

Nuttle, T, TE Ristau, AA Rojo (2013) Long-term biological legacies of herbivore density in a landscape-scale experiment: forest understoreys reflect past deer density treatments for at least 20 years. Journal of Ecology 2014, 102: 221-228

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Abstract

1. Ungulate browsers, when at high densities, are major drivers of vegetation change in forests world-wide. Their effects operate via a variety of generalizable mechanisms related to plant palatability and relative growth rate with respect to browsing pressure.
2. Though such impacts are obviously long-lasting when they determine composition of tree regeneration, we document in a unique long-term (30 year) experiment that biological legacies of initial deer density persist in the understorey herbaceous vegetation at least 20 years after deer densities were equalized.
3. We sampled understorey vegetation in former clear-cut areas where density of white-tailed deer (*Odocoileus virginianus*) was manipulated (3.9–31.2 deer/km²) for 10 years (1979–1990), and stands experienced ambient deer density (ca. 10–12 deer/km²) for the next 20 years (1990–2010) to determine whether initial deer density treatments still influenced understorey vegetation in

30-year-old, closed-canopy forests.

4. Stands initially (1979–1990) exposed to higher deer densities had ca. five times higher fern cover

and three times the seedling and forb cover in 2010, as well as significantly lower angiosperm

species density, compared to stands initially exposed to lower deer densities.

5. These results appear driven by deer avoidance of ferns, allowing them to expand at high deer

density and sequester sites for decades.

6. Synthesis. Our long-term, experimental results show unequivocally that elevated deer densities

cause significant, profound legacy effects on understorey vegetation persisting at least 20 years. Of

relevance regionally and globally where high deer densities have created depauperate understoreys,

we expect that deer density reduction alone does not guarantee understorey recovery; stands may

need to be managed by removing recalcitrant understorey layers (e.g. ferns).

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