Biotic interactions govern the distribution of coexisting herbivores in the Arctic Archipelago – a case for conservation planning

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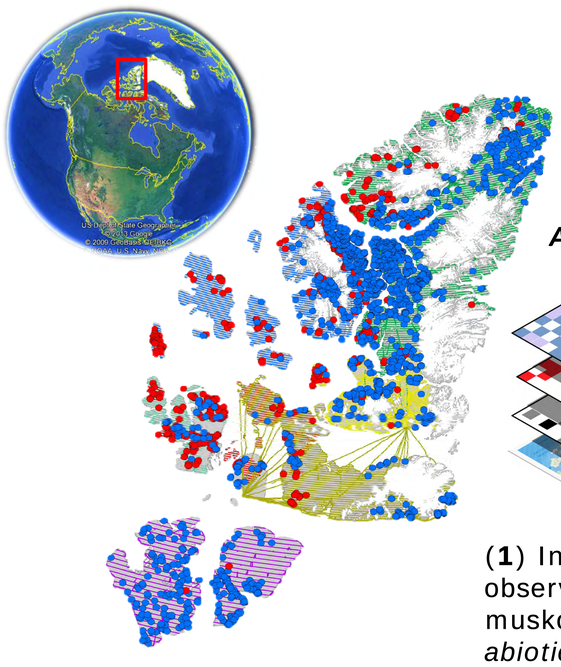
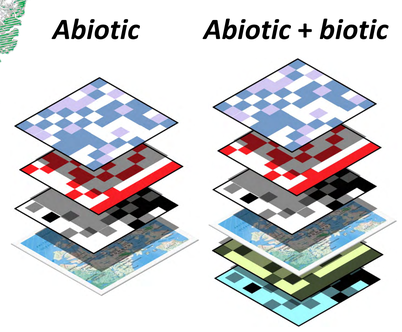
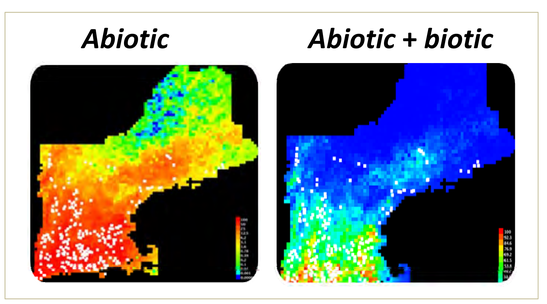


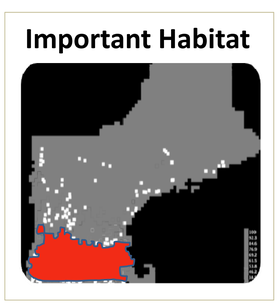
Understanding species distributions has become urgent with global changes in climate and declines in wildlife and their habitat. In response, species distribution models (SDMs) have emerged as a fundamental conservation tool. These models often use abiotic environmental variables and overlook biotic interactions – *such as competition and herbivory* - that can shape a species range.



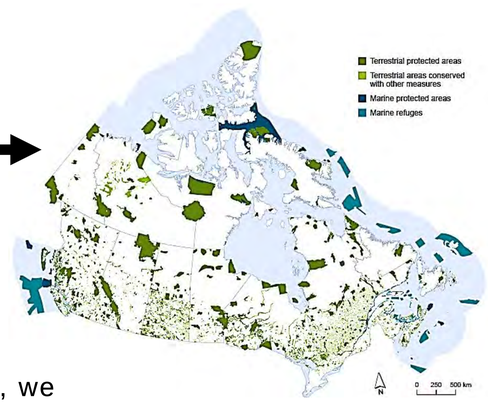
(**1**) In separate SDMs, we integrated observations of Peary caribou (🔴) and muskoxen (🔵), with *abiotic* only and *abiotic+biotic* variables to estimate their late winter distributions.



(**2**) We evaluated model performance and variable importance to determine the best models. We mapped habitat suitability and evaluated changes when biotic predictors were added.



(**3**) Using our best models, we identified areas of high conservation value and related these to existing protected areas.



