Canadian contribution to the review of empirical critical loads for nitrogen

— setting biodiversity-based empirical critical loads of nutrient nitrogen in boreal Canada using gradient forest analysis

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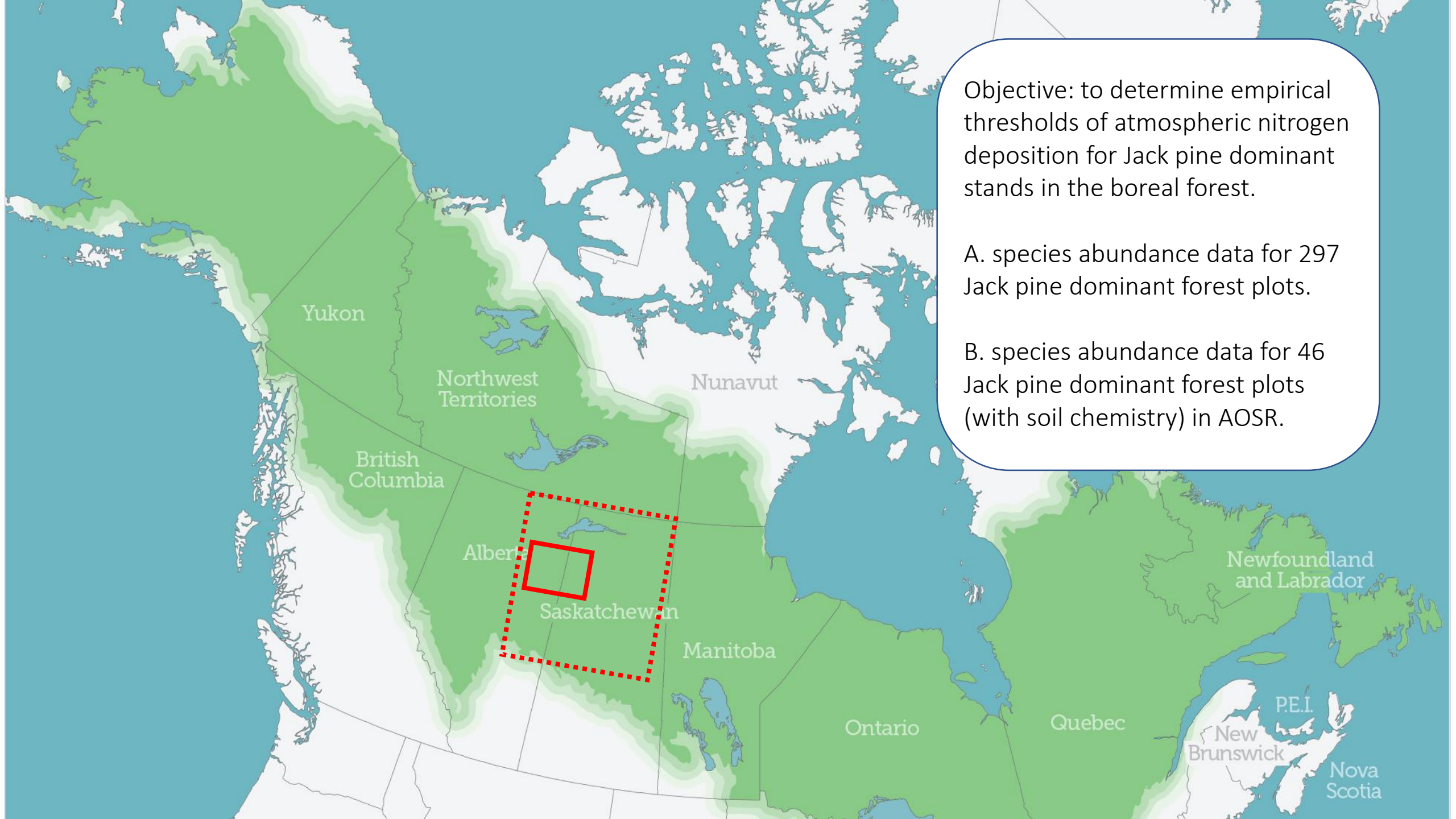


Objective: to determine empirical thresholds of atmospheric nitrogen deposition for Jack pine dominant stands in the boreal forest.

