

Ecosystem modeling reveals extensive soils that could support globally rare pine barrens and sandplain ecosystems in New York State

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Abstract

Pine barren and sandplain ecosystems are unique, globally rare ecosystems whose open-canopied vegetation structure supports a unique assemblage of plants and animals. They occur almost exclusively on deep, sandy soils, and require periodic disturbances to prevent succession to forest. Though these ecosystems, and the unique species that live in them, are rare today, they once occupied a larger area of coastal and interior New York and New England. In order to better understand pine barren and sandplain distribution in the past, and the potential for restoring them in the future, we mapped the distribution of soils in New York State that can support these ecosystems. We quantified soil percent sand and soil depth of 156 known high quality remnant pine barren and sandplain ecosystems to calculate threshold soil characteristics. We then mapped all soils in the state that were at least as sandy and deep as the threshold values we calculated. The total area of our map of potential soil conditions was over 9,500 km², made up of forested (57%), urban (26%), agricultural (13%) and open (4%) land cover. Nearly 7,000 km² – almost 20 times the area of known, high quality remnant ecosystems – of land was forested, agricultural, or open land. Existing examples of pine barren and sandplain ecosystems were mostly embedded within much larger matrices of forest, agriculture, and urban land cover that shared the distinctive soil conditions. The presence of extensive soils in coastal and interior New York that, with the appropriate disturbance regime, have the potential to host pine barren and sandplain ecosystems offers a new perspective on these ecosystems' distribution in the past – and about how to better align restoration and conservation to preserve the future.

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