

## **Brown-headed Nuthatch**

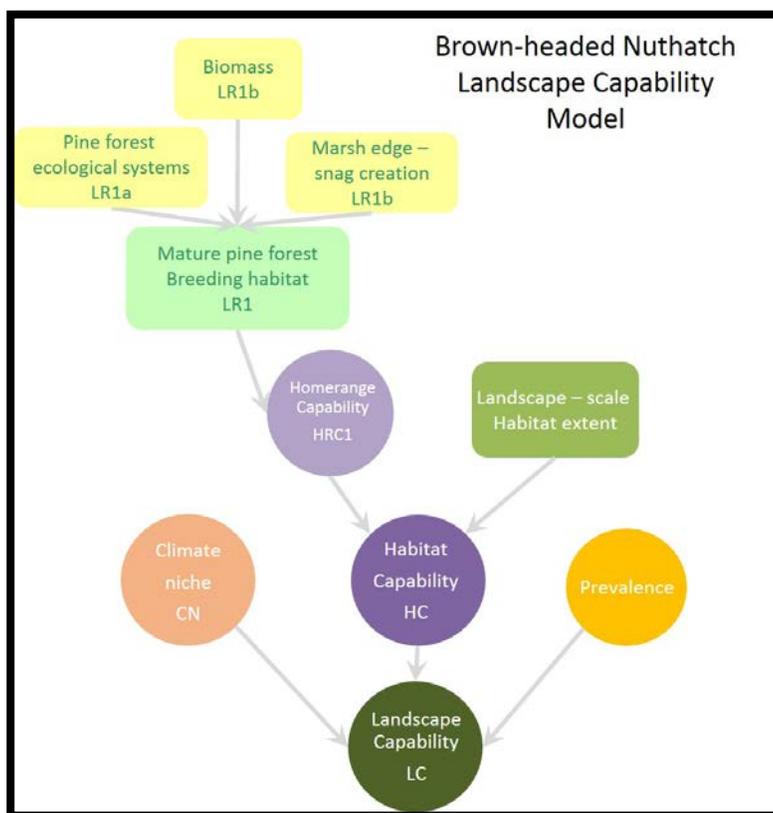
Brown-headed nuthatch was selected for the Designing Sustainable Landscapes project of the North Atlantic LCC ([https://scholarworks.umass.edu/designing\\_sustainable\\_landscapes/](https://scholarworks.umass.edu/designing_sustainable_landscapes/)) due to its associations with mature pine forests and pine plantations within the Coastal Plain and Piedmont in the Mid-Atlantic region of the NALCC. The *Landscape Capability (LC)* index integrates habitat capability, prevalence 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 three factors representing: (1) upland mature forests for breeding as defined by ecological systems, biomass and proximity to marsh edge for creation of standing dead trees, and (2) suitable habitat extent, representing the amount of suitable breeding habitat in the surrounding landscape. 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.

