Meeting the needs of today's private woodland owner
Trouble in the understory

Imagine returning to a favorite woodland you knew as a child but had not visited for decades. You recall a hardwood stand in southern Wisconsin where the ground was carpeted with a dense array of native wildflowers. Now, you find instead dense patches of exotic buckthorn shrubs, some ferns, a carpet of garlic mustard in patches, and scattered jack-in-the-pulpits. You see only an occasional mid-sized tree and a dearth of seedlings.

Or perhaps you recall a dense stand of hemlock or a white cedar swamp in northern Wisconsin once haunted by a rare orchid. Upon returning, you now notice less cover except for patches of sugar maple saplings. What could be causing such dramatic changes in the woods?

Although many factors act to alter Wisconsin woodlands, you would be smart to suspect white tailed deer.

We are aware of many costs of deer overabundance. Each year, about 60,000 deer are hit on Wisconsin highways. Farm crop losses have mounted along with impacts on garden plants. Rates of Lyme disease, carried by deer ticks, continue to climb. Yet we rarely hear how overabundant deer populations threaten forests.

For many years, deer managers doubted whether deer were having pervasive impacts on tree seedlings and other forest understory plants. Now, we know better, in part because of the research our group and others have been doing over the past 15 years. Here, we share some of those results with the aim of informing WWQA members of what to look for and what to expect when it comes to deer impacts on forests. We'll also touch on some possible solutions to what Aldo Leopold called "the deer dilemma."

Deer herds crash, then rebound

How did we get to our present situation with deer? Let's review what happened in Wisconsin. A combination of dense mature forest cover, hunting by Native Americans, and predators like wolves and cougars all acted to check deer populations before European settlement. Wildlife biologists estimate there were no more than 8 to 10 deer per square mile in northern Wisconsin and perhaps up to 15 in parts of southern Wisconsin back then.

The Paul Bunyan era brought hungry loggers, market hunters, farm settlements, and "open seasons" on deer and predators. Deer were extirpated from many Eastern states and most of southern Wisconsin by 1900 when bag limits and restrictive hunting seasons were finally established. But enough deer remained in Wisconsin to rapidly repopulate the state through the 1920's and 30's.

Aldo Leopold taught in his 1933 textbook "the way to manage game is to manage habitat." Habitat conditions were ideal. Rapidly re-growing early successional trees like aspen provided ample forage for deer. Forest management involving regular clearcuts provided grassy openings and plentiful "edge" habitat. Without cougars, wolves, or the shooting of does, deer thrived.

After visiting Germany and Austria in 1935, Aldo Leopold returned worried about what too many deer could do. What he saw raised questions about where Wisconsin was headed. In fact, deer had become so abundant by the 1940's that starvation began to kill animals. Recognizing that booming deer herds were wreaking havoc on forests, Leopold began to speak out about the dangers posed by overabundant deer. He also became a Conservation Commissioner (a forerunner to today's Natural Resources Board). Despite receiving personal criticism from some hunters, he fought to expand antlerless hunting to control herd size. Such a season in 1943 succeeded in killing 16,000 antlerless (does and fawns) deer and 66,000 bucks, but fierce reactions forced a reversion to the usual buck law in 1944. Leopold warned that without corrective action, Wisconsin would "end up with impoverished herds, depleted forests, and (I hope) a fund of painful experience."

In addition to these political battles, Aldo Leopold emphasized the value of research for understanding deer impacts. He pointed out to those listening that a deer population increase "cannot be understood at all except in terms of plant ecology." He began to photograph habitats and build enclosures (an area surrounded by fencing to keep deer out) which could show what effects deer were having. Exclusions still serve as a valuable tool for understanding deer impacts as well as a way to demonstrate these impacts to the public.
Researchers also use other tools to improve our understanding of how deer shape forest habitats. However, as our understanding has grown, so have herd sizes. Limits on hunting, scarce predators, favorable habitat conditions, winter feeding of deer, and mild winters have all helped boost deer to record densities.

What are these deer doing in our woods?

To understand the impacts deer are having, researchers continue to use exclosures as well as several other tools. Where we have geographical variation in deer densities, we can compare areas with more and fewer deer in what we call "natural experiments." The Apostle Islands provide a great example. Deer densities there range from zero (on deer-free islands like Outer) to as high as they are anywhere in the state (Madeline Island with close to 60 per square mile). Work in the mid-1990's showed that mountain maple, yellow birch, and mountain ash all declined greatly on islands with abundant deer. Canada yew is even more sensitive. Its evergreen foliage is a favorite winter deer food, but these shrubs never outgrow the reach of deer. In fact, even at low densities, deer disrupt the plant's reproduction cycle by eating the male cones along the outer edge of foliage, reducing pollen production and seed set (work by Taber Allison then at the University of Minnesota).

