

Northern Research Station

Rooted in Research

ISSUE 1 | AUGUST 2020

Reading the Foodscape: Advances in White-Tailed Deer Habitat Management

Too Much of a Good Thing

If you look at a list of official state animals, there's one species that stands out from the rest. While 6 states boast of their bears and 5 states have highlighted their horses, a whopping 10 states have designated white-tailed deer (*Odocoileus virginianus*) as a state animal.

White-tailed deer have an interesting and complicated history. While widespread hunting drastically reduced the species' population nearly a century ago, conservation programs and regulated hunting have helped populations rebound. For decades, high-density deer populations have suppressed forest growth, severely diminished some wildflower and shrub species, and degraded habitat for wildlife and recreation.

KEY MANAGEMENT CONSIDERATIONS

- High-density deer populations can suppress forest growth, wipe out some plant species, and degrade habitat for wildlife and recreation.
- Deer management has tended to rely on hunting for population control, with less emphasis on habitat health and biodiversity.
- Ongoing research by the Northern Research Station and its partners is helping land and wildlife managers evaluate deer habitat and hunting strategies by examining forest health and biodiversity.
- In northern Pennsylvania, when about 20 percent of a square-mile area was managed to provide a healthy deer forage "foodscape," the negative deer-browsing impact was reduced so much that the area resembled a fenced off area where deer were kept out all together.



NRS scientists are developing guidelines for white-tailed deer and habitat management based on forest health and biodiversity. Photo by David Cappaert, Research Entomologist, from Bugwood.org.

Forage Availability: A New Perspective

To help manage habitat in high-density deer locations, scientists at the Northern Research Station are studying how landscape-wide forage availability, also known as the "foodscape," influences deer browsing. This research, described in a 2017 Landscape Ecology article, can be used by land and game managers to reduce deer browsing impacts around the country. The article, entitled "Spatio-temporal variation in foodscapes modifies deer browsing impact on vegetation," was written by Northern Research Station scientists Alejandro Royo and Susan Stout (now retired), along with research partners at the University of Georgia's Warnell School of Forestry and Natural Resources.



Browsing to Their Heart's Content

Royo's research has been applied in the Allegheny National Forest in northwestern Pennsylvania. The area is widely recognized among local hunters for excellent deer hunting and well known among forest managers and researchers for its lack of a healthy forest understory.

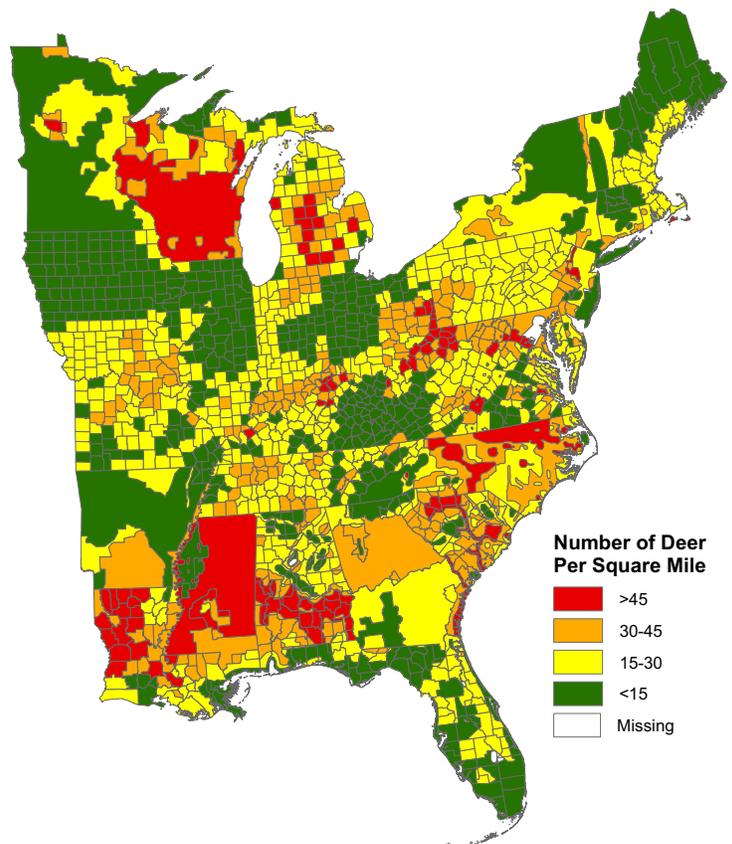
This is something that Andrea Hille, an Allegheny National Forest silviculturist, has been watching for decades. According to Hille, "In places like the Hearts Content Recreation Area, which is a popular visitor site, excessive deer browsing has damaged the understory for 80 years. We actually have an interpretive trail that includes a fenced-off area to show how the ecosystem looks different when you keep out the deer." The problem, Hille explains, is that after decades of deer browsing, biodiversity is very low and the only plants and trees left are those that deer don't like to eat.

Creating a Win-Win-Win Scenario

The research found that when about 20 percent of a square-mile area—roughly the typical home range of a white-tailed deer—is managed to be forage-rich, the negative deer-browsing impact on the overall area is reduced to a point that it resembles an area where deer are kept out altogether.

In the Allegheny National Forest, managers must consider deer browsing impacts and forage availability as part of their strategy to sustain a diversity of tree seedlings and plants. Managers start by assessing what proportion of the landscape is in potentially forage-rich habitats. Using this information, they can target areas for growing forage during timber harvesting activities. This helps sustain forage at a level that reduces overall deer impacts on the forest understory.

As Royo explains, "There's sometimes a sense that there's a tug of war between deer and forest management. While hunting is an important aspect of deer and habitat management, it's important to consider forage as well. By understanding how these two factors affect habitat and by enhancing hunting in some areas to allow natural regeneration to occur, you can provide forage to improve deer health while protecting hunting opportunities and maintaining biodiversity. It's a win-win-win scenario."



Recent studies are helping land and wildlife managers to target deer population control with a goal of habitat restoration. Data source: Quality Deer Management Association.

Project Lead

Alejandro Royo is a forest ecologist at the Northern Research Station in Irvine, Pennsylvania. Additional information on Alex and his research can be found at www.nrs.fs.fed.us/people/arojo.

FURTHER READING

Royo, A.A.; Kramer, D.W.; Miller, K.V.; et al. 2017. [Spatio-temporal variation in foodscapes modifies deer browsing impact on vegetation](https://doi.org/10.1007/s10980-017-0568-x). *Landscape Ecology*. 32: 2281. <https://doi.org/10.1007/s10980-017-0568-x>.

McWilliams, W.H.; Westfall, J.A.; Brose, P.H.; et al. 2018. [Subcontinental-scale patterns of large-ungulate herbivory and synoptic review of restoration management implications for midwestern and northeastern forests](https://doi.org/10.2737/NRS-GTR-182). Gen. Tech. Rep. NRS-182. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 24 p. <https://doi.org/10.2737/NRS-GTR-182>.

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