Research maps out trade-offs between deer and timber

May 10 2011

Timber harvesting that leaves gaps in the forest canopy allows sunlight and water to nurture a new generation of trees -- at least in theory. Credit: Megan Matonis, Center for Systems Integration and Sustainability, Michigan State University

Since the 1950s, sustainability in northern hardwood forests was achieved by chopping down trees in small clumps to naturally make room for new ones to spring up. Early experiments with single-tree and group selection logging found that desirable species like sugar maples did a great job of regenerating in the sunny, rain-drenched harvest gaps – theoretically eliminating the need to replant.

But something has changed.

In a sweeping study of a huge swath of Michigan's Upper Peninsula,

Michigan State University researchers document that in many places, the sugar maple saplings that should be thriving following harvesting are instead ending up as a deer buffet. This means the hardwood forests are not regenerating.

The results of the study, "Gap-, stand- and landscape-scale factors contribute to poor sugar maple regeneration after timber harvest," are published in this month's online edition of the journal *Forest Ecology and Management.*

"We've found that deer, light availability, and competition from non-tree plant species are affecting sugar maple regeneration in parts of the Upper Peninsula," said Megan Matonis, who recently earned a master's degree in forestry while a member of the Center for Systems Integration and Sustainability at MSU. "No sugar maples are regenerating in the southern area near Escanaba. In the future, this could challenge the sustainability of timber harvesting in this region."

In some forest areas harvested for timber, sedge overtakes seedlings and hardwood regeneration fails. Credit: Megan Matonis, Center for Systems Integration and Sustainability, Michigan State University

Forest conservation is a persistent push and pull between maintaining crops of hardwoods, especially sugar maple, for the timber industry and herds of deer for hunters. The interplay between these conflicting resource uses can also impact bird habitat. Indeed, when Matonis, joined by Michael Walters, MSU associate professor of forestry, and James Millington, former post-doctoral researcher and now a Leverhulme Early Career Fellow at King's College in London, ventured into the U.P. forests for the study, they were peppered with questions by both hunters and loggers -- Team Deer and Team Trees. "It's amazing how differently these two groups generally view the situation," Matonis said, "Some hunters feel there aren't enough deer in the forests whereas 'save a tree, kill a deer' is the sentiment of many loggers."

The study area stretches over some 3,000 square miles of public and private land from Crystal Falls to the west, east and south to Escanaba and north of Marquette. For two years, they examined the harvest gaps left in forests when hardwoods are cut down.

Researchers examined several aspects – the amount of light in gaps of different sizes, competition from other plants on the forest floor, potential seed supply, and the relative richness and wetness of the soil. The goal: Determine what factors are affecting the regeneration of sugar maple. The results of this study fed into the development of a computer model designed to help balance those often-competing uses of the forests.

"Management paradigms for deer and northern hardwood forests have not only resulted in regeneration failure where deer populations are especially high but also in low tree regeneration diversity where they are not," Walters said. "These results and results from other projects by our research group are being communicated to forest managers and have resulted in their beginning to consider alternative management approaches for assuring the sustainability of this important resource."

What they found is that in the north, where heavy snows push deer populations south in search of food during the winter, sugar maple saplings generally are thriving in the harvested areas.

In some areas harvested for timber, regeneration is successful in the gaps left by cleared trees. Credit: Megan Matonis, Center for Systems Integration and Sustainability, Michigan State University

"In some areas, this timber harvesting technique works great," Matonis said. "We were practically swimming through saplings."

Yet in the southern portion of the study area, there were areas where no saplings survive. Saplings are a tasty snack for hungry deer.

Matonis says that although munching by deer seems to be the main cause of low sapling densities in the south, other factors also make it a tough life for saplings. Low light levels in small gaps and competition from other plants also play roles in poor regeneration. A grass-like plant called sedge appears to out-compete tree saplings in many forests following harvests. Previous research conducted by Walters in the U.P. suggest that deer can help sedge take over by removing saplings and other plants

that they find more appetizing.

Provided by Michigan State University