We discovered that deer do the same thing to some wildflowers like the pretty and once common bluebead lily. Lilies in general suffer from deer herbivory (plants eaten by animals), but deer focus particularly on taller individuals in flower or fruit as their yellow flowers and blue fruit make them conspicuous from a distance. Deer impacts have resulted in striking differences in vegetation among the islands and Apostle Islands National Lakeshore managers are now worried about deer invading previously deer free islands, like Raspberry Island.

Another way to estimate deer impacts is to look for conspicuous browse damage among tree seedlings and saplings present in a forest. Because deer lack front incisors, stems that have been browsed by a deer have a rugged appearance (in contrast to hare or rabbit browse which shows a clean chisel cut). Where deer are common, these signs of browse are often found on seedlings of oak, maple, yellow birch, white pine, and even balsam fir (where deer are abundant). In fact, researchers use a deer browse index based on the proportion of maple twigs browsed in the deer ‘molar zone’ on small saplings. Sugar and red maple seedlings are useful here as they tend to be abundant but persist as they can also tolerate browse. We can also use the relative numbers of seedlings and saplings in various size classes to infer browse impacts. Smaller seedlings are often common, particularly in the North where winter snows give them some protection. Taller saplings, however, can be vanishingly scarce as well as showing the bunched stems and torn shoots typical of deer browse.

Eastern hemlock and northern white cedar show particularly dramatic patterns. Winter browsing by deer has so reduced sapling recruitment in these species that many evergreen stands are breaking up and are being replaced by balsam and hardwoods. Furthermore, surveys in the northwoods show that the abundance of taller saplings declines directly as deer become more abundant (as judged from the sugar maple browse index). In contrast, Indian reservations, which normally have lower deer populations, show good regeneration, confirming that these trends do not result from shifts in climate. If further steps are not taken, computer projections suggest...
that hemlock and cedar forests may be lost from most parts of our region.

More recently, we have investigated how deer affect forest understory herbs. These grasses, ferns, and wildflowers represent most of the plant diversity present in a forest and never grow tall enough to escape deer. Deer eat mostly herbaceous (non-woody) plants in the spring and summer. Because these plants grow slowly in the shade, they are slow to recover from herbivory.

As already noted, deer are finicky eaters with a preference for pretty wildflowers like lilies and orchids, particularly when these are tall and conspicuous from flowers or fruit. This allows us to use plant height and flowering condition to indicate deer herbivory. We can also use diversity itself and patterns of relative abundance to infer deer impacts.

Species like trillium, Solomon’s seal, twisted stalk, bluebead lily, and wild sarsaparilla have all declined considerably over the past 50 years. Ironically, these declines have been most dramatic in state parks and other areas protected from deer hunting. (We learned this by re-surveying sites systematically sampled 50 years ago by John Curtis and other University of Wisconsin ecologists.)

In contrast, ferns and species like jack-in-the-pulpit are well-defended chemically and persist well even when deer are abundant.

Deer also like to eat grasses, but grasses and sedges are tough, high in fiber, and tolerate grazing well because their growing points are close to the ground. Not surprisingly, grasses and sedges have generally increased in abundance over the past 50 years, as has the average fiber content of plants left in the understory. Deer may be eating themselves out of a good home.

Collectively, we see several parallel worrisome trends. These include declines in the ability of many forest trees to regenerate, declines in forest diversity and wildflower populations, and increases in already abundant and widespread species. These “winners” include not only the ferns, grasses, and sedges just mentioned, but also invasive woody plants like hawkweed, once scarce in Wisconsin forests, and garlic mustard. As distinctive sets of species are lost and our forests become more and more alike, we see a trend that biologists now label “biotic homogenization.”

Those concerned with the future of our forests should ponder the scene on the Allegheny plateau of Pennsylvania where chronically high deer populations over past decades are converting once dense and diverse forests into what locals call “fern parks.” Here, deer leave only ferns and some grasses in the understory and prevent the regeneration of most trees. Over time, the overstory opens up, converting these forests into savannas.

What should be done?

