



# Managing Iowa Wildlife: White-tailed Deer



Photo by Roger Hill

The flash of the whitetail of a deer bounding across the road is a common sight in Iowa. Many people in the state value white-tailed deer simply because of their presence. Most Iowans enjoy the aesthetic value of seeing these graceful animals along roadsides and in woodlands, parks, and farm fields. In addition, deer offer numerous recreational opportunities including nature watching, photography, and hunting. Deer hunting recreation annually makes \$30.6 million for Iowa.

However, deer also can cause problems in the state, especially in areas where high herd densities exist. Deer can consume crops, destroy ornamental trees and shrubs, damage forests through browsing and antler rubbing, and collide with motor vehicles.

This bulletin presents the history, biology and reproduction, habitat, and habits of white-tailed deer in Iowa and explores deer-human interactions. The information characterizes the types of damage that occur, describes how to identify deer damage, and explains alternatives available to manage these problems.

## History

Deer were very abundant in Iowa at the time of European settlement, but uncontrolled hunting and habitat destruction quickly reduced their numbers. Though it seems hard to believe today, by 1898 deer were virtually gone in all parts of the state, and the hunting season was legally closed. New populations of deer moved into Iowa from surrounding states. These immigrant deer repopulated the state with the help of deer that escaped or were released from captive herds and deer purchased from other states. As herd densities increased, some deer were trapped and moved to different areas of the state to aid the restoration effort.

Populations were becoming highly concentrated in some areas by the early 1950s and began to damage agricultural crops. This led to the first modern hunting season in December 1953 in which 4,000 deer were harvested. Iowa Department of Natural Resources (DNR) officials estimate the current population to be about 300,000 after the hunting season, with over 100,000 harvested in 1996. (See figure 1.)

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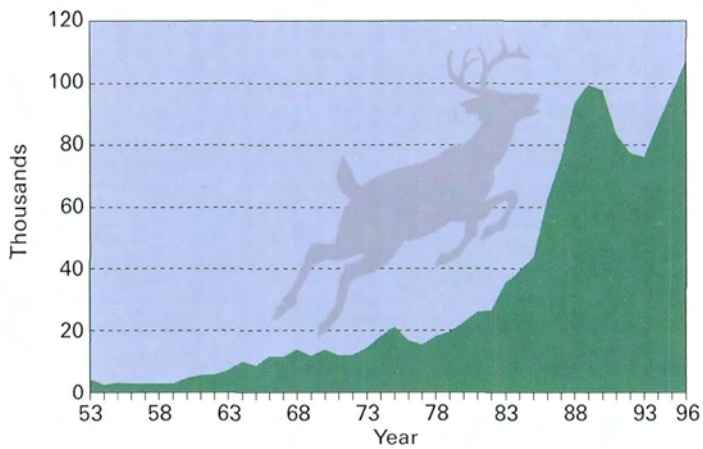


Figure 1. Number of deer harvested annually in Iowa.

## Biology and Reproduction

The white-tailed deer (*Odocoileus virginianus*) is Iowa's largest existing native mammal. The white underside of the tail, for which this deer is named, is its most distinctive characteristic. White-tailed deer stand 35 to 38 inches tall, although they may appear taller because of their long legs and slender bodies. Deer have an excellent sense of smell, and their hearing is well-developed. Their eyesight is fair, and they have poor color vision. However, they can easily detect movement.

During the winter, deer have a heavy gray-brown coat that changes to a lighter-weight, red-brown coat in summer. Adult males (bucks) reach weights of 240 to 265 pounds after about 4½ years while females (does) will average 140 to 160 pounds. Fawns usually are born



Photo by Roger Hill

A young fawn.



Photo by Roger Hill

Buck during breeding season.

in May and June. They weigh between 4 and 8 pounds when born and have a reddish-brown coat with white spots. They lose these spots after three or four months when they no longer rely solely on camouflage for protection.