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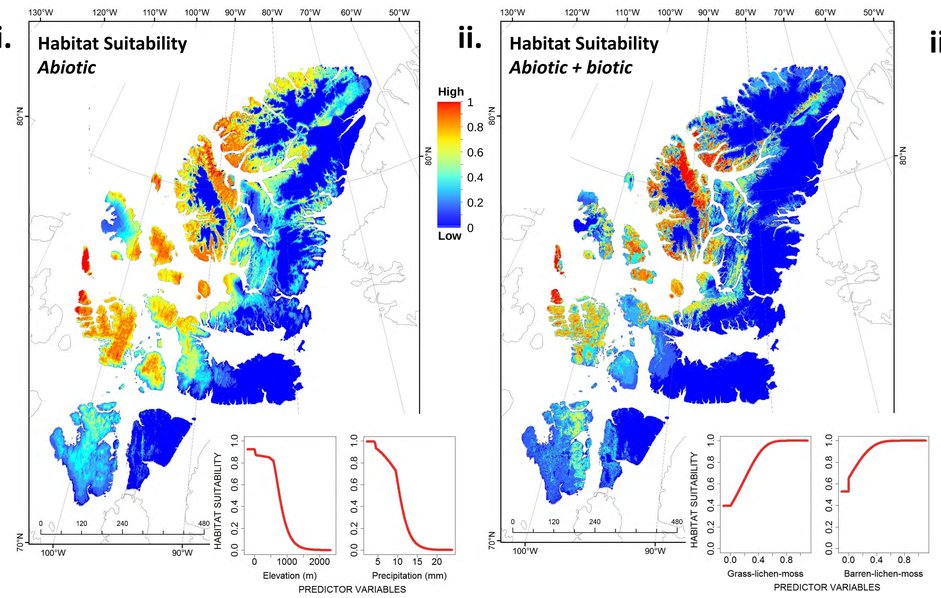
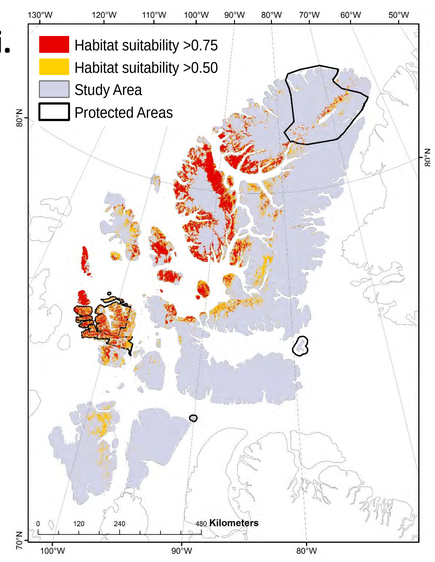
Peary caribou



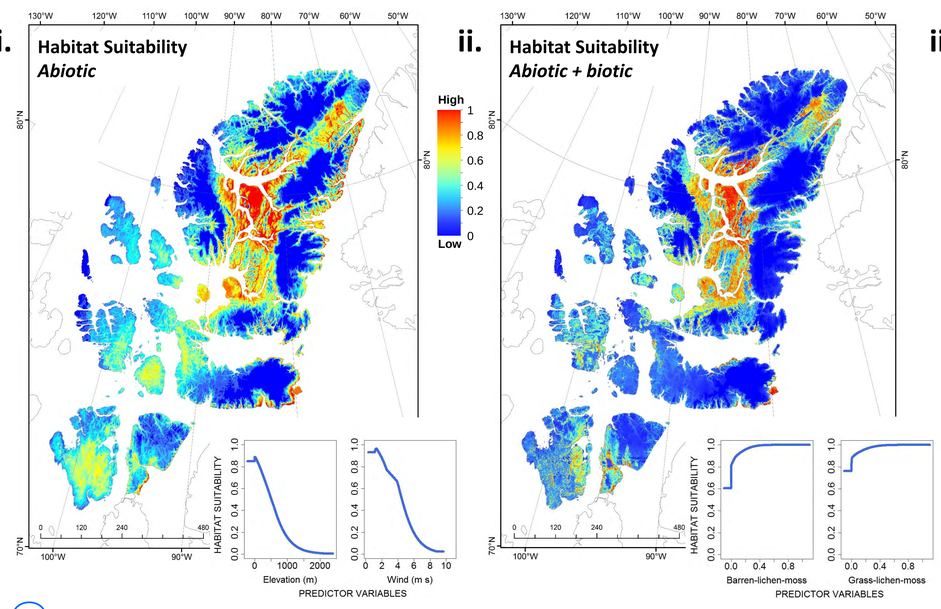


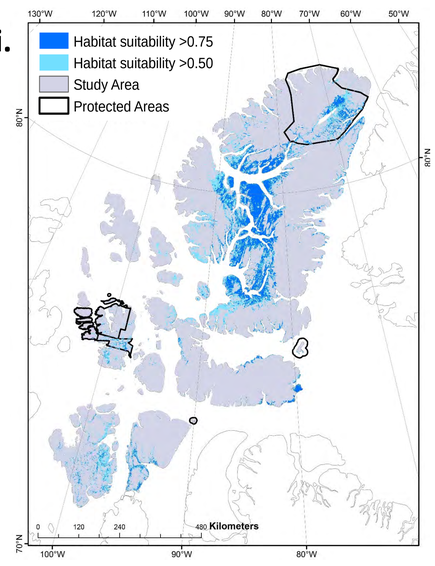
i. *Abiotic* models, AUC = [0.81], were outperformed by *abiotic+biotic* models, AUC = [0.87].

ii. Grass-lichen-moss and barren-lichen-moss cover were the most important variables.

iii. Areas of high habitat suitability (>0.5) covered 16% of study area. Only 15% of this habitat is protected.

Muskoxen





i. *Abiotic* models, AUC = [0.78], were outperformed by *abiotic+biotic* models, AUC = [0.85].

ii. Barren-lichen-moss and grass-lichen-moss cover were the most important variables.

iii. Areas of high habitat suitability (>0.5) covered 16% of study area. Only 11% of this habitat is protected.

Key Findings

- ***Abiotic + biotic* models outperformed *abiotic* models.**
- **Importance of grass-lichen-moss and barren-lichen-moss suggests food resources are limited.**
- **Areas of high conservation value largely lie outside existing protected areas.**
- **Picking the right areas for protection means including biotic predictors in SDMs.**

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