We now understand a lot about the impacts deer are having on our forests. Deer impacts once considered local, short-term, or particular to only a few species are now known to be widespread, persistent, and affecting many forest tree, shrub, and herb species. What will we do with this knowledge? Have we learned from Leopold that we should remove our depleted forests?

First, we should admit that gaps remain in what we know about deer impacts. We don’t know, for example, whether deer impacts are reduced in forests adjacent to farm fields where crop residues provide alternative forage. How does the presence of wolves affect deer numbers and behavior and do wolves reduce deer impacts on tree seedlings and other understory plants?

The Wisconsin DNR estimates that an average wolf will eat 18 to 20 deer per year, or at the current population account...
for about 8,000 deer killed in Wisconsin per year, not enough to control the deer herd.

How long must exclosures, or reduced deer densities, remain in place for tree seedlings to grow to a height where they escape deer? How long do slow-growing herbs need to be protected from deer to allow re-colonization and recovery? How do these dynamics depend on light and soil conditions? And finally, how many exclosures do we need to convince skeptics of the profound impacts deer are having in our forests? All these questions deserve further attention but should not be used as excuses to postpone action.

Deer densities remain at, or near, all-time highs in Wisconsin. Their browsing is profoundly affecting patterns of tree regeneration as well as forest diversity generally. If we are to retain evergreen forest types in the north and oak forests in the south, we need aggressive deer management of the kind Leopold called for. Those opposed to antlerless seasons and expanded hunting opportunities often believe they are protecting the herds, yet the damage high deer densities inflict on forests makes conditions worse for deer in the long run. These impacts also make it important to address deer issues sooner rather than later when damages will have mounted.

Woodland owners have an opportunity to join forces with motorists, farmers, and others concerned about the impact of too many deer. A few small but highly organized hunter groups have often effectively blocked the Wisconsin DNR from implementing more effective deer management policies. In contrast, forest owners and others with legitimate worries about record high deer numbers have been far less organized and effective in swaying deer management.

If you agree that our forests deserve greater attention, discuss these issues with fellow landowners. Share your concerns with local DNR foresters and wildlife managers. Attend Conservation Congress meetings and voice your opinion. The DNR will hold public meetings in a year or two on deer population goals for each deer management unit, and woodland owners should attend to voice concerns about deer numbers.

And remind your hunter friends: shoot a doe, save a forest.

Don Walter, Ph.D. (dmwalter@wisc.edu) teaches ecology, field biology and conservation biology at the University of Wisconsin–Madison. His research over the past 15 years has focused on patterns of tree regeneration and native plant diversity in relation to forest and landscape conditions, the impacts of deer browsing, and long-term shifts in forest plant communities. He has worked with state agencies and environmental organizations to improve forest and wildlife management. Some of his work is summarized in his book Wild forests—conservation biology and public policy (Island Press, 1994). Dr. Walter currently serves as president of the Society for the Study of Evolution.

Sarah Wright (sowright@wisc.edu) is a graduate student in Botany at UW-Madison. She grew up in suburban Milwaukee, but her fondest childhood memories are of wandering through the woods with her father, who taught her to recognize signs of deer passing through or bedding down in the vegetation. She is interested in working with students and citizens to monitor impacts of deer on plant communities.
Some have a hard time seeing the trees from the deer

by Tim Eisele

Oh deer, what can the matter be? Wisconsin legislative committees heard from several natural resource specialists that high deer populations are the matter. Deer are taking a toll on Wisconsin’s forests.

The testimony was presented April 11 at the State Capitol in Madison when the Assembly Committee on Forestry, chaired by Representative Don Friske (R-Merrill), and the Assembly Natural Resources Committee, chaired by Representative Scott Gunderson (R-Union Grove), held a special public hearing to learn about the forest impacts of deer in Wisconsin.

Deer and trees, not a good mixture

Bill VanderZouwen, DNR chief of landscape ecology, told the committees that, although deer are native to the state, they are a “browsing” species and have the capability of eating themselves out of house and home.

The DNR, according to the state Administrative Code which has the force of law, sets population goals for the herd. The goals take into account the carrying capacity of land, hunter success, ecological impacts, disease transmission, deer/vehicle collisions, the Chippewa tribe treaty rights, and tolerable agricultural damage. The DNR came up with a formula for determining intolerable damage to agricultural crops, but has never established a similar formula for forestry damage. (The fund for agricultural damage payments comes from money hunters pay for deer permits, and if forestry damage were to be paid a source for funds would have to be found.)

