

Representative Species Model: American Black Duck, Non-breeding (*Anas rubripes*)

American Black Duck, Non-breeding Season

American Black Duck (non-breeding) 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 estuarine and freshwater coastal marsh and open water. 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.

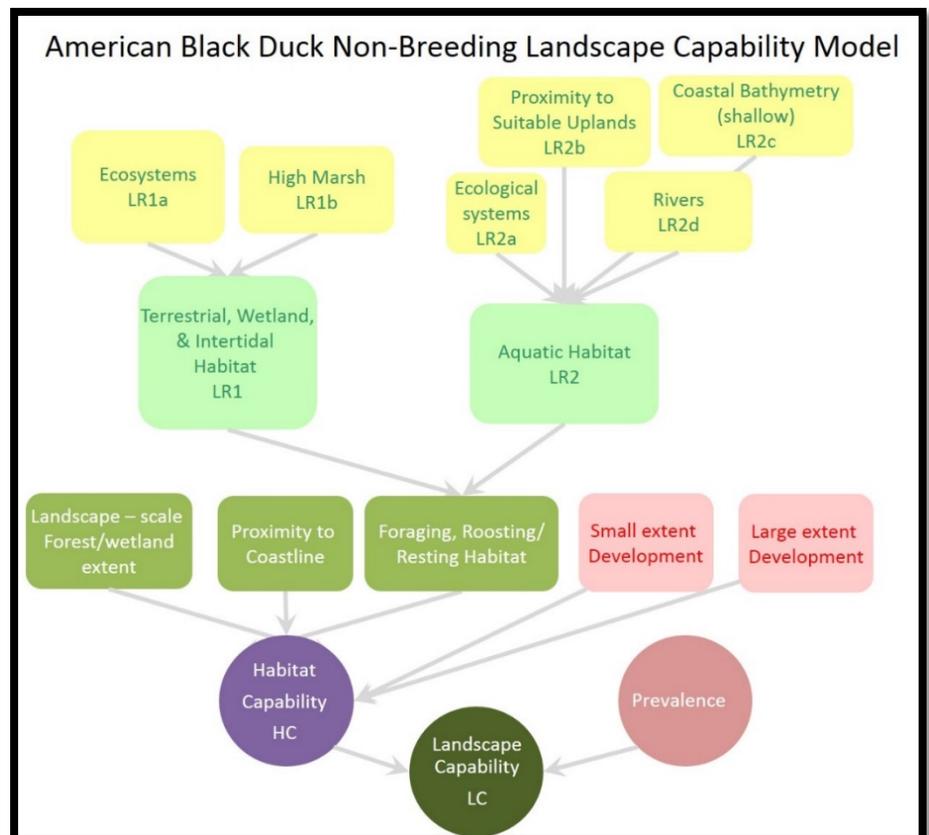
Habitat capability (HC) - The *HC* index considers six factors representing: (1) terrestrial, wetland and intertidal ecosystems as defined by ecological systems and high marsh mapping, (2) Aquatic ecosystems as defined by ecological systems, bathymetry, lotic systems and proximity to undisturbed uplands; indices 1 and 2 identify foraging, roosting and resting habitat, (3) suitable habitat extent, representing the amount of suitable non-breeding habitat in the surrounding landscape (~2km extent), (4) small extent development, representing the likelihood of anthropogenic disturbance that occur on a scale of tens to a few hundred meters from a developed edge, (5) large extent development, representing the effects of human-mediated landscape changes that accumulate over a larger geographical area, and (6) proximity of potential habitat to the coastline such that locations within 16km are most suitable and gradually declining with increasing distance. The *HC* index represents the relative capacity of a site to provide the habitat needed by the species during the non-breeding season based on current scientific knowledge.



