Testing Land Resource Area Concepts
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Introduction
The NRCS’s Land Resource Regions (LRRs), Major Land Resource Areas (MLRAs) and Land Resource Units (LRUs) are used to guide programs and practice applications based on geographical areas where resource concerns, problems, or treatment needs are similar. While the art and science of resource area mapping has advanced significantly in the past several decades, the NRCS’s regionalizations have typically lacked suitable quantitative foundations in defining resource area concepts.

With the recently adopted provisional Ecological Site initiative (intended to complete initial inventory of ES in the contiguous U.S. by 2020), a pressing need has arisen to stratify ES concepts by practical and functional resource areas. Because resource areas (LRRs, MLRAs, and LRUs), are rarely discrete physical entities—often being conceptualizations reflecting perceived biases from the mappers—it is important that resource areas implement rule-based procedures to test concepts and geography. Here we present a methodology suitable for testing resource area geography and provide two case studies from the Desert Southwest and in the Central United States.

Methodology
Resource area boundaries were tested using a ranked-order model of local MLRA components (climate, geology, physical geography, soil, and land use) from existing MLRA boundaries in relationship to regional data. We then used a dimensionality reduction method to transform spatial models of elevation, climate, water balance, geology, soil properties, and phenology into a single grid and performed the similar analysis. Modeled geographic resource areas were tested against the 2006 MLRA boundaries through contingency table and cross tabulation using Cohen’s K coefficient for determining model agreement. Cohen’s K is given as:

\[ \kappa = \frac{Pr(a) - Pr(e)}{1 - Pr(e)} \]

where Pr(a) is observed proportionate agreement, Pr(e) is the probability of chance agreement [1]. Pr(e) is calculated from the land area agreement between the two maps [2].

Resource Area Comparisons
Resource area boundaries were clipped using an 85% threshold based on transformed models (center bottom). “Very good” agreement (\( \kappa = 0.8127 \)) was shown for MLRA 76, while only “moderate agreement” (\( \kappa = 0.5667 \)) demonstrated for MLRA 42.

Results
MLRA 42: Southern Desert
MLRA 42: Southern Desertic Basins, Plains, & Mountains is commonly known as the Chihuahuan Desert. MLRA 42 is one of the largest resource areas in the continental U.S., exhibiting high variability amongst resource area components.

MLRA 76: Blue Stem Hills
MLRA 76: Blue Stem Hills, is commonly known as the “Flint Hills”. This resource area typically has uniform shallow soils, chert (flint) rich limestone bedrock close to the surface, and relatively homogeneous vegetation.

Conclusions
While a national effort is underway to update NRCS’s Land Resource Regions, Major Land Resource Areas, and Land Resource Units, soil scientists and ecologists require tools to define resource areas in order to stratify local ecological site concepts. Here we explore a simple method to test resource area boundary concepts through a data oriented approach based on the historic regionalizations.

Map Resource: