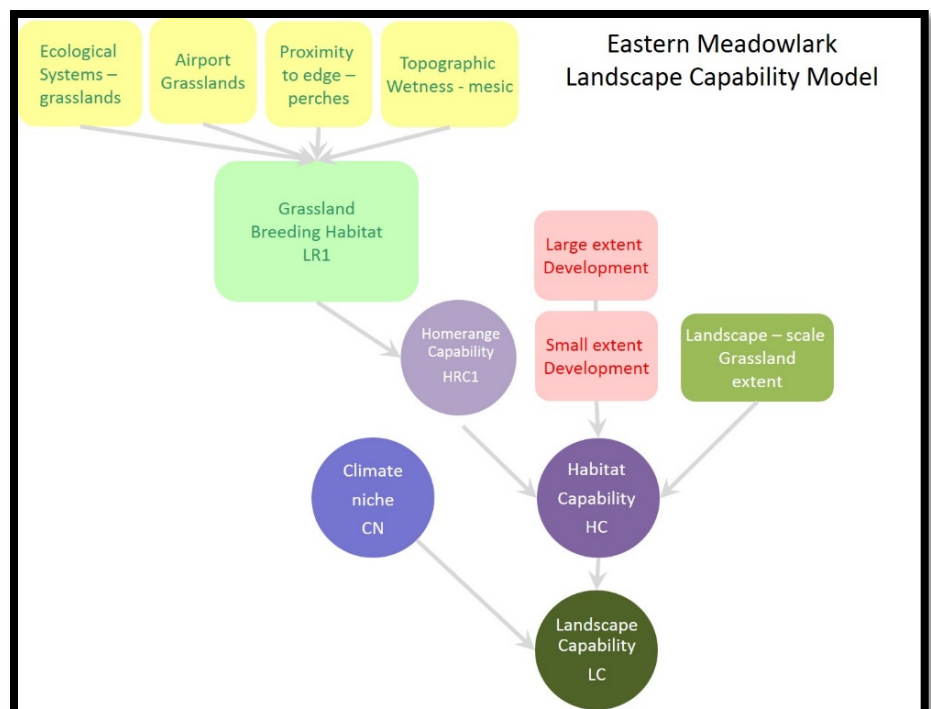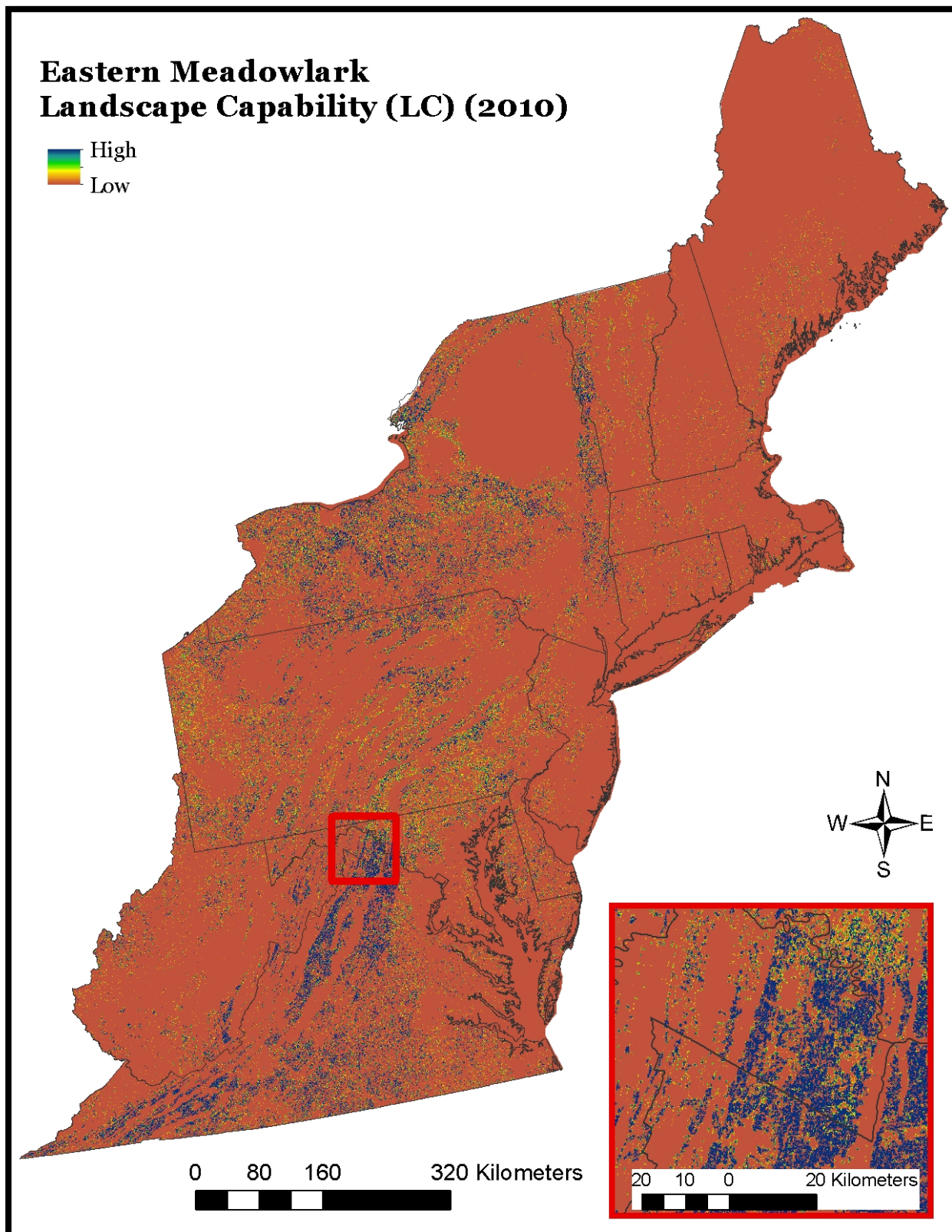# Eastern Meadowlark