Agricultural damage was the first major impact that wildlife managers began to deal with, and since have had to deal with sociological and ecological impacts. Deer hunting is estimated to account for a $1 billion industry in the state, with more than 500,000 hunters purchasing licenses and equipment, and spending money in local stores, motels and restaurants.

“Hunters, by buying licenses and permits, pay for deer management, nobody else does,” VanderZouwen said.

Management of deer is closely tied to shooting antlerless deer (does and fawns). To keep the population the same as the previous year hunters need to shoot at least the same number of deer as were born the previous spring.

Deer management units have goals of either 10 to 19 deer per square mile of deer range, 20 to 24 deer, or 25 to 30 deer. When populations reach 20 to 23 deer per square mile of range a negative impact on vegetation occurs.

VanderZouwen said that the deer population goal setting process is updated every three years, which will take place in about a year and a half.
From 1960 to 2003, Wisconsin’s deer population goals increased, while the actual populations stayed above goals. Kovach said that when populations are under 20 deer per square mile of habitat, deer don’t cause significant impacts on the forest. But, as populations go over 20 there are significant impacts.

Some of the impacts include:

- Failure to regenerate vegetation—A 2005 survey of DNR foresters found that they believe that deer are the number one barrier to successful regeneration in a vast majority of counties. “If we can’t regenerate a forest, that is unsustainable forest management and it could jeopardize forest certification,” Kovach said.

- Regeneration requires increased cost and effort—It may be necessary to use tree tubes, bud caps, repellants (which deer usually get used to), or fencing to get regeneration. If that fails, it could be necessary to return and redo a harvest. In Pennsylvania, the Forestry Commission now finds it necessary to fence around harvests in order to get regeneration.

- Reduced growth rates of vegetation—It will take more time for the undergrowth to grow larger, and non-preferred species may be the ones that survive.

- Alteration of the composition of the forest—Deer prefer some species, and avoid others. For instance red pine, spruce and beech are normally not preferred by deer, while white pine, aspen, oak, hemlock, and white cedar are preferred. The two later species are not important to the timber industry but they are important ecologically. The understory of plants, such as lilies, orchids and Canada yew, don’t survive with deer, whereas ferns, which deer don’t prefer, thrive.

- Alteration of animal communities—Birds, such as the gray jay that depends on hemlock and cedar which are eaten by deer, may be affected.

“Foresters ask what we can do about regeneration, but with a high deer herd there may not be much we can do,” Kovach said. “We can choose to manage for species that aren’t preferred by deer but that would not be good for the timber industry or the ecology. We can invest in protection, such as tree tubes. It is important for forestry to get more involved in deer management issues.”

Tim Van Deelen, assistant professor at UW-Wildlife Ecology, said that deer were
Wisconsin's deer population goals and actual deer populations have increased substantially between 1960 and 2005. DNR graph.

originally present in southern Wisconsin but with settlement in the north and logging they moved north, and then expanded back to the south with increasing agriculture.

Recent population increases have come about with changes in agriculture and forestry, and the popularity of artificial feeding.

"The way we do forestry has almost optimized the state for deer habitat," he said. "And with abundant deer, there are fewer saplings."

The question is—what is a responsible level of deer on the landscape that will allow forest regeneration but still allow deer to exist on the landscape? Van Deelen said that Wisconsin was the center of research on deer on the landscape, much of it by Professor Don Waller at UW-Madison.

Higher deer populations mean shifts in the ground layer of forests to ferns, grasses and sedges. The forests are seeing a decline in native species, as high deer populations have displaced moose from the state, and the large number of deer provides food for more wolves.

Van Deelen said it was difficult to know the impact of baiting and feeding but there are indications deer management units appear to have a quicker recovery of populations following the hunting seasons, and baiting and feeding may be the reason.

"Deer and forests are locked into a system, jointly influencing each other," Van Deelen said.

The only tool that wildlife managers have to affect the deer populations is hunting, however deer populations are beginning to get out of the control of recreational hunting. Early experiments at the Sandhill Wildlife Area show that it is very difficult to reduce the deer population to very low levels.

Scott Gunderson commented that if regeneration of commercially valuable tree species is impractical, that will have a huge impact on the economy.

"There is a risk that we are running," Van Deelen said. "Part of the problem is that some hunters say they don't see enough deer while their neighbors can't get trees to grow. There is a landscape level variation that the DNR has no control over, and we are moving to a time where regeneration is very expensive."

