Terrain may help identify habitats that are resilient to the effects of climate change

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A new paper in *The Condor: Ornithological Applications*, published by Oxford University Press, finds that models which use terrain features offer both practical and theoretical advantages in identifying climate resilient habitats for migratory birds whose populations are impacted by climate change.

Biodiversity is currently dropping at unprecedented rates, in large part to the fragmentation, alteration, and destruction of natural spaces. Habitat conservation efforts for migratory birds are particularly difficult as they depend on multiple environments spanning the bounds of state parks, national borders, and even continents. This is compounded by the ever-increasing growth of human developments and the competing interests of various stakeholders. These assorted and complex challenges limit the number of territories that can be restored or preserved. It is vital then to identify, and subsequently protect, climate-resilient habitats that have a stronger likelihood of remaining suitable over a longer period of time.

This study focused on three forest birds that have received considerable conservation attention in the Canadian Maritimes due to steep drops in population: the Rusty Blackbird (85% decline), Olive-sided Flycatcher (79% decline), and the Canada Warbler (71% decline). Over the past few decades, species distribution models (SDMs) have emerged as useful tools for understanding a habitat's value for a species. Previous SDMs were created for the three birds in this study, but these models did not consider the implications of climate change. Moreover, prior studies discouraged the inclusion of topographical features.

This study finds that certain terrain features can assist in predicting suitable habitat areas. For instance, an increased depth from the water table in a given terrain decreased the sustainability for both the Rusty Blackbird and the Canada Warbler. As for the Olive-sided Flycatcher, the study indicates that their population was more abundant in valleys and low-slope areas. The study further puts forward the idea that, as these terrain features are generally less affected by climate change than are variables such as temperature and precipitation, they should assist in identifying habitat areas which are more likely to remain suitable for target species over the long-term.

Though differences in forest features may have a more direct impact on a species distribution, these models demonstrate that terrain features do have predictive value, and can sometimes provide a stronger explanation for certain species. The stability of these features, and their ability to predict climate resilient habitats, is especially important in an era of climate change, as shifts in other environmental factors are expected to significantly alter forest ecosystems.

"In this brave new world of climate change, habitat loss, and increasing demands on the environment, a great many bird species, including the Rusty Blackbird, Olive-sided Flycatcher, and Canada Warbler are at serious risk of being lost forever. Nonetheless, using terrain features to help plan habitat protection and recovery efforts may improve the likelihood these beautiful species continue to persist into an uncertain future."

More information: "The importance of using topographic features to predict climate-resilient habitat for migratory forest landbirds: An example for the Rusty blackbird, Olive-sided flycatcher, and Canada warbler", *The Condor* (2019). DOI: 10.1093/condor/duz057

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