Iowa white-tailed deer have higher reproductive rates than those found in some other areas because of the high quality habitat. Does in Iowa typically

have their first fawns when they are about one year old (yearlings). Most yearling does have single fawns and most adult does have twins. Because of the highly productive habitat, about 8 to 12 percent of adult Iowa does have triplets. In the wild, some adult does maintain this high reproductive rate for up to 10 years.

Like their relatives the elk and moose, only male deer have antlers. Antler size is determined by the genetic background and availability of high quality food, though it also is somewhat influenced by the deer's age. Antlers begin to grow in March or April and continue through August or September. At the peak of development, antlers may grow as much as one-half inch per day. While they develop, the antlers are covered with a soft skin called "velvet." As this soft skin dries in the fall, the bucks rub their antlers against trees and shrubs to remove the velvet. Bucks shed their antlers after the breeding season ends in late January. Each successive "rack" of antlers will grow larger than the previous set, provided nutrition is adequate. Large antlers are an important factor in courtship competition between adult bucks; however, a large, healthy body also is required to establish a buck's dominance.

## Habitat

Deer normally are associated with wooded areas, but they will use other areas, such as fence lines, marshes, and even grassy areas like those in Conservation Reserve Program land. The key feature seems to be availability of adequate cover. Deer habitat also must provide an adequate supply of good quality food, especially in the fall and winter, to keep the deer in good



Photo by Roger Hill

*Deer prefer woodlands and woodland edges.*

physical and reproductive condition. Cornfields often are used by Iowa deer during the growing season because they provide cover and easy, protected travel, in addition to food.

### **Diet**

White-tailed deer are ruminants like cattle. This means they can digest foods, such as woody plants, that humans cannot. Deer will eat grasses, sedges, fruits, nuts, forbs, and mushrooms in addition to their “basic” diet of trees and shrubs. A majority of the deer’s diet consists of a single food item, but deer sample many plants while feeding. In Iowa, row crops, especially corn and soybeans, can make up 78 percent of their diet. When food is scarce, deer will eat almost any plant, even those they avoid when food is plentiful. For example, browsing effects sometimes are evident on eastern red cedar, which is not a preferred food.

### **Movements**

White-tailed deer are very mobile animals. Studies with radio-collared deer found they move about one mile per day in their daily activities. Most daily movements occur within the deer’s home range. However, the location and size of this home range may change seasonally in response to availability of adequate food and shelter. It also may change permanently because of social pressure from dominant animals.

### **Daily Movements**

White-tailed deer are crepuscular animals, meaning they are most active at dawn and dusk. However, they are very adaptable and will be active at other times if they must share their habitat with humans. Typically, deer will bed down during the day in a protected wooded area. Rather than sleep during this time, the deer ruminates (digest their food) and groom themselves, moving around about every two hours. In the summer, they may eat midday because of the long time between their

morning and evening feedings. At night they bed down in areas more open than their daytime resting spots. Often, the two bedding areas are on opposite ends of the home range.

### **Home Range**

A home range is the area used in the normal activities of food gathering, mating, and caring for young. The size and location of the white-tail’s home range varies with the season, and most deer occupy the same home range year after year. Does and their young usually stay in the same general area throughout the year, while adult bucks are more territorial and typically have larger home ranges. Unusual movements of one female that had been fitted with a radio-collar showed she traveled between two areas separated by a major city and 15 miles. She made this journey several times over the course of a summer.

### **Seasonal Movements**

Deer often have winter and summer breeding ranges that differ in location and size. In Iowa, secure cover, a reliable water supply, and hunting pressure are all important factors in establishing a home range. Habitat changes may influence seasonal movements of deer by altering the availability of food and cover. However, food is not a dominant factor influencing home range because there usually is a plentiful supply year-round.