Cedar and aspen are difficult to regenerate because of deer.

Van Deelen pointed a finger at feeding, saying that if lots of people put out the legal limit of two gallons it could be a critical difference. Although some people point to food plots, they are normally not a factor during the winter whereas feed piles that are replenished daily are.

Rep. John Ainsworth (R-Shawano) pointed out a difference in that he feeds cattle but they are confined on his land. With recreational feeding of deer, people feed the animals but then they wander and go onto other people's land.

Discussion of needs

VanDe/cover said that the committee could support deer population goals and encourage people to come to the table and be part of the discussion. Also, regulations that move away from traditional seasons need support.

Kovach said that there are reasons to be concerned about the deer population, and Van Deelen agreed saying, "We are facing an impoverishment of some plants in Wisconsin. We have a deer problem and the DNR needs to look for some management scheme that looks out for forest floor plants."

VanderZouwen emphasized it is important to get all the people at the table to discuss deer population goals. But, one big problem is access to land, and although wildlife belongs to the public, the land belongs to private individuals who control access to the wildlife.

Gene Roark, WWOA legislative chairman, told the committee of concerns about the impact deer have on forests.

"Although our board of directors has not taken an official position about deer numbers or the regulations used to harvest deer, I can tell you that there is a great deal of concern about deer," Roark said.

He related that he and his wife, Jean, bought 120 acres in Richland County 33 years ago, enrolled it in the Managed Forest Law and planted white pine, black walnut and red oak. They have had a terrible time with deer and find it disheartening to see the top leader of the plants chewed off. The only way to get seedlings to grow is by surrounding them with woven wire cages, which is costly and labor intensive.

He also related an experience he had when the land was open to public access when a van-load of hunters emptied out to hunt the land. After that he closed the land to public access, but made the point to the committee that just because it is closed to

Gene Roark (back to camera) testifies on behalf of WWOA at the joint meeting of the Assembly Committee on Forestry and the Committee on Natural Resources. Tim Eisele photo
public access it does not mean that it is not hunted. Roark now has a regular crew of six hunters, all of whom he knows, who hunt the land to reduce deer populations.

Rep. Barb Groneman (R-Whitehall) observed, that from the testimony, she realized that Roark and other landowners work hard to improve their forest, but the deer populations are causing problems and she wondered if it was time to stop feeding and baiting in the state.

Bob Rogers, representing the Society of American Foresters and the Governor's Council on Forestry, noted that when people work with the forest they are not working for themselves but instead for future generations.

"What we see now, and especially with oaks, is the result of what our ancestors did," he said. "This is a system that is long lived, and people need the best available information to manage it. Decisions on what we should do, are social decisions, but hopefully they should be informed decisions. What I have heard here is that there is a regeneration problem, and we know how to regenerate oaks. Once the seedlings are established there can still be several bottlenecks."

Deer management is critical for forest regeneration.

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Can small deer exclosures work?

by Karl Martin

Understanding the impact of deer density levels on forest regeneration is critical for determining acceptable deer populations. Deer are a natural component of the ecosystem, however, a variety of human impacts on the landscape may have resulted in deer numbers exceeding their natural densities in some areas.

Researchers, resource managers, and the general public have noted negative impacts from high deer densities on tree regeneration, herbageous plants, aquatic systems, and vertebrate and invertebrate species. These impacts can result in severe ecological degradation and economic losses, as has been observed in forestry regeneration projects in many parts of the country, including Wisconsin.

A common technique to assess the impact a wildlife species has on a system is to exclude the particular species from all or a portion of the system that you are interested in. For deer this most often involves the construction of a fence type structure to exclude deer from an area. One of the challenges with this approach is that deer have the ability to jump over fences in excess of 8-feet in height. Construction of 8-foot high or higher deer fence is expensive, time consuming, and often involves modifying vegetation near the fence as part of the construction process. In addition, it can be extremely difficult to install an 8-foot high deer proof fence in remote areas because of the logistical constraints of getting supplies to the field site.

We wanted to assess the effectiveness of relatively short fences (5-foot high hog wire) for excluding deer from relatively small plots (5, 6, and 7 meters on a side). We decided that food was the most logical tool for us to assess the effectiveness of various exclosures since this would be the primary motivation for a deer to jump a fenced enclosure in a wild setting or backyard garden.