A. species abundance data for 297 Jack pine dominant forest plots.

B. species abundance data for 46 Jack pine dominant forest plots (with soil chemistry) in AOSR.

What did we do?

Gradient forest analysis was used to assess individual plant species response under multiple environmental gradients to identify empirical thresholds for atmospheric nitrogen deposition.

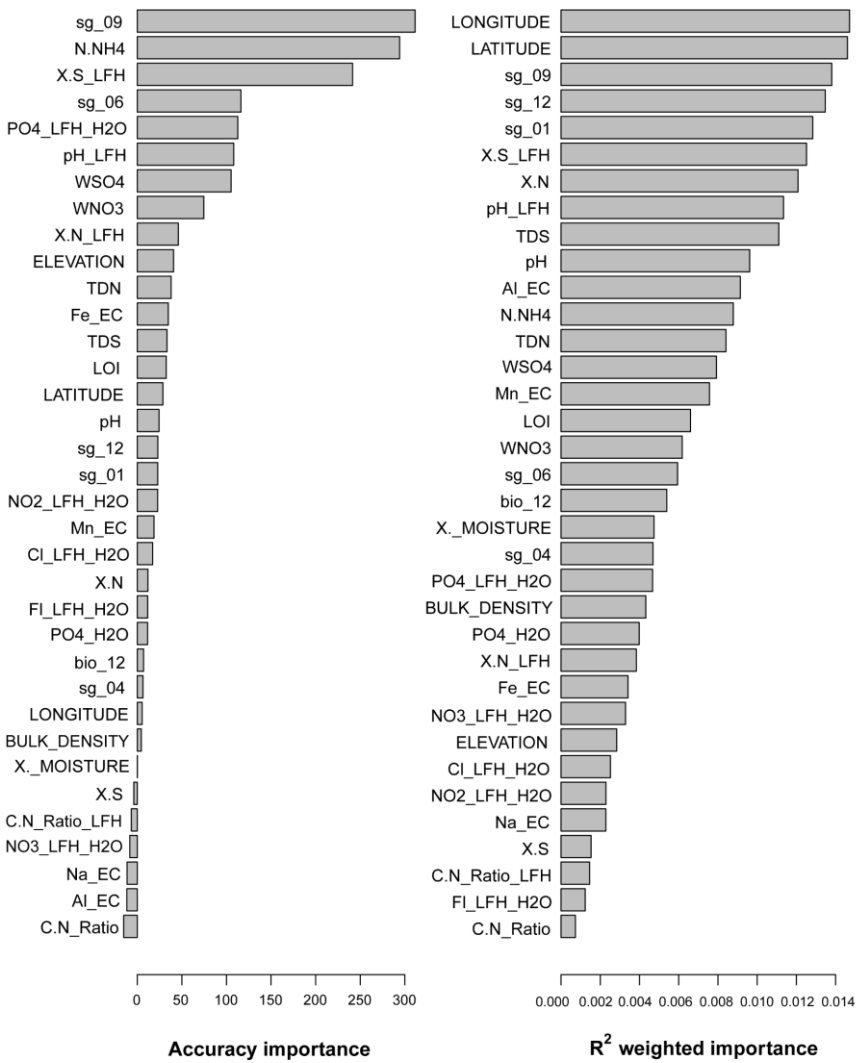
What data did we use?