In the spring and summer, the home range is small because does must care for their newborn fawns. It increases in the fall when breeding activities demand greater movement and food becomes less abundant. Winter ranges are smaller since the deer restrict movements to conserve energy. During this time, deer usually live off the fat reserve they built up in the fall and rely on reduced winter food supplies. In addition to these seasonal movement changes, deer movements can be altered more permanently by converting agricultural land to natural habitats. This provides secure cover where none existed previously. The reverse also is true: converting natural habitats to agricultural or residential uses reduces the availability of secure cover and alters deer movements.

### **Dispersal Patterns**

Social pressure from larger, mature bucks forces young bucks out of their original home range when they are about 18 months old. During this dispersal, young bucks may travel several miles in search of a suitable area to establish a territory. For example, in a northeast Iowa study, a young male was found over 40 miles away from where he was originally marked.

## Communication

Deer communicate with each other vocally as well as through scent and sight, although scent is the most important communication method. Vocalizations allow deer to communicate messages of hunger, fright, and danger, in addition to identifying individuals by varying the tone, pitch, and intensity of their calls. The four basic reasons for communication among deer are locating individuals, marking territories, displaying dominance, and alerting others of danger.

When they are in estrus, does emit a scent that bucks follow to locate the does for breeding. Bucks looking for does during this time make low, grunting sounds that are thought to attract the females' attention. Bucks and does also may call to one another, but most vocalizations occur between a doe and her fawn.

Bucks mark their territories in two basic ways: urine marking and scrapes. The far-reaching odor of urine may intimidate other bucks from entering the territory of an established male and probably attracts does to the site. Buck scrapes usually consist of a broken twig or branch 1 to 2 meters off the ground with a depression directly beneath the damaged branch scraped in the soil by their hooves. Scrapes function as signposts, identifying the presence of a particular buck in the area. Territories and scrapes are marked by a scent, called a pheromone, that is produced by glands in the deer's leg.

Deer display their dominance toward subordinate animals through aggressive behavior. For example, a dominant buck may make a scrape in front of a smaller buck. If dominance is tested, two bucks will engage in a sparring match, using their antlers as weapons. Three



Photo by Roger Hill

*Buck in velvet.*

vocalizations—grunts, snorts, and wheezes—are associated with aggressive behaviors and are made by both males and females. These vocalizations often are accompanied by posturing threats.

The white underside of the tail serves as a signal to alert other deer of trouble. Other behaviors, including snorting and hoof stamping, also may be displayed when danger is detected. If they are pursued, deer can run 35 miles per hour and jump over 8-foot fences. More often, they will freeze in place and wait for the danger to pass or try to slip away undetected.

## Deer-Human Interactions

Deer populations increased dramatically across eastern North America during the 1980s and 1990s. At the same time, their natural habitat was greatly reduced as a result of the continuing expansion of urban areas and conversion of native landscapes to agriculture. The remaining deer habitat became stressed by the high population densities. Protected areas, such as state preserves, forests, and county and state parks, began showing stress. More problems related to the high deer numbers became evident as agricultural crops suffered damage from deer traveling from the safety of the preserves to the fields to eat. The most recent development has been problems associated with deer in expanding urban environments. Ornamental trees and shrubs in residential and commercial areas suffer damage as deer seek alternative food sources. In addition to damaging landscape plantings, the increased deer activity can cause property damage in vehicle-deer collisions. The possibility of deer transmitting diseases to humans and other animals also is a concern. Compounding these problems is the controversy surrounding hunting as a means of managing deer populations.



Photos by Roger Hill

*Buck evidence. Buck rub (left), and scrape in soil (right).*



Photo by Jim Pease

Deer crossing signs warn of likely areas for vehicle-deer collisions.

### Deer-Vehicle Collisions

Deer-vehicle collisions often are difficult to avoid. A deer unexpectedly jumps out onto the road, and the driver must either swerve or hit the deer. Many times the deer is hit regardless of the driver's decision. In 1995, Iowa reported 11,167 collisions caused by animals on the road, approximately 9 percent of all traffic collisions in the state. Nearly all of these animal-vehicle collisions were caused by deer.