To amplify the desire we decided to test our exclosures in the middle of winter in northern Wisconsin; a time when deer should be physiologically stressed and most in need of food. The ultimate goal of this research project was to evaluate low fence exclosures as an economical, logistically feasible method to assess deer impacts on tree regeneration and understory development.

This initial research was aimed at developing a solution for installing remote deer exclosures for research as well as for landowners who want to exclude deer from their gardens or a small regeneration site. This is the first part of what will be a longer research project that installs 420 deer exclosures distributed evenly in northern Wisconsin where we have a silvicultural experiment designed to accelerate and evaluate development of old-growth characteristics.

Study

We established 4 replicate study areas on private property in northern Wisconsin to assess the effectiveness of a 5-foot high fence at keeping deer excluded from an area. Since deer have the ability to jump a 5-foot high fence with ease the real issue is how a deer perceives its ability and willingness to jump into and out of a relatively small enclosed area. To test this we set up 3 exclosures of different sizes at each of our 4 study sites. After a 2-week period of prebaiting to get deer habituated to each site we built 3 square exclosures that measured 5, 6, and 7 meters on a side at each of the 4 study sites. Experience has shown that once deer begin using a location, like a garden, it is more difficult to exclude them. Thus, prebaiting deer and habituating them to the exact sites added to the rigor of our test.

Each study site was at least three miles apart, to evaluate different individual deer at several sites, while maximizing the number of deer visiting each of the exclosures and allowing our cameras to monitor multiple exclosures at one time.

Baiting

In January 2005, we started prebaiting each site with a mixture of corn and black sunflower seeds. Once the exclosures were built on a site we continued to check each exclosure every other day. Two gallons of bait were at the center of each exclosure and we distributed 2 gallons of the bait mixture on the outside of the 3 exclosures to keep deer interested and returning to the site daily. The outside bait was completely consumed during each 2-day period and had to be replenished on every visit. The bait was often removed within the first few hours of the 48-hour period between rebaiting.

Monitoring

Each site was monitored by digital, motion sensitive, infrared cameras to observe deer movements at each site and to determine if deer jumped over the fence into any exclosure. We also used tracks as evidence of deer activity inside and outside of each exclosure which worked extremely well since fresh snow was common during the study. Snow depth at the time of the study ranged from...
More than a dozen deer can be seen standing around the outside of three small enclosures (5, 6, and 7 meters on a side) in Karl Martin's research project. Photo by Bruce Kohn

12 to 20 inches. Deer were observed for 10 days after the installation of the fences at each site, with one site maintained for several additional months as an anecdotal assurance that deer might not become accommodated to the fence after a longer period.

Results

Each study site had more than 10 deer visiting nightly, with one site having more than 22 deer observed. The bait placed on the outside of the fence was consumed each night and eventually deer started to visit the enclosures in the daytime.

On the first night a single deer jumped into one of the four 7x7-meter enclosures. The deer ate the bait mixture for about 16 minutes while several deer stood on the outside of the enclosure and watched. The deer on the outside of the enclosure made no attempt to jump into the enclosure even though there was no bait remaining on the outside of the enclosed area. This was the only deer we observed inside our enclosures at any of the study areas during the 10-day monitoring period following the installation of the enclosures.

Deer used their heads and necks to bend the hog wire down several inches at each of the sites, but no deer entered the enclosures at those sites.

No more deer entered the 7 x 7-meter enclosure even though bait was provided there for several months longer than the study.

Discussion

Our results support the use of 5-foot high fences for excluding deer from areas up to 7 by 7 meters for research purposes, but these enclosures should also be effective at excluding deer from small areas such as home gardens or planting areas. We purposely tested the effectiveness of fencing at a time of year when conditions were extremely harsh and using food that was highly palatable and being eaten by deer. The desire of a deer to enter a vegetation enclosure in the forest should be significantly lower than the conditions we set up in our study. In addition, at the time of year when home gardens are at their peak production the amount of highly palatable food outside the enclosure will be significantly higher than the available food in this study. Establishing an enclosure prior to deer use should add insurance of protection against deer.

A remaining unknown is the size area that can be effectively protected with a 5-foot high fence. Will such a fence protect an area as large as 10x10 meters? Meanwhile, gardeners might consider using a dividing (intermediate) fence if they want to protect a garden significantly larger than 7x7 m.

The supplies we used included 7.5-foot T-posts, hog wire, post maul, and wire—all of which are available at hardware stores. In addition, these supplies can be hauled out and installed in remote areas without the use of machines such as ATV's or post-hole diggers.

