Common Loon

Common loon 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 are northern New England lakes. 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 eight factors representing: (1) ecological system, identifying cold-cool oligo-mesotrophic lakes, (2) small lake islands for nesting, (3) complex shorelines for nesting, (4) shoreline development, (5) ecological systems identifying suitable shoreline nesting habitat (e.g., wetlands), (6) lake size, (7) proximity of aquatic habitat to shoreline and (8) large extent development, representing the effects of human-mediated landscape change. The *HC* index represents the relative capacity of a site to provide the breeding habitat needed by the species based on current scientific knowledge.

Climate niche (CN) - The *CN* index uses four climate variables representing: (1) growing season precipitation, (2) annual precipitation (3) minimum daily temperature and (4) growing degree days. The *CN* model is based on a statistical model derived from 286 absent BBS segments and 384 present BBS 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.

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 the *HC*, prevalence 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 performed using 1,145 present and 1,145 absent eBird data points. Model performance was determined to be acceptable (Kappa = 0.61, Deviance explained=27%, AUC = 0.91).

Common Loon Breeding Landscape Capability Model

Common Loon
2010 Landscape Capability (LC)
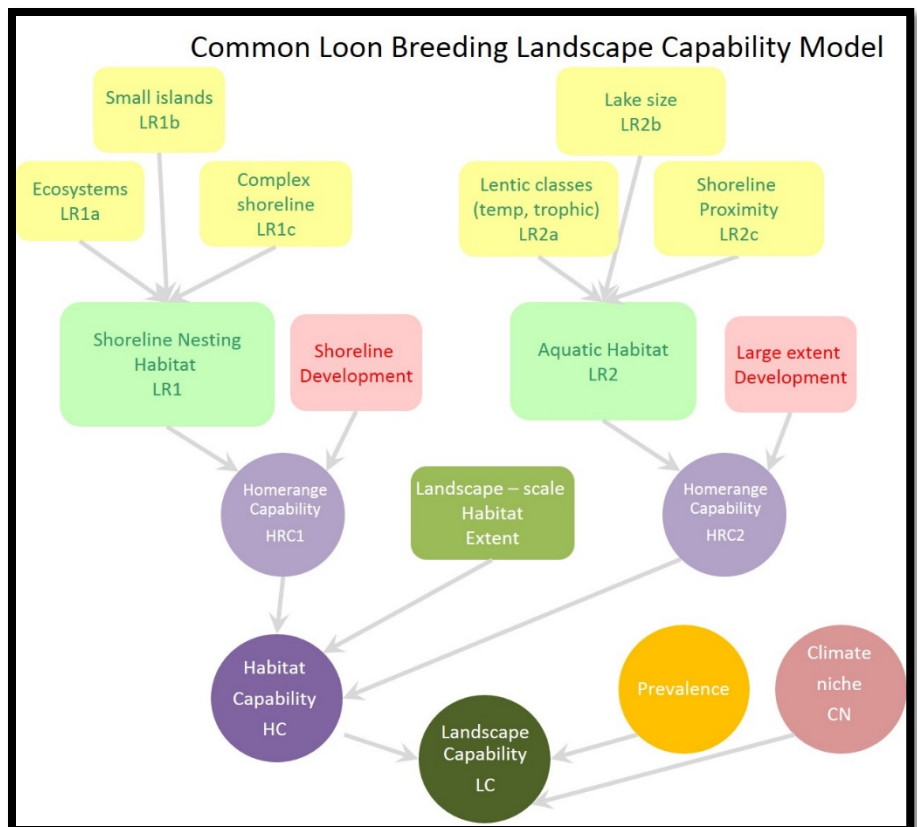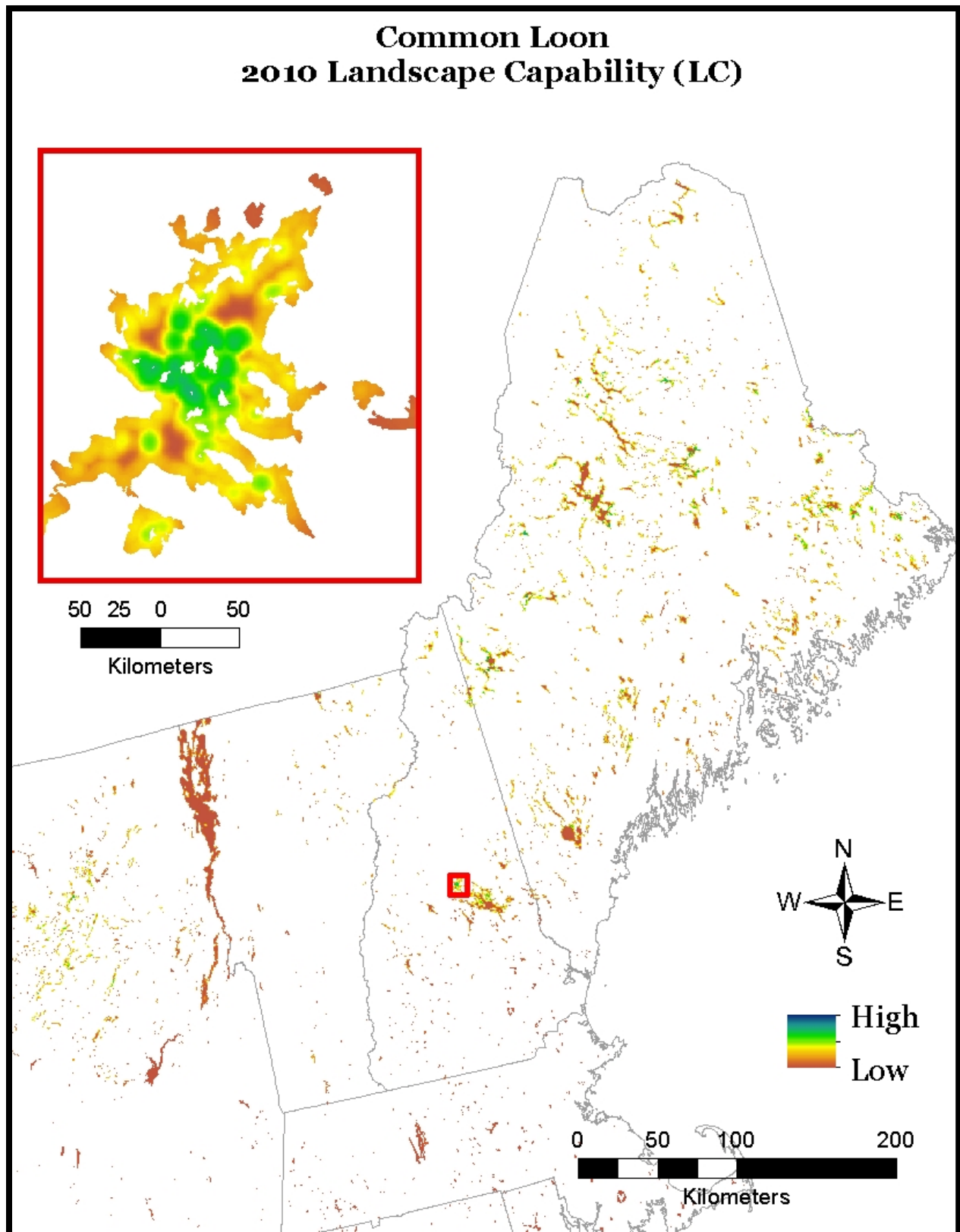
See technical document on species at https://scholarworks.umass.edu/designing_sustainable_landscapes/ for a detailed description of the Landscape Capability modeling process.