Deer whistles, devices purported to alert deer of a vehicle, do not work. Several studies have shown that deer do not pay any attention to the sound made by the whistles. However, if installing a deer whistle on your car makes you more alert and aware of deer, it could possibly help you avoid an accident.

### Disease

Modern sanitary practices have virtually eliminated the threat of deer transmitting diseases to humans and other animals. Deer theoretically could transmit brucellosis and tuberculosis to other animals, such as pigs and cattle. However, this is very rare and not generally thought to be a serious threat to domestic livestock.

The dangers associated with humans contracting *E. coli*, salmonella, and giardia from deer are similar to the risks involved with handling any animal. These diseases should not pose a problem to people handling deer as long as careful attention is given to keeping conditions sanitary. However, deer are a factor in the spread of Lyme disease. Lyme disease is caused by a corkscrew-shaped bacterium transmitted to humans and other animals by the tiny deer tick, *Ixodes scapularis*. This tick has a complicated two-year life cycle during which it feeds on several hosts. White-tailed deer play an important role in this life cycle by acting as a host to adult deer ticks in the fall, winter, and early spring. Since deer

ticks rely on specific hosts for each stage of their life cycle (including mice in one stage), removing one host will interrupt the life cycle, thereby possibly eliminating the ticks and Lyme disease from an area.

Some people have suggested eliminating deer to extinguish Lyme disease. While this may be possible in some areas, such as small islands, it is not practical, nor desirable, in most cases. Taking precautions when one might be exposed to deer ticks is a much more practical alternative. For more information on Lyme disease, see Iowa State University Extension publication Pm-1407, *Lyme Disease: Information for Iowa Residents*.

### Deer Hunting

Deer hunting is an important management tool as well as a recreational activity in Iowa. Since deer have few remaining natural predators (coyotes may prey upon fawns in Iowa), hunting serves as the major source of mortality. Some people feel hunting is inhumane; however, Iowa's deer herd could grow at an annual rate of 20 to 40 percent if it was not regulated by hunting. This would result in a doubling of the population every three years. Increased herd densities resulting from such a population explosion would result in huge economic losses for landowners. Iowa's remaining natural landscapes also would be changed due to excessive browsing before natural processes began to regulate deer populations.

In 1996, more than 175,500 Iowa hunters pursued Iowa deer during the shotgun, archery, and muzzleloader seasons. These hunters spent an average of \$200 each for food, firearms and bows, clothing, travel, and other items associated with deer hunting, contributing more than \$30 million to Iowa's economy. This added income, combined with the damage prevented by reducing deer numbers, makes deer hunting very important in Iowa.



Photo by Jim Pease

Hunting is an important part of deer management. Good hunter/landowner relations must be cultivated and maintained.