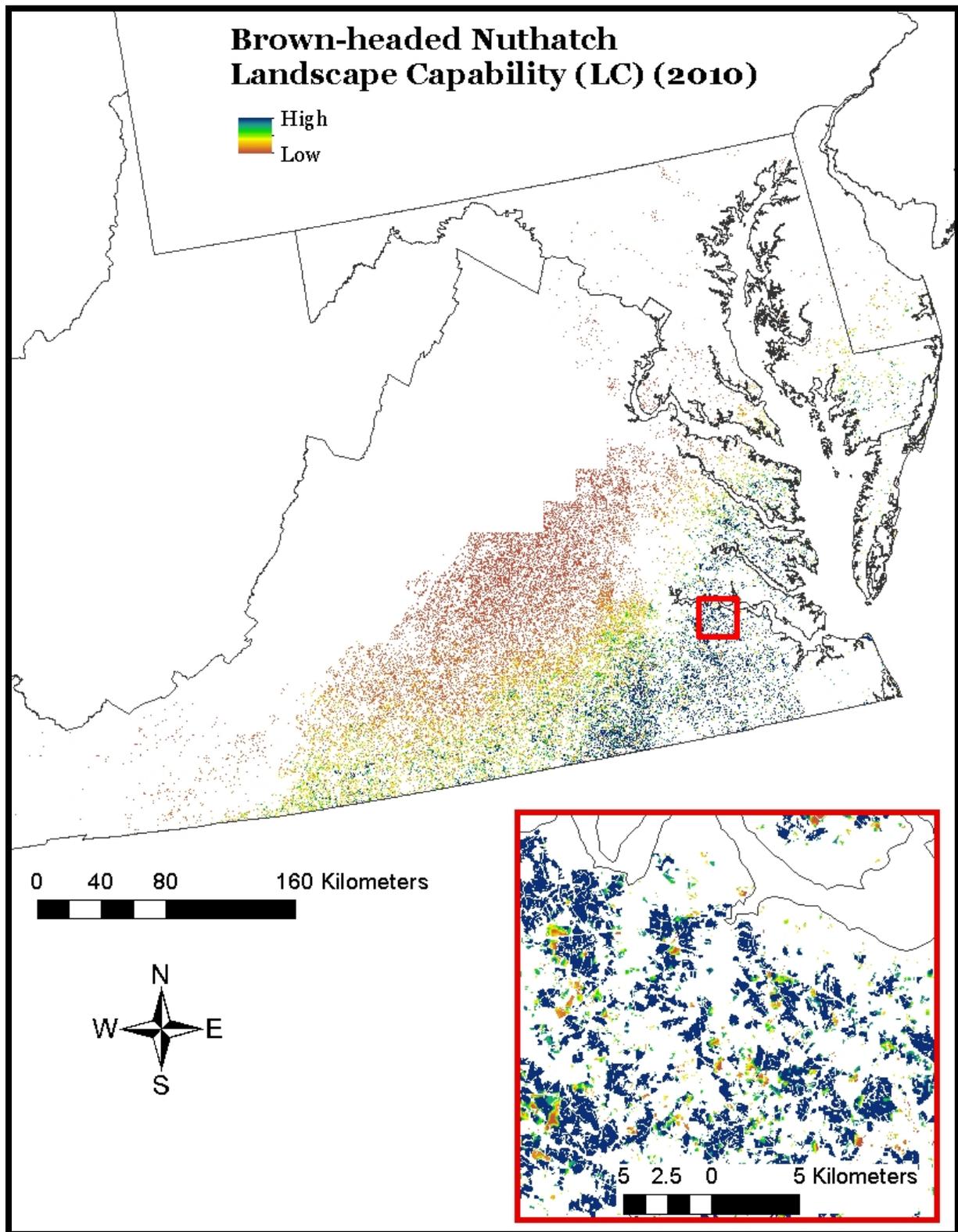
**Climate niche (CN)** - The *CN* index considers six climate variables representing: (1) growing degree days, (2) growing season precipitation, (3) annual precipitation, (4) annual mean temperature, (5) maximum summer temperature and (6) minimum winter temperature. The *CN* is based on a statistical model derived from 806 absent locations and 806 present locations based on Breeding Bird Survey segment 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.

**Prevalence index** - The Prevalence index is based on the proportional presence of the species across space and is derived from a smoothing of the presumed present and absent locations of the same BBS route segments as used for *CN*. The prevalence index represents the species' relative occurrence based on its current distribution without consideration of environmental determinants and is intended to address biogeographic factors other than habitat or climate (e.g., disease) that influence the species' current distribution.

**Landscape Capability (LC)** - The *LC* index is computed as the product of *HC*, *prevalence* 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 independent data from eBird data (288 present and 288 absent locations). Model performance was determined to be marginal (Kappa = 0.37, Deviance explained=38.5%, AUC = 0.67). The marginal model performance is primarily driven by a high omission error rate (0.61). This is caused by many present eBird locations where deciduous forests are mapped. It is likely that nuthatches are responding to the occurrence of pine trees at a smaller scale than what is mapped in The Nature Conservancy's ecological systems mapping.



**Representative Species Model: Brown-headed Nuthatch (*Sitta pusilla*)**



See technical document on species at [https://scholarworks.umass.edu/designing\\_sustainable\\_landscapes/](https://scholarworks.umass.edu/designing_sustainable_landscapes/) for a detailed description of the Landscape Capability modeling process.