Eastern Meadowlark was selected as a representative species for the Designing Sustainable Landscapes project of the North Atlantic LCC (https://scholarworks.umass.edu/designing_sustainable_landscapes/). The habitat clusters (ecological systems) and associated wildlife species that it represents generally comprise of grasslands.

The *Landscape Capabilit*y (*LC*) index integrates habitat capability and climate suitability into a single index that reflects the relative capacity of a site to support the species.

*Habitat capability* (*HC*) - The *HC* index considers four factors representing: (1) ecological system, identifying grassland systems (including pasture) representing the capability of a system to provide the required invertebrate food and nesting locations needed for breeding, (2) proximity of breeding habitat to available perches (forests or roads), (3) topographic wetness, intended to identify mesic conditions, (3) landscape-scale habitat extent, representing the amount of suitable habitat in the landscape surrounding the homerange, (4) small extent development, representing short-distance edge effects such as changes in microclimate, vegetation structure and access by predators that occur on a scale of tens to a few hundred meters from a developed or agricultural edge, and (5) large extent development, representing the effects of human-mediated landscape change that accumulate over a larger geographical area and that may penetrate more deeply into the forest than the processes of local edge effects, such as population increases of cowbirds and generalist predators.  The *HC* index represents the relative capacity of a site to provide the habitat needed by the species based on current scientific knowledge.

*Climate niche* (*CN*) - The *CN* index uses two climate variables representing: (1) growing degree days, (2) annual precipitation, (3) maximum summer temperature, (4) minimum winter temperature, and (5) annual temperature and is based on a statistical model derived from 5,522 Breeding Bird Survey (BBS) route segments distributed through the Humid Temperate Domain. The *CN* index represents the probability of the climate being suitable for the species based on its current distribution in relation to current climate.

*Landscape Capability (LC)* - The *LC* index is computed as the product of the *HC* and *CN* indices (see map). Thus, the index computed for 2010 reflects the gradient of worst (0) to best (maximum value) sites within the landscape that support this species during the breeding season. Note, we also compute this index for the future (e.g., 2080) based on output from the landscape change model. Model performance was evaluated using an independent dataset (eBird occurrence data; 2,947 present locations and 3,256 absent locations) and determined to be acceptable (Kappa = 0.71, Deviance explained=68%, AUC = 0.81).



Eastern Meadowlark Landscape Capability Model

**Eastern Meadowlark
Landscape Capability (LC) (2010)**

High
Low

0    80    160        320 Kilometers

20   10   0        20 Kilometers

See technical document on species at https://scholarworks.umass.edu/designing_sustainable_landscapes/ for a detailed description of the Landscape Capability modeling process.