# Red-shouldered Hawk

Red-shouldered hawk 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 consist of moist hardwood and mixed forests and includes Appalachian northern hardwood forests, Southern and Central Appalachian cove forests, and Southern Atlantic coastal plain and piedmont forests. The *Landscape Capability* (*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 six factors representing: (1) forested floodplain and wetland ecosystems for breeding as defined by ecological systems and biomass, (2) upland forests within close proximity to foraging areas, (3) suitable habitat extent, representing the amount of suitable breeding habitat in the surrounding landscape, (4) large extent development, representing the effects of human-mediated landscape changes that accumulate over a larger geographical area. The *HC* index represents the relative capacity of a site to provide the habitat needed by the species during the breeding season based on current scientific knowledge.

Climate niche (CN) - The *CN* index considers four climate variables representing: (1) growing degree days, (2) growing season precipitation, (3) annual mean temperature, and (4) minimum winter temperature. The *CN* is based on a statistical model derived from 5,000 absent locations and 5,000 present locations based on eBird data distributed throughout 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*. 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 a holdout subset of the eBird data (2,023 present and 2,023 absent locations) because BBS was inadequate for the climate suitability model. Model performance was determined to be acceptable (Kappa = 0.52, Deviance explained=37%, AUC = 0.83).

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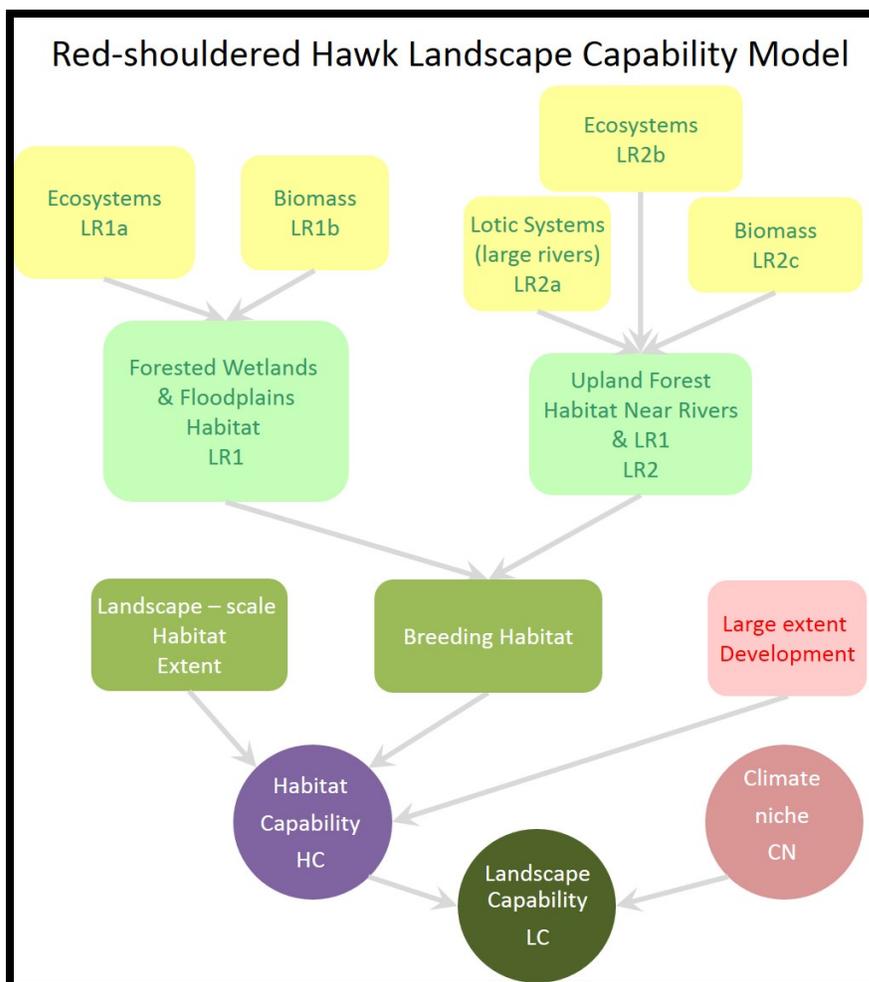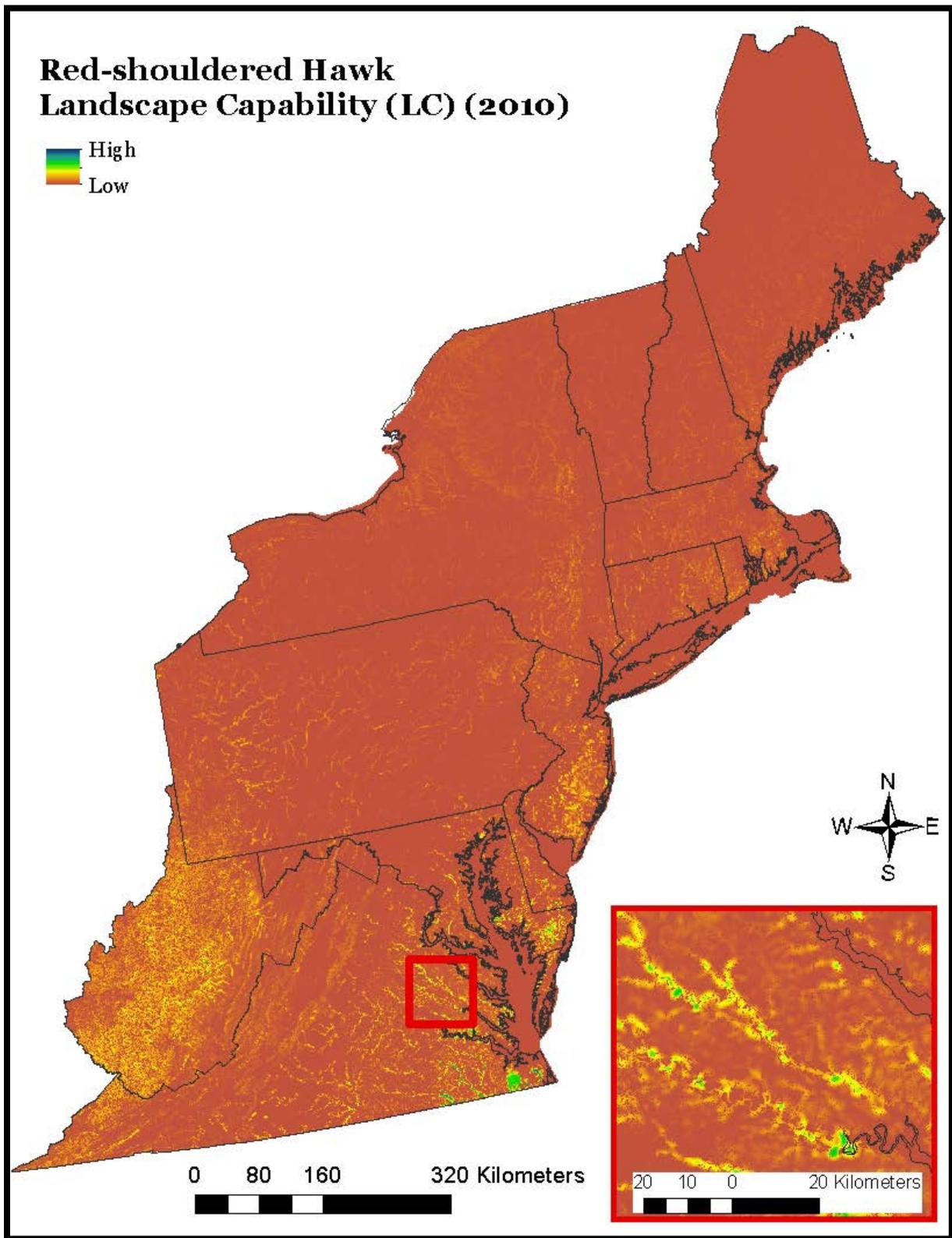
See technical document on species at https://scholarworks.umass.edu/designing_sustainable_landscapes/ for a detailed description of the Landscape Capability modeling process.