Karl Martin, Ph.D. (karl.martin@dnr.state.wi.us) is a forest research scientist at the DNR in Rhinelander. He provided this article for information for WWOA members. Future research plans include a long-term research project using deer enclosures to understand deer impact on forest ecosystems. Funding for this research was provided by DNR Divisions of Forestry and Enforcement and Science.

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Controlling deer damage in Wisconsin

by Scott Craven, Scott Hygenstrom
and Philip Peterson

Deer and the damage they cause are part of a larger problem of wildlife: a public resource on private land. Wildlife cannot simply be eliminated when it conflicts with a landowner’s use of land. Neither can landowners bear the entire burden of support for these public resources.

The solution lies somewhere between these extremes. Wisconsin must manage its deer herd to satisfy several interest groups. Most landowners enjoy having some deer on their property, despite real or potential damage. This fact, coupled with the economic and aesthetic values of deer, suggests that a combination of herd control through hunting and a conscientious and reasonable effort at damage control will serve everyone’s needs.

Ways to reduce deer damage:

- **Removing live animals**—Live trapping is possible for some urban areas, but it is very expensive and requires the expertise of professionals. It is not considered a practical or long-term solution.

- **Shooting permits**—Agricultural damage deer shooting permits may be issued by the DNR. These permits allow the crop owner to remove deer causing damage to crops. Contact your local county damage specialist or your local DNR wildlife biologist for further details. For more information consider contacting: USDA-Wildlife Services Rhinelander (1-800-228-1368); USDA-Wildlife Services Waupun (1-800-433-0688); DNR Wildlife Damage Abatement and Claims Program, P.O. Box 7921, Madison, WI 53707; or the Internet Center for Wildlife Damage Management: [http://wildlifedamage.wi.umn.edu/](http://wildlifedamage.wi.umn.edu/)

- **Birth control**—Research on the use of reproductive inhibitors is underway. However, delivering the inhibitor to the deer remains a problem. This may be a technique best suited for urban parks and not rural or agricultural settings.

- **Scare devices**—One of the keys to success with scare devices or repellents is to act at the first sign of damage. It is difficult to break a deer’s behavior pattern after it is established.

- **Repellents**—Repellents that help prevent deer from feeding on crops are useful in damage control programs. Some materials are chemical formulations designed to repel deer, others are readily available materials that affect deer behavior. Repellents are best for orchards, nurseries, Christmas trees, gardens and ornamental plants. Their value is limited on row crops and large acreages. Some include: Deer-Away (putrescent egg solids), Hinder (ammonium soaps), Thrash (tetramethylthiram disulfide), Miller's Hot Sauce (capsaicin), Ro-pec (benzyl diethylyl ammonium saccharide and thymol), bags of human hair and bars of soap.

- **Deer fencing**—Where deer are abundant or crops are particularly valuable, fencing may be the only way to effectively minimize deer damage. Several fencing designs are available to meet specific needs. Temporary, electrified fences are simple, inexpensive fences useful in protecting garden and field crops during snow-free periods. Deer are curious and attracted to these fences by their appearance or smell, and are lured into contacting the fence with their nose. This causes an effective shock that trains deer to avoid the fenced area.

- **Hunting seasons**—Killing deer during the legal season is probably the best way to control deer populations. In response to recent large herds, the DNR continues to implement regulations including “antlerless only” permits, special “bonus deer” permits, extended seasons, and post-season hunts. Landowners can reduce the deer population in their area by soliciting hunters who have either sex deer permits and will shoot does. Hunters with buck tags contribute little to population reduction. By allowing hunting, landowners provide public access to a public resource while reducing deer damage.

Landowners are alerted that this year’s deer hunting season has gone through its “ups and downs” as it was changed by legislative objection and then came back to life in April. This year’s season includes Earn a Buck (EAB) in north central units, a unique December antlerless deer season the second week in December, antlerless tags for just $2 and no October Zone I. For the latest, see the DNR web site: [www.dnr.state.wi.us](http://www.dnr.state.wi.us/).

If you don’t hunt, or don’t feel knowledgeable about hunting, consult a DNR wildlife manager. The solution often involves contacting a group of hunters, explaining the situation and letting them conduct the hunt. Many will accept some restrictions in return for a good place to hunt. Plans should include designating a specific location for each hunter, for a safe hunt and allowing the landowner to determine how many hunters to accommodate at one time.

