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Forest Connect

Supporting Sustainable Management of Private Woodlands

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Protecting Seedlings and Wildflowers from Deer Browsing

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Woodland owners often question why they can't grow plants that they desire in their woods. They can see interfering plants and assume those are the limiting factor. That is only partly true.

Interfering plants, both native and non-native, can create a dense shade that impedes the establishment and growth of desired seedlings and wildflowers. There are also other ways that interfering plants interfere with desired plants, such as by providing habitat for seed predators or dense root mats that impair seedling roots. Quite often, interfering plants are the result of excessive impacts from deer.

Many factors and conditions must align for successful forest regeneration, which is the reproduction of desired species of tree seedlings and wildflowers. For example, there needs to be a seed source, the seeds need to survive until they germinate, soil moisture conditions need to be sufficient but not excessive, there needs to be adequate quality and quantity of sunlight, and other conditions. Although it is difficult or impossible to know with certainty, without a site visit, why forest regeneration is impeded at a particular location, a common barrier in many parts of NY is the impact of deer.

Figure 1. In this private woodland in the western Adirondacks there are fewer than 10 deer per square mile. The creation of a 12 ft x 12 ft fence within a patch cut, after a few years, demonstrates how excluding deer allows for the development of a healthy native forest.

Photo credit P. Curtis

The evidence for deer impacts is based on observations of deer exclosures throughout NY, and observations reported by professional foresters. These exclosures change only the access for deer, and the result is often the abundant proliferation of native plants inside the exclosure (Figure 1). In many cases the number of deer per square mile is less important than the number of deer relative

to the available food supply. Ultimately the question becomes focused on those techniques that are most likely to reduce the impacts of deer.

Before the ultimate question, there are intermediate questions to answer. The answers to these questions influence the appropriate techniques to reduce deer impacts.

The first intermediate question is, if deer are the problem, then how many deer are too many, or how few deer are desired? The context for this question is from the perspective for the successful establishment and growth of desired forest regeneration. Woodland owners trying to regenerate desired plants will likely desire fewer deer than the number of deer desired by some hunters interested primarily in seeing many deer. Historically, this conversation focused on the number of deer per square mile, or deer density, as an index for too many or not enough. More important than deer density is the number of deer relative to the ability of the landscape to support those deer. If there is abundant forage, the landscape can support more deer. If deer have heavily browsed the landscape and forage is scarce, there will be fewer deer and the landscape cannot support as many deer. Where deer are a problem and in much of the state, the herd would need to be reduced by 40 to 60%, as a result of any cause of mortality, to stabilize the herd. Thus, in an area that has a deer impact problem and is able to achieve this level of reduction would still have a problem, it's just that the problem isn't getting worse. The appropriate number of deer varies with local conditions, but is indicated by success in the establishment and growth of a full and healthy plant community of desired species.

The second intermediate question addresses the vegetation goal. The appropriate starting condition for a young forest would be to have many thousands of seedlings and saplings of desired species per acre; this is known as "full stocking." (Figure 2) Full stocking offers the greatest range of options for the owner, provides for the efficient utilization of sunlight by trees, and assures that deer impacts have been contained. Some techniques to reduce deer impacts result in scattered pockets or patches of seedlings or wildflowers and an area that is not fully stocked. While this is positive, the effort is incomplete. Deer impacts still drive ecological processes, and owner's options remain limited for future economic and biodiversity outcomes.

Figure 2. This area is fully stocking with sugar maple seedlings. Heavy deer browsing, despite aggressive hunting, prevents seedlings from gaining any significant height, or good form.

There are several techniques to limit deer impacts that range from inexpensive to expensive, and between lethal and non-lethal. Costs are related to labor and materials. Most materials can be priced through local or online vendors. Labor costs, if done by the owner, depend on how the owner values their time. Any one or a combination of techniques may be selected by an owner depending on their desired outcome for forest regeneration.

Recreational hunting is a time-honored tradition in our culture, and often advanced as a technique to manage the deer herd. Hunting connects people to nature, can bond families across generations, can be good exercise, and provides

revenue to many communities and businesses. However, hunting, as practiced in most locations, is insufficient to limit the impacts of deer and achieve full stocking. Hunters typically are not compelled or able to shoot enough deer. Most hunters lose interest in hunting at a density of deer that is still high enough to have significant negative impacts on forest vegetation. Many areas are not hunted or hunted minimally thus providing refugia for deer during the season. Owners should encourage hunting, especially of female deer, and owners who allow free access for hunters are protected from liability under NY's general obligation law.

