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CLIMATE CHANGE

Too Many Deer: A Bigger Threat to Eastern Forests than Climate Change?

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The recovery of white-tailed deer populations is a stunning conservation success. But is it too successful? Photo © The Nature Conservancy (Matt Miller)

“ I now suspect that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer.”

- Aldo Leopold, A Sand County Almanac, 1949

In August, 2012 The Bloomberg View published a staff editorial entitled *Deer Infestation Calls for Radical Free-Market Solution*. The *Wall Street Journal* then ran a story in November 2012 entitled *America Gone Wild*, noting the impact of overabundant deer. **If business news organizations can talk freely about deer,** The Nature Conservancy (TNC) needs to speak openly as well. Aldo Leopold long ago warned us of the problems of a growing deer herd. Have we waited too long to heed his advice, or is there still time to reverse the damage done?

No native vertebrate species in the eastern United States has a more direct effect on habitat integrity than the white-tailed deer. There are no hard numbers, but in many states deer populations continue to rise well beyond historical norms. In many areas of the country deer have changed the composition and structure of forests by preferentially feeding on select plant species.

In northern Minnesota, TNC staff demonstrated that decades of overbrowsing led to recruitment failure for many tree species, a shift in subcanopy and canopy dominance towards non-preferred white spruce, and significantly lower forest productivity (White 2012). In New York, TNC scientists report that one-third of New York's forests are currently compromised as a result of excessive herbivory (see New York Forest Regeneration Study).

Findings similar to these have been documented across the country. U.S. Forest Service researchers have noted that even if areas with high deer densities were managed to reduce the impact of deer, there may be long-lasting legacy effects (Royo 2010). Webster (2005) found severe and lasting impacts at Smoky Mountain National Park to be so complete that some plants such as trilliums were unlikely to recolonize local areas on their own. Deer are also well-documented vectors for the dispersal of non-native exotic plants (Knight et al. 2009, Baiser et al. 2008, Williams and Ward 2006).

Indirect effects on wildlife have been reported as well, such as **widespread declines of North American songbird populations** (Chollet 2012). One study found forest songbirds that preferred nesting in the shrub and intermediate canopy layer declined in abundance and species richness as deer density increased (deCalesta 1994).

White-tailed deer likely impact every landscape east of the Mississippi River. The damage has been insidious — both slow moving and cumulative. Unfortunately, the harm is often overlooked, or worse, accepted as somehow "natural."

In our opinion, no other threat to forested habitats is greater at this point in time — not lack of fire, not habitat conversion, not climate change. Only invasive exotic insects and disease have been comparable in magnitude. We can argue about which threat is more significant than another, but no one who walks the eastern forests today can deny the impact of deer to forest condition.

It is clearly true that fire suppression has had a widespread impact on successional trajectory and tree species composition. A natural fire return interval would be a great benefit to many eastern forests. Yet even where fire is present, excessive deer herbivory has been shown to depress tree species diversity or at least minimize the benefits of fire. In the words of a recent study on the interactions of fire, canopy gaps, and deer browsing: "… restoring disturbances without controlling browsing may be counterproductive." (Nuttle, 2013)

While we acknowledge that climate change is a long-term stressor that will lead to significant changes in eastern forest ecosystems, **high deer populations have had a much greater negative impact currently** and over the last several decades. At present there is little evidence of direct climate change impacts on eastern forests (Beckage et al. 2008, Woodall et al. 2009, Zhu et al. 2012, Rustad et al. 2012). With climate envelope and other modeling systems, we have a general understanding about likely range shifts and compositional changes in eastern forests over the next 50-100 years. However, due to the many interacting factors such as atmospheric deposition (nitrogen, ozone), insect pests and pathogens, invasive plants, CO_2 enrichment, longer growing seasons, and white-tailed deer populations, there is a high degree of uncertainty about the future condition and function of eastern forests in a changing climate (Frelich and Reich 2009, Rustad et al. 2013).

No such uncertainty exists regarding the negative impacts of high deer populations on eastern forests; the body of evidence is unequivocal. In this article, we present only a small fraction of the literature on deer impacts. Reducing the impact of deer herbivory is currently a key forest restoration strategy (White 2012, Nuttle et al. 2013) and likely will become more important in order to help maintain resilient, functioning forests in a warming climate (Galatowitsch et al.2009).

Engaging society to address the problem will be difficult, probably similar to our experience with wild pig eradication in California and Hawaii, but on a wider scale. **Views on deer management are deeply entrenched**, both among those who hunt and those who don't. People have strong opinions when it comes to deer.

The forest understory is nearly absent except for Japanese stiltgrass. Note the deer appears to be especially thin. Valley Forge National Historical Park, Pennsylvania. Photo: Ron Rathfon.

A Call to Action

Change is possible but it won't be easy or quick.

Deer management cannot be regulated at the federal level. As early as 1896 the Supreme Court ruled that states have "ownership" of their wildlife. As a result, each state has its own intricate rules. State regulations need not be standardized, but efforts at reform must be made state-by-state. This process will be slow as rules are generally promulgated by processes that ensure adequate evaluation by respective wildlife authorities and to allow for public review.

Nevertheless, some states are beginning to do the difficult work of changing policies to stabilize or reduce the number of deer. For example, Indiana recently enacted the first modern firearms season targeting female deer in the state's history.

It will be **difficult to overcome traditional hunter concepts of proper deer management** as it is counter-intuitive to most hunters that fewer game animals are desirable. Decades of effort, patience, and expense were invested to enhance populations to the point where hunting success is now commonplace. To suggest that populations be reduced and therefore increase the effort needed to harvest a deer understandably generates resistance. Success will take a carefully crafted and sustained public relations effort.

Like almost all conservation problems, **deer management is a societal issue**. If the deer population is to be reduced, it must be reduced slowly. Rules that lower the population drastically will almost certainly spur a backlash from hunters who can appeal to their respective legislatures to overturn regulations they regard as harsh. In an effort to lower the population of deer in Wisconsin the DNR liberalized hunting dramatically.

The result was a hunter revolt. Gov. Scott Walker campaigned on a pledge to fix deer management. Once elected, he made good on that promise by appointing a deer trustee to evaluate his state's DNR. The trustee's final report noted that by failing to adequately communicate with hunters and involve them in determining solutions the DNR had lost credibility (Kroll 2012). A similar push back may be occurring in Pennsylvania.

In some sense **one of the greatest losses** of all is that deer are no longer viewed as the majestic and even mystical animals of the forest that they were only a few decades ago. To quote Bloomberg: "… it's hard to think of a more insidious threat to forests, farms and wildlife, not to mention human health and safety, than deer."

How different that is from the time of John Muir, who wrote, "Standing, lying down, walking, feeding, running even for its life, it [deer] is always invincibly graceful, and adds beauty and animation to every landscape — a charming animal and a great credit to nature."