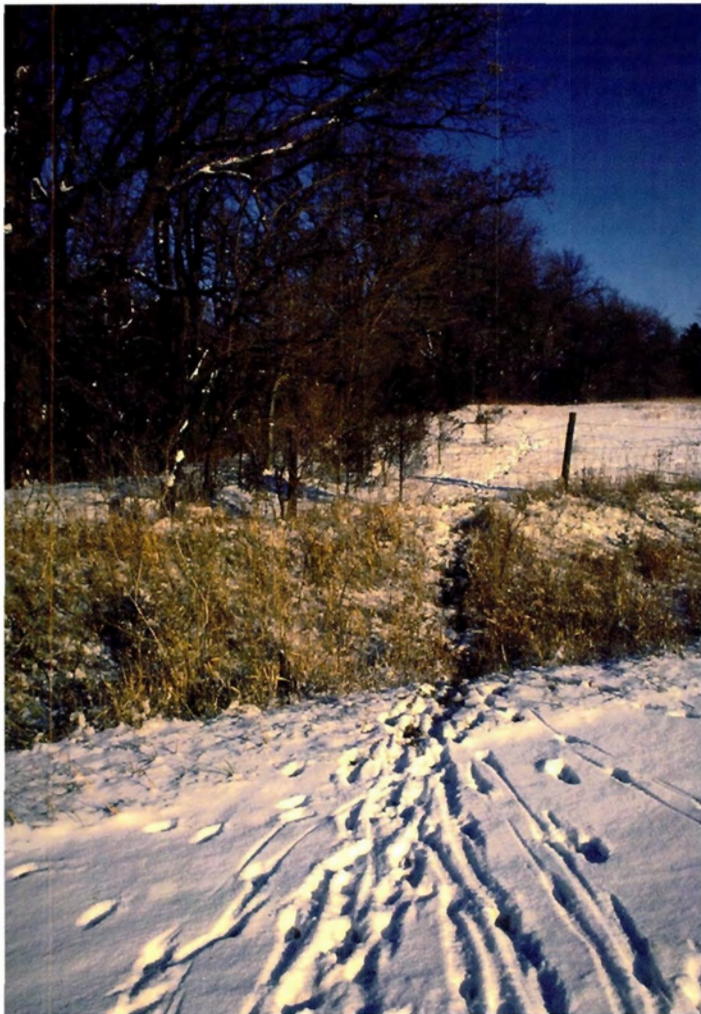


Photo by Roger Hill

*A high density of deer can cause damage to crops and yards.*

### Damage Identification

Two major types of deer damage result from deer eating vegetation and bucks rubbing their antlers on trees. Deer tear plant material when feeding because they have no upper front teeth. This results in a jagged edge rather than a clean cut on the damaged vegetation. Deer prefer to eat the growing portions of plants. For example, they pull the tops and leaves off corn plants to reach the tender parts of the plant and discard the less desirable leaves. They eat the terminal buds of trees and shrubs in addition to the succulent leaves and stems of woody and herbaceous species.

Recognizing deer damage is the first step in determining the best management alternative for the situation. In addition to the signs described previously, fresh droppings, tracks, and observations of deer provide evidence that deer are causing the damage. Many times damage caused by rabbits, raccoons, birds, and squirrels is credited to deer. Figure 2 provides identification tips for damage caused by wildlife that may be mistaken for deer damage. The following section describes common types of damage caused by deer.

### Consumption of Agricultural Crops

Scenes of deer emerging from the woodlands at dusk to feed in corn and soybean fields are common throughout the state. In fact, 56 percent of Iowa farmers in a 1991 survey experienced crop damage from deer. Although deer sometimes are blamed for knocking down corn-stalks, most of the damage they cause to agricultural crops involves eating the plants. Deer use agricultural fields throughout the year, but activity peaks at specific times in the growing season. As might be expected, damage to row crops often is the worst at field edges near protective woody cover.



Photos by Jim Pease

*Figure 2. Rabbit damage (left); deer damage (right).*

### Corn

Deer first move into cornfields when the plants are emerging. They eat the new shoots as the corn reaches three to four inches tall. The most activity takes place somewhat later in the growing season, when the corn has grown to about 2½ feet tall. At this stage, deer eat the apical meristem of the plants, pulling off the tops of the plants while the leaves remain in place. Activity



Photo by Roger Hill

*Over half of Iowa farmers experience some crop damage from deer.*

peaks again when corn reaches the silking stage. Damage at this point can prevent the ear from forming. As the ear develops, deer nip kernels off the emerging cob. Ears damaged in this way may develop with short, smutty husks. The final peak of activity begins when the corn is mature. Deer bite off the end of an ear, sometimes leaving the husk intact. They will continue to feed in cornfields after harvest, eating the waste grain left behind by the combine or picker.

