

Habitone analysis of quaking aspen in the Book Cliffs (Utah, USA): effects of site water demand and conifers on aspen cover.

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Paper Abstract: Quaking aspen is the most widely distributed tree species in North America, but its presence is rapidly declining across the western United States. This decline is complex, but due largely to two factors widely separated in temporal scale: 1) water limitation on aspen seedling recruitment by Holocene climate change, and 2) shading of aspen clones by conifer encroachment during a century of fire suppression. These processes interact variously and often diffusely, so that traditional, binary habitat mapping approaches can only resolve their net effect after complete loss of aspen patches. To inform aspen management in the Book Cliffs, a biogeographic link between the Utah and Colorado Rocky mountains experiencing marked aspen decline, we estimated the niche of quaking aspen to potential evapotranspiration (*PET*) by regression, projected this (fuzzy) niche geographically as *habitone*, and then correlated the deviation from *PET*-habitat expectation to presence of conifers. Results confirm the strong constraint of site water demand on aspen and suggest that conifer presence decreases actual aspen presence beneath *PET*-*habitone* values. The information conserved by *habitone* analyses allowed detailed maps of management importance and potential, which would have been severely degraded by traditional habitat analyses. It can only be assumed that such increases in the information content of habitat maps will result in more effective land management.

Keywords

Habitat, *habitone*, quaking aspen, fuzzy sets, gradient analysis, GIS