

Northern Research Station

Rooted in Research

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Leaving It Messy: Using Tip-up Mounds to Promote Tree Species Diversity

Seeing Opportunity After a Blowdown

When a tree falls in the woods, should it be removed? In managed forests, common practices call for cleaning up and removing timber following a blowdown. But when Northern Research Station research forester Christel Kern sees the root mass of a fallen tree, she's more likely to see it as an opportunity. Her work is described in a 2019



A mature yellow birch demonstrates that tip-up mounds can provide a suitable microsite for the entire life cycle of this light-seeded tree species. Courtesy photo by John Schwarzmann, State of Wisconsin Board of Commissioners of Public Lands, used with permission.

KEY MANAGEMENT CONSIDERATIONS

- Moderate blowdown events that affect 30-60 percent of a forest stand's tree canopy present an opportunity to facilitate regeneration of light-seeded species that might otherwise fail to regenerate due to deer browsing or other factors.
- Leaving a portion of uprooted trees from a blowdown event unsalvaged and protected from heavy equipment traffic can maintain newly created mound features and their potentially unique regeneration niche.
- Selection of reserved uprooted trees should include species with rot-resistant wood, such as eastern hemlock and other long-lived conifers, to provide decayed wood substrate for future tree regeneration that may depend on such germination sites.
- Proximity to canopy gaps and seed trees, especially light-seeded species, is another consideration when selecting locations for reserved uprooted trees.

Forest Ecology and Management article entitled "Mounds Facilitate Regeneration of Light-Seeded and Browse-Sensitive Tree Species After Moderate-Severity Wind Disturbance."

Current best-management practices call for keeping standing and downed wood and including canopy gaps following a moderate wind disturbance. According to the article, in forests affected by moderate-severity windstorms, defined as a wind event that affects 30-60 percent of a forest's tree canopy, uprooted trees and exposed root masses turn into what is known as tip-up mounds. Over time, these exposed root structures can create slight elevational variations in the forest that can serve as habitat for a variety of tree species.

Just Out of Reach

Kern and others researched how tip-up mounds affect overall tree species diversity. They found that as these mounds decay and saplings begin to grow on them, sapling height relative to the main forest floor provides some protection from animal browsing. That means that certain tree species, especially those that are “light-seeded” with seeds that are blown by the wind, may have advantages regenerating if some mounds are left intact. Examples include yellow birch (*Betula alleghaniensis*), eastern hemlock (*Tsuga canadensis*), paper birch (*Betula papyrifera*), and white cedar (*Thuja occidentalis*), all of which are desirable to white-tailed deer (*Odocoileus virginianus*). If maintaining or increasing tree diversity and perpetuating natural communities are management goals, then preserving patches of uprooted trees can help propel restoration objectives.

As Kern describes it, “Nature can look messy after a blowdown, but there are unique opportunities that can lead to diversification that lasts for hundreds of years.” The researchers also found that not all mounds are created equal. Trees with rot-resistant wood, such as eastern hemlock in this region, create the best mounds for desired germination, especially when they are close to light-seeded tree species and canopy gaps. “Soil in mounds is less dense,” Kern explains, adding, “It’s an oasis of different conditions where some trees can thrive.”

A Regional Take on Mound Research

Kern’s research, which was sponsored by the Board of Commissioners of Public Lands in Lake Tomahawk, Wisconsin, involved old-growth or nearly-old-growth stands with minimal or no management. Lake Tomahawk forest supervisor John Schwarzmann, who worked with Kern on the research, said it provided a scientific basis to what he’s seen in North America’s hemlock-northern hardwood ecosystems. “This confirms similar research that’s been done on this topic in other regions,” he says, adding, “In fact, it lines up in a way that you don’t often see, and it provided perspective on addressing regeneration issues due to deer browsing in this region.”

Schwarzmann said the study guidelines will be followed for future moderate blowdowns in stands with the requisite



Beyond the reach of hungry deer, yellow birch saplings grow on a new tip-up mound at the Kemp Natural Resources Station study site in Woodruff, Wisconsin. Courtesy photo by John Schwarzmann, State of Wisconsin Board of Commissioners of Public Lands, used with permission.

soils for desired tree species diversity. “Even if the mounds are lower than you’d expect to make a difference,” he says, “a moderate blowdown may be the only chance in the lifetime of a stand to enable regeneration of browse-sensitive tree species.”

Project Lead

Christel Kern is a Northern Research Station research forester based out of Rhinelander, Wisconsin. She received a PhD in natural resource science and management from the University of Minnesota, Twin Cities. More information on her work can be found at www.nrs.fs.fed.us/people/Kern.

FURTHER READING

Kern, Christel C.; Schwarzmann, John; Kabrick, John; Gerndt, Kathryn; Boyden, Suzanne; Stanovick, John S. 2019. [Mounds facilitate regeneration of light-seeded and browse-sensitive tree species after moderate-severity wind disturbance](https://doi.org/10.1016/j.foreco.2018.12.040). *Forest Ecology and Management*. 437: 139-147. <https://doi.org/10.1016/j.foreco.2018.12.040>.

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