### **Soybeans**

Soybeans also suffer from deer damage even though this crop does not have the added benefits to the deer of cover and protected travel that corn has. Stunted soybean plants are a sign that deer damage may be taking place. Deer eat the tender terminal buds of the plants, resulting in the plants appearing “bushy.” Peaks in activity occur when the plants are first coming up, when the beans begin to bloom, and right before the beans mature. Not much activity is seen in fields once the soybeans mature unless left over winter. However, most feeding in soybean fields occurs outside the growing season, when deer move back into the fields after harvest and eat waste grain.

### **Consumption of Landscape and Garden Plants**

In the spring, deer often nip off emerging shoots and blooming flowers in gardens and flower beds. Deer also may consume fruits and berries produced by plants in addition to eating the leaves. While rabbits may damage these plantings in a similar way, it is very simple to determine which animal is causing the problem. Deer also may consume wild perennials. Woodlands with high deer densities often have few blooming spring wildflowers.

### **Browsing of Trees and Shrubs**

While deer generally are considered browsers that consume woody plants, other green plants, fruits, and berries also constitute much of their diet. As a result, deer damage trees and shrubs, eating the past year’s growth and dormant buds, especially in fall and winter months when these other food sources are not available. When food is scarce, the deer will browse on older twigs and branches and consume species that they normally avoid. In extreme cases where the food supply is low and the population is high, you can see a “browse line” on trees and shrubs. In this situation the deer consume all edible branches on woody plants as high as they can reach. This results in a visible line between the damaged and undamaged parts of the trees. The deer may even stand next to the tree with their front hooves on the trunk to reach food higher off the ground.

### **Antler Rubbing**

Damage from antler rubbing can be severe in the fall. Bucks rub their antlers on trees to remove the dried velvet from their antlers. While this behavior is not as widespread as browsing, it can have harsh consequences for individual trees. Damage usually is limited to an area on the trunk between 1½ and 3½ feet above the ground. The action may strip bark from young trees, resulting in dead or deformed trees.



*Bucks rub their antlers on trees in the fall.*

### **Management Alternatives**

Several alternatives are available to manage deer damage. Each alternative has certain benefits, but not all options can be used in every situation. Options for managing deer damage can be divided into two major categories: population control and damage management.

#### **Population Control**

Regulating the size of Iowa’s deer herds is the best way to reduce damage because lower deer densities translate into less damage to the habitat. Possible ways to control population size include hunting, trapping, and administering contraception to deer.

**Hunting** is the most effective way of lowering population levels because deer are removed from the ecosystem with relatively low investments of time and tax money. Annual surveys of the deer population are made by the Iowa DNR to determine the ideal harvest to maintain a healthy, tolerable population. Information from these surveys is used to determine the number and types of licenses that

will be issued. In 1996, more than 175,000 hunters purchased licenses permitting them to hunt deer in Iowa, thereby helping to manage the population and fund wildlife programs while enjoying a recreational activity.

However, public hunting is not a perfect solution because it is not acceptable in all areas where problems exist. Some areas have a high **cultural carrying capacity** for deer. In other words, people in the area have a high tolerance of deer and the related damage and would prefer deer were not hunted. Also, hunting is not feasible in cities and some wildlife areas because of the potential for property damage and injuries to people or other animals. In some metro areas in other parts of the country, **sharpshooting** is used in places where hunting is not feasible. Another related option for population control is the **special controlled hunt** in which skilled hunters harvest problem deer within a specific area by a specific means, such as bow hunting.

In areas where hunting is not feasible, **live trapping** deer with nets or box traps may be useful in controlling deer populations. When the trap and release management alternative is used, the question of where to relocate problem deer must be considered. Trapped deer must be released in vacant habitat or in a controlled area, such as a wildlife reserve or a deer farm. They cannot be simply transported from the overpopulated area to another nearby habitat.

Studies on relocated deer have found that a vast majority of the animals die from the stress related to being trapped, moved, and released in a strange environment. Those that survive often return to the area where they were trapped. A variation of the trap and release method of management is to kill the deer once it is trapped. Some people feel this alternative is more humane than hunting. While these alternatives can be used in some areas where hunting is not permitted, both trapping methods are much more labor intensive and expensive than hunting.