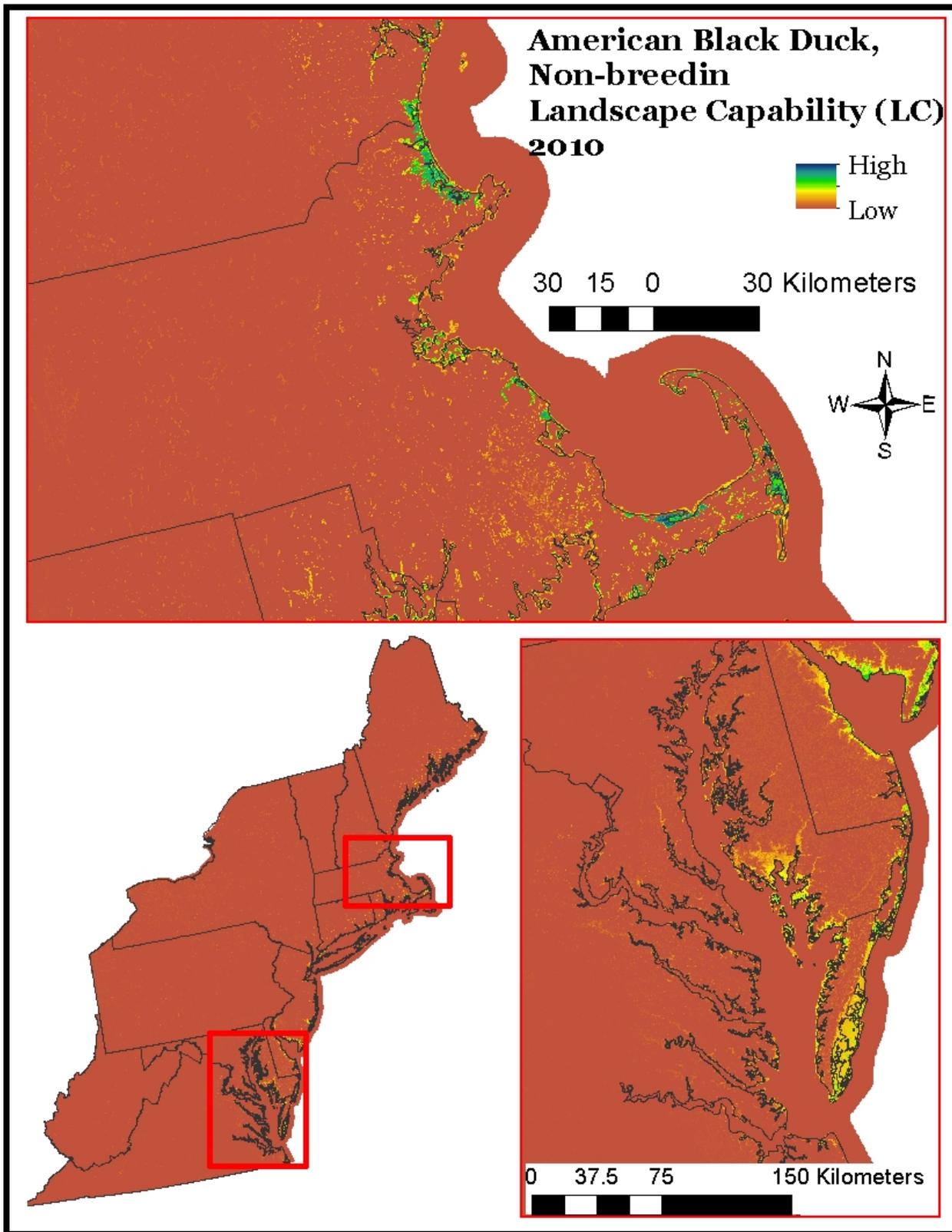
Climate niche (CN) - The *CN* index considers six climate variables representing: (1) growing degree days, (2) annual precipitation, (3) precipitation that occurs during the growing season, (3) annual mean temperature, (5) minimum winter temperature, and (6) maximum summer temperature. The *CN* is based on a statistical model derived from 7,150 absent locations and 7,074 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 non-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 993 present and 993 absent eBird data points that were held out of the *CN* model dataset. Model performance was determined to be acceptable (Kappa = 0.47, Deviance explained=20%, AUC = 0.75). We are currently working the Black Duck Joint Venture to acquire additional occurrence data to improve this evaluation.



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