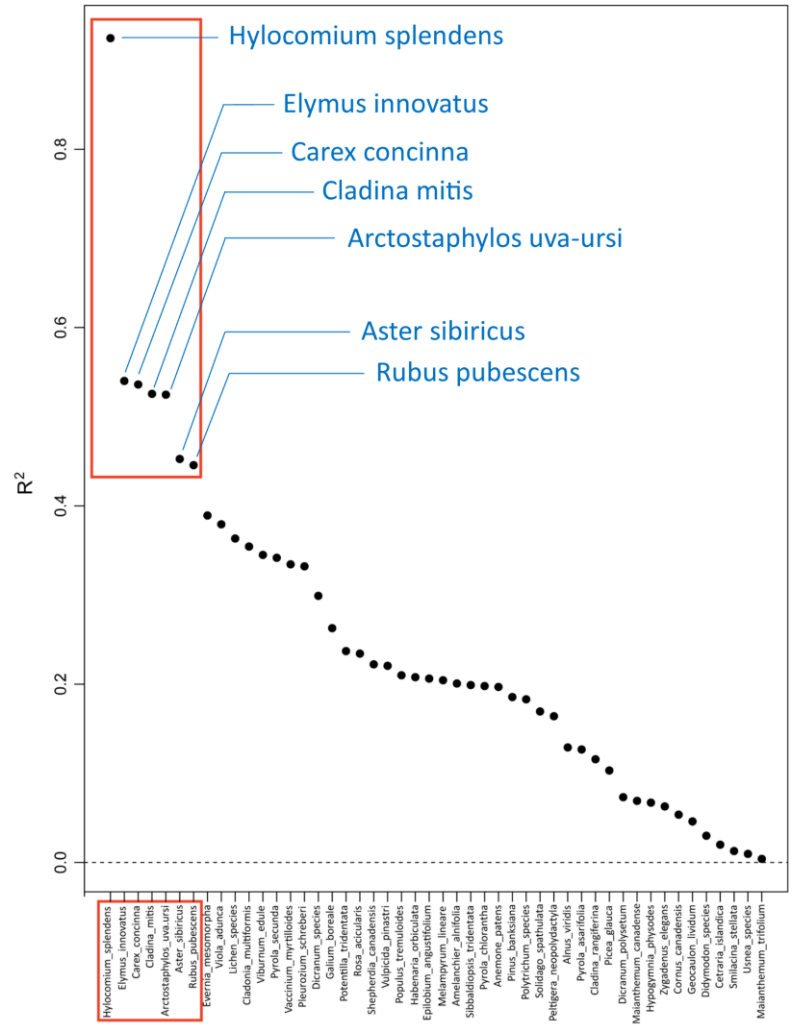
Species abundance data (206 species) for 46 Jack pine dominant stands across 35 environmental gradient variables (soil chemistry, climate and deposition).

What is gradient forests?

Roubeix V, Danis P-A, Feret T, Baudoin J-M, 2016. Identification of ecological thresholds from variations in phytoplankton communities among lakes: contribution to the definition of environmental standards. Environmental Monitoring and Assessment 188(4): 246.

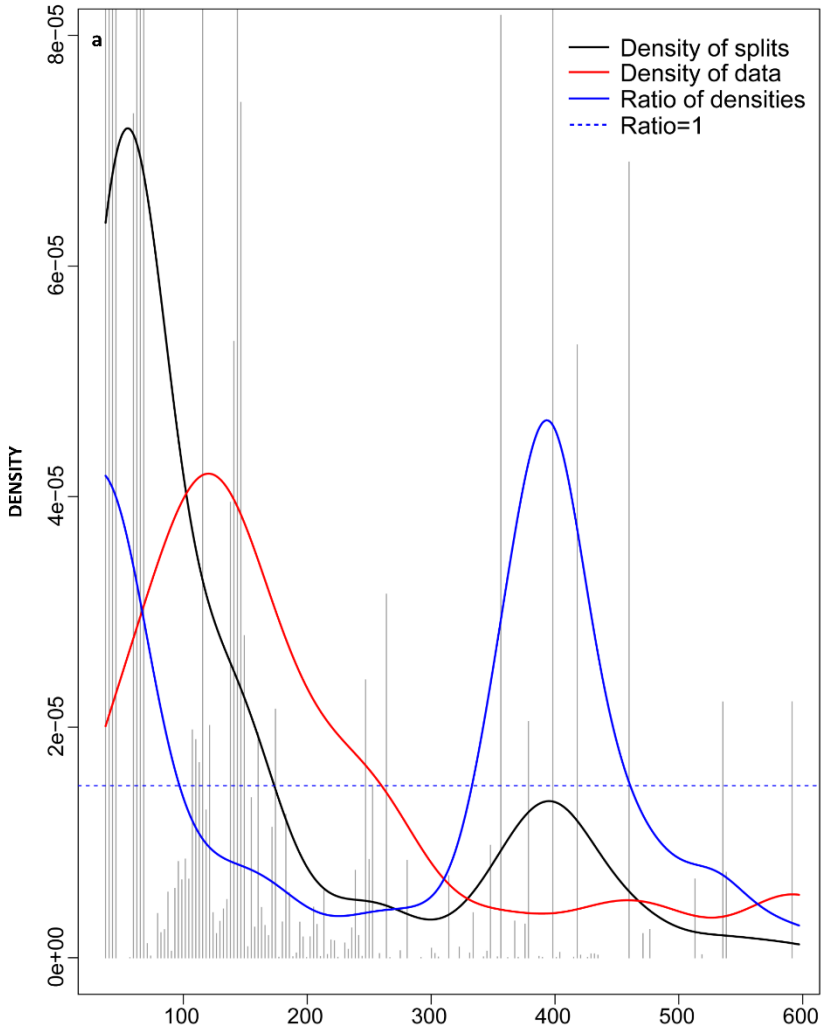
predictive power for each environmental variable

