limitations posed by their use. Also, few reserve design approaches explicitly use common animal species information in the reserve design system.

Description

We compared reserve networks designed using Marxan least-cost reserve planning software for various parsings of the MIGAP models. As an example, figures 1 and 2 show the difference in a least-cost reserve using all MIGAP species models with and without currently designated reserves locked into the solution. We also compared Marxan designed reserves for two grassland birds using the MIGAP models with those using alternate Maximum Entropy (Maxent) potential habitat models. The latter models are derived from a statistical approach using actual locations of species and one to many environmental layers to predict habitat suitability. We found that while least-cost reserve design can result in very efficient reserve networks, using the MIGAP models for this purpose is risky. Because of the over-predictive nature of the models, there is little certainty that any identified planning unit harbors any given species. Minimizing the number of planning units for a reserve, with this uncertainty, is inappropriate and potentially misleading.

We then demonstrated how the MIGAP models can be used effectively to quickly filter out any conspicuous omission of habitat types on proposed or existing reserve networks. We tallied the number of species that did not meet representation criteria for six alternate reserves defined by different combinations of planning units assigned “biodiversity opportunity cost categories”. These categories, defined by the MDNR as part of their current biodiversity planning effort, were determined by ownership, current management designation, and assumed available resources for biodiversity management. They are intended to reflect actual costs required to implement and sustain management for biodiversity and represent a much refined stewardship data layer from the original MIGAP study conducted in 2004. The results for any given reserve, can be viewed as a graph to quickly assess which species deviate most from representation criteria. Planners can then consider if there is good cause for concern and target resources accordingly.

Status

Final report completed and delivered to the GAP program.

Goals for Next Year

Once comments are received; revise and submit to journal.

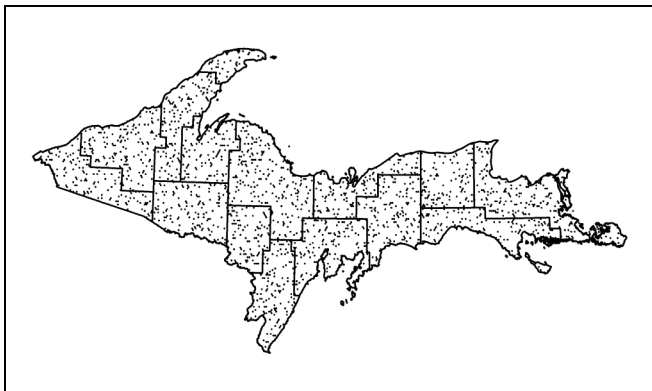


Figure 4. Marxan best solution for all MIGAP species in the Upper Peninsula.

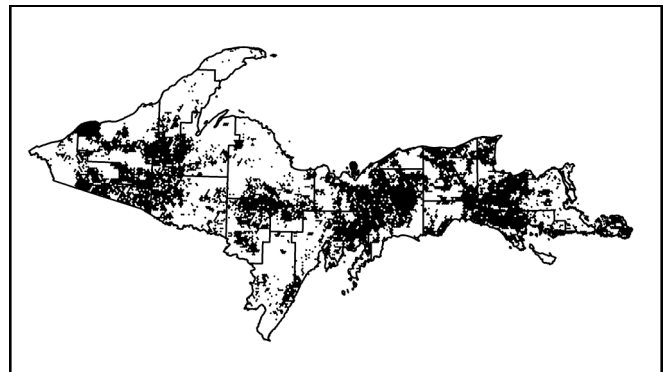


Figure 5. Marxan best solution for all MIGAP species in the Upper Peninsula with existing reserves locked in first.