Figure 3. Tree tops will protect seedlings from deer browse. Seedlings established when the slash is placed will receive the greatest benefit.

The use of scattered or clustered tree tops (known as "slash") or hinge cutting are techniques used by some owners. When trees are cut for firewood or timber, some portion of the top is typically left in the woods. By using directional felling or heavy equipment, clusters of two or three tops can be positioned together, or tops can remain scattered. With hinge cutting, trees up to several inches in diameter are partially cut, with a high stump, such that the stem remains connected to the stump. Seedlings within the tops are protected (Figure 3). In either case, the amount of woody material or slash available to impeded deer is small compared to the total area of cutting. If there are mature seedlings or small saplings these techniques offer scattered protection. If deer pressure is heavy and there are no established seedlings, the rate of decay of the slash may exceed the time required for seed fall, seedling establishment, and seedling growth to a height above the reach of deer. Further, these techniques offer no protection outside the immediate zone of slash and are unlikely to result in full stocking.

Figure 4. Tree cages (pictured) or plastic tree tubes will protect seedlings from deer. In most areas at least a 5 ft cage or tube is necessary.

Tree tubes and cages will protect seedlings, but their use for extensive areas is not practical (Figure 4). Many owner prefer 5 ft tall metal cages made from 2" x 4" wire fence because they can be made at home and easily re-used. Commercial plastic tubes should have air vents to allow circulation, be in full contact with the soil, and be inspected at least annually. This technique is effective, but difficult to apply across broad areas or to achieve full stocking.

Another technique is the use of mesh fence and living fence posts on small areas (Figure 5). Wooden blocks are attached to low-value trees using a fender washer and long rust-proof nail. High-tensile wire is suspended from the blocks and supports a 5 - 6 ft mesh fence and ideally a 1 foot apron. The apron, or alternatively slash loosely piled around the outside perimeter, is important to limit deer from crawling under the fence. These exclosures have proven effective on 0.1 to 0.25 acres if they are regularly maintained to keep the fence up and to prevent deer from crawling under the edge. Deer can

jump most fences, but these fences around small areas limit deer impact. This technique is limited in areal extent, and requires diligence by the owner to regularly inspect and repair the fence. Owners could create small patch cuts or areas that are heavily thinned and achieve full stocking incrementally across their property. At some point, the fence will or should be removed, with the option to reuse it. A fact sheet on methods and costs is available here https://blogs.cornell.edu/cceforestconnect/files/2015/12/Fencing-xanc6w.pdf

Figure 5. An example of the effectiveness of a small area protected by 5 ft plastic mesh. See the text for methods to use wire at the top to help support the fence.

Photo credit J. Michael.

Larger areas can be enclosed with taller plastic mesh fence of 7 to 8 ft using a similar technique as the 5 ft plastic mesh. The primary difference is to ensure that a second high-tensile wire is suspended approximately 10 - 12 inches above ground. This low wire helps stabilize the fence and further limits deer crawling under the mesh. An apron of mesh is especially important. This technique allows for larger areas of regeneration, but the taller fence has added cost and labor to install and repair.

A new technique being tested at Cornell's Arnot Teaching and Research Forest is the use of a slash wall (Figure 6). Details are available by searching for "slash wall" at http://CornellForestConnect.ning.com In this technique, trees are felled such that the crowns of trees near the edge fall on or near the perimeter of the harvest area. The wall should be 10 ft or more wide and tall and very dense. Experimental heights have been 10 ft, though extra width might compensate for a slightly lower height. Regular monitoring will ensure that gaps in the wall can be plugged. Early indications for the effectiveness of this technique to exclude deer are positive. Installation requires a special commitment to either mechanical felling equipment or extra work on the part of the owner or logger.

The impacts of deer often interact or co-occur with interfering vegetation. The dominance of interfering vegetation in a woodland is often an indicator of a deer problem. If control of interfering vegetation is intended to encourage forest regeneration, the first consideration should be to assess the impacts of deer. Control of interfering vegetation without the presumptive control of deer impacts will be a wasted effort.

Figure 6. The slash wall around this 76 acre harvest at Cornell's Arnot Forest is 10 ft tall, more than 10 ft wide, and very dense. The cost for slash walls, averaged over change to 30,000 feet and $1.47 per foot for the feller buncher and operator. These experimental walls have effectively limited deer access and impact for the first 3 growing seasons.

Photo credit B. Chedzoy.

For additional information on woodland management go to:
www.ForestConnect.com & www.CornellForestConnect.ning.com

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