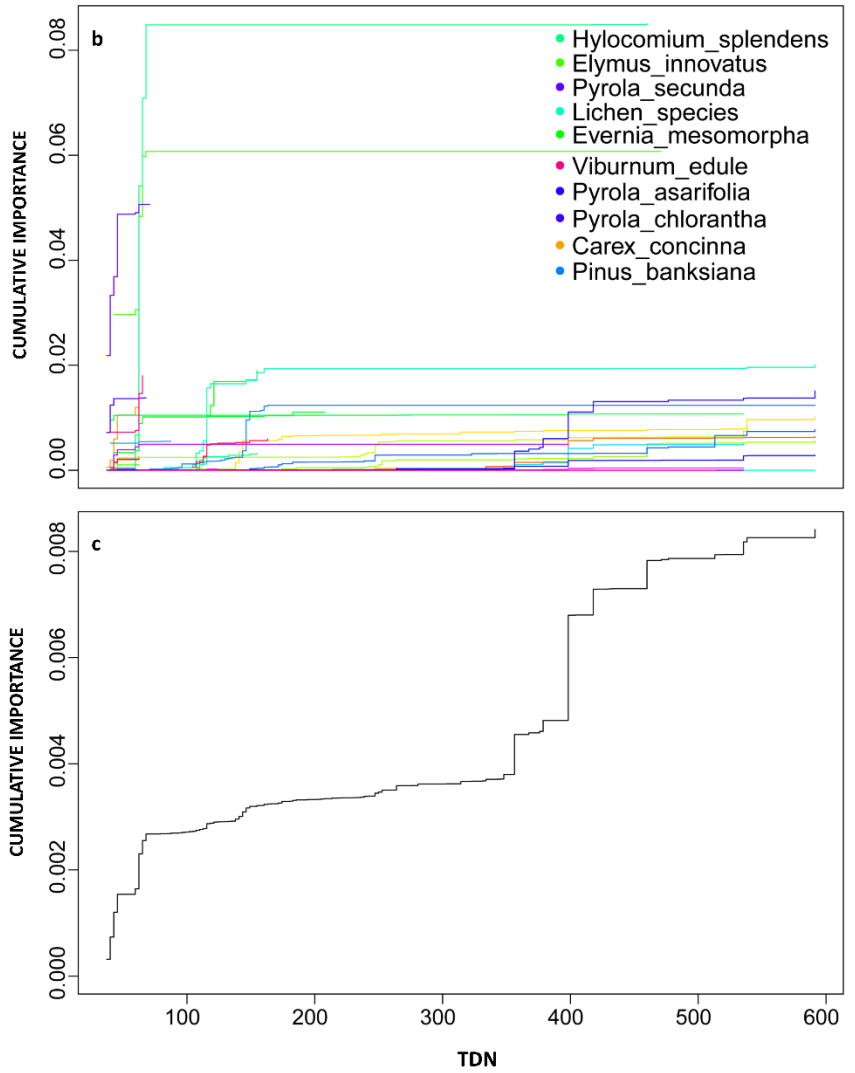




measure of the fit of random forest model for each species

greater community level changes (high split importance values) occur when the ratio of densities > 1





community cumulative importance plot showing the overall pattern of compositional change for all species

Gradient forest analysis identified two empirical thresholds for atmospheric nitrogen deposition for Jack Pine dominant stands in the boreal forest

Vascular species 5.6 kg N ha^{-1} yr^{-1}

Lichen species 1.5–3 kg N ha^{-1} yr^{-1}

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