

Can local and behavioral adaptations maintain a species' distribution under climate change?



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Background



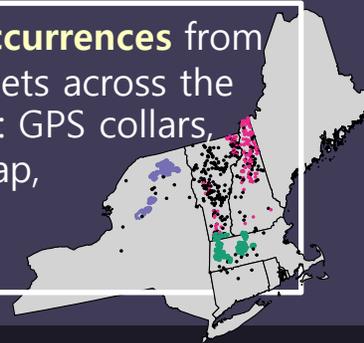
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Moose are a **cold-adapted species**. The Northeastern U.S. forms the trailing edge of their North American range.

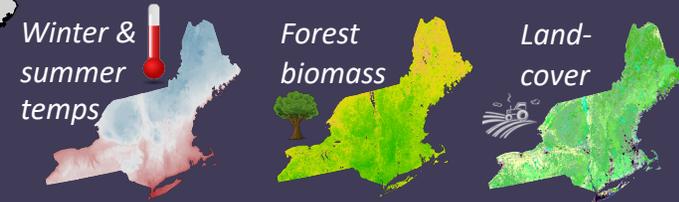
Climate change could affect moose survival and distributions via direct thermal stress and/or indirect effects.

Data & Methods

Moose occurrences from four datasets across the Northeast: GPS collars, camera trap, and GBIF data



Environmental data from the Designing Sustainable Landscapes dataset¹, ERA5², Daymet³, and CMIP6⁴

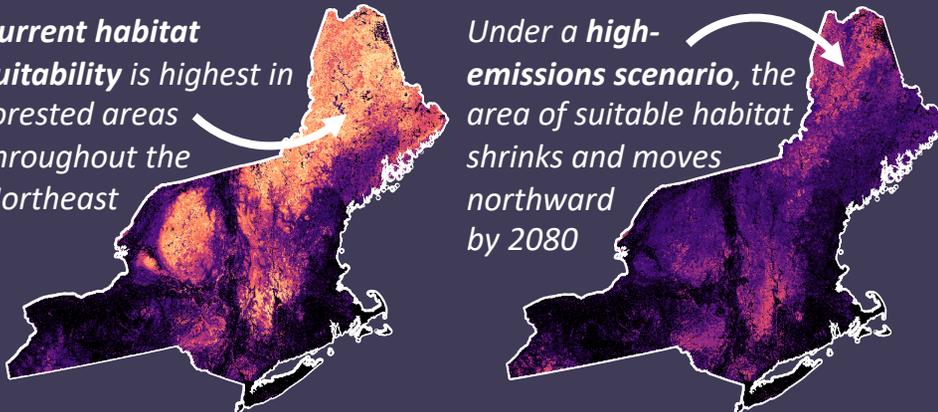


Results

Habitat suitability will decline under climate change, but...

Current habitat suitability is highest in forested areas throughout the Northeast

Under a high-emissions scenario, the area of suitable habitat shrinks and moves northward by 2080



least suitable most suitable

...the best predictors of moose occurrence vary by state, so **moose might be locally adapted**...

...and they **move to forested wetlands on warm days**, which could increase their tolerance to climate change.

Variable importance



Temperature variables are more important in MA and NY than in NH and VT

References (1) McGarigal, K., et al. (2017). *Designing Sustainable Landscapes Project*. University of Massachusetts, Amherst. (2) Thornton, P.E., et al. (2018) Daymet: Daily Surface Weather Data on a 1-km Grid for North America, Version 3. (3) Copernicus Climate Change Service. (2017) ERA5: Fifth generation of ECMWF atmospheric reanalyses of the global climate. (4) Earth System Grid Federation. (2020). *CMIP6 multi-model ensemble*.

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