Leasing your land for hunting privileges is another consideration. You might offset your crop damage losses with a hunting lease. Leases may be daily or for one or more years, although if your land is enrolled in the Managed Forest Law and is enrolled to be open to the public you must abide by the restrictions of your agreement.

Keeping deer away from trees and crops takes some doing.

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*This article is adapted from the UW-Extension publication #G3083, Controlling Deer Damage in Wisconsin. Copies of the full article are available from the UW-Extension on line at [www.uwex.edu/ces/pubs/](http://www.uwex.edu/ces/pubs/) or by calling 1 (877) 947 7827.*
Venison delights
by Tim Eisele

If your goal is to reduce the number of deer on your woodland, then you’ll want some good recipes for venison.

Joe Hinrichs, of Mt. Horeb, is a professional chef who passes along some tips for preparing and cooking venison. He believes in removing the hide from the deer as soon as possible so that the meat does not spoil. When cutting up the meat, and again before cooking, he makes sure all fat and connective tissue is removed.

He also recommends that venison not be allowed to sit between the time it is cooked and served. Keeping the meat in a moist heat, like a pressure cooker, crock pot or Dutch oven, keeps it from drying out.

His favorite recipes are reprinted here for your use.

Tim Eisele (teisele@chorus.net) edits Woodland Management and works full-time as a freelance outdoor writer. He and his wife Linda own land in Crawford County, where the Eisele door camp will fire up the wood stove and enjoy its traditional dinner at Hinrich’s venison rainbow stew in November.

Hinrich’s venison rainbow stew
5 lbs. cubed venison stew meat
1¼ tsp. thyme
1½ tsp. garlic powder
½ tsp. black pepper
Salt to taste
1 tsp. celery salt
1 tsp. chili powder
¾ tsp. sweet basil
1½ cups brewed black coffee
½ cup catsup
1½ gallons beef stock
8 potatoes, cut into 1-inch cubes
2 medium onions, diced
8 carrots, cut coin-size
1 lb. frozen peas

Cut venison into ⅛-inch cubes and dust with flour and seasoning salt. Then brown in a large roasting pan. Add beef stock, coffee, catsup, onions and all the above seasoning. Bring to a boil.

Reduce the heat and simmer for two hours or until the meat is tender. Add more liquid if necessary to maintain the volume at 1½ gallons. Add the potatoes and carrots and cook until tender. Add frozen peas and thicken with a butter roux (roux is equal parts of melted butter and flour formed to a cookie dough-like consistency). Serve over baking powder biscuits. This serves 8 to 10 cold, wet, hungry hunters.

Wisconsin River-bottoms pot roast
2 tbsp. flour
2 sliced onions
1+ lb. venison pot roast
¼ cup apple cider vinegar
1 cup canned tomato
¼ cup lemon juice
1 cup beef stock
¼ cup black coffee
1 tbsp. Worcestershire sauce
2 cloves garlic
1 pkg. Lipton onion soup mix
¼ tsp. coarse black pepper

Rub flour on the roast and brown well on all sides in a heavy pot. Place a rack under the meat. Add the onion, tomato, beef stock, garlic, salt and pepper. Sprinkle the onion soup mix over the top of everything.

Cover, simmer for two hours. Combine the remaining ingredients and pour over the meat. Cover and simmer until tender, about 1 to 1½ hours. This is also very good and convenient cooked in a crock pot, although cooking times will be longer.

Oriental venison stir fry
1 to 3 lbs. venison steak cut julienne in ⅛-inch thick strips, ⅛-inches long
3 cups beef or chicken stock
1 green pepper cut in julienne strips
1 cup soy sauce
1 red pepper cut in julienne strips
Teriyaki sauce to taste
3 cups celery or bok choy cut diagonally
¼ tsp. ground pepper
1½-oz can of sliced water chestnuts
1 clove finely minced garlic
2 pkgs. frozen snow pea pods
½ tsp. ground sage
2 bunches green onions cut diagonally
½ tsp. sweet basil
cornstarch for thickening sauce
8 oz. button mushrooms

In a pan, heat the stock, soy sauce, teriyaki sauce and spices. Bring to a boil and thicken with cornstarch. In a Wok or large, heavy skillet, stir fry the venison steak until medium rare. Remove and put in a covered bowl.

Place all the vegetables in the Wok and stir fry until crisp-tender. Add hot, thickened sauce and meat to vegetables. Serve over a bed of wild rice blend.