**Contraception** is another management alternative that has been examined in the past decade. Steroid contraceptives have been developed for captive deer that work on the same principle as human birth control pills. However, this management tool is not likely to be a viable option for controlling deer populations on a large scale in the near future. Presently there is no legal form of use for steroid contraceptives in deer except in limited experimental studies. One of many problems is controlling the dosage given to variable-sized deer. Some forms of contraception also have been shown to affect

nontargeted species. In test studies, widespread use of deer contraceptives caused declines in small mammal populations, affecting the balance of the ecosystem. Also, repeated use of contraceptives may cause permanent sterility in the deer population. In addition to the difficulty of administering the drug to deer, concerns about human food safety and the expense of this method also must be addressed before contraception can be recommended as a management tool. At this point, contraception for deer is still in a highly experimental phase of research.

## Damage Management

While population control is important in managing deer damage on a large scale, damage management is effective in managing problems on a smaller scale. The key to preventing deer damage is to anticipate problems. Individuals experiencing deer damage can use management methods—including repellents, scare devices, and fences—to help alleviate, or eliminate, the problem. Before choosing one of these damage control alternatives, have a goal in mind of what you are trying to accomplish and an understanding of the management alternatives available.

### Repellents

Repellents discourage deer from feeding on plants by making them smell or taste undesirable or making them difficult to eat. In addition to commercial repellents applied to plants, some plant species have natural defenses against deer.

Commercial repellents provide temporary relief but do not solve the problem of deer damage. If they are hungry enough, deer will eat plants even though they are treated with repellents. The high cost and limited effectiveness of repellents make them impractical for use on row crops and other large areas, but they are well suited for orchards, gardens, and ornamental plants. The effectiveness of repellents depends on many factors, including the weather. For example, some repellents require reapplication after rainfall.

**Contact repellents** are applied directly to plants, repelling the deer by their taste. Because they affect the taste of plants, contact repellents should not be used on plant parts intended for human consumption. These repellents are most effective on dormant trees and shrubs. Young trees should be treated completely. With older trees, it is more economical to treat only the new growth within reach of deer (about 6 feet above maximum snow depth). New growth appearing after treatment is not protected from deer damage. Thiram, an effective contact repellent, is included in most commercial





Photo by Jim Pease

*An assortment of repellents that vary in effectiveness.*

repellents. Some of these include Chaperone™, Guftafon 42-S8™, Nott Chew Not™, Scram 42-S™, and Bonide Rabbit & Deer Repellent™. Hot pepper sauce is another taste repellent reported to reduce deer browsing on plants.

Deer detect **area repellents** by their odor. Area repellents can be used to treat the perimeter of a large area creating an undesirable border that may discourage deer from browsing on the interior. As a result, these repellents can protect larger areas at lower costs than contact repellents. Some area repellents can be used on plants grown for human consumption because they are not applied directly to the plants. Fermented egg solids are used in many odor repellents including BGR Big Game Repellent™ and Deer Away™. Hinder™ and Magic Circle™ also are effective area repellents. In addition, bags of human hair, moth balls, blood meal, and bar soap hung in trees are reported to repel deer.

**Natural defenses** possessed by some plant species are structures, such as thorns, that make the plant difficult to eat and undesirable tastes and smells. Deer rarely damage barberry, birches, dogwoods, and spruces. Although they usually avoid many pine species, deer damage white pines. In general, thorny and aromatic species are avoided, but even these plants may suffer from deer damage if food is in short supply.

Deer prefer to eat species with soft leaves and fruits. Some species that are often severely damaged include fruit trees, arbor vitae, rhododendrons, yews, hostas, viburnums, maples, and oaks. These species are rich in nutrients that deer require and do not possess defenses against browsing. Avoid these species in areas where deer densities are high since damage is very probable.

## Scare Devices

Noise-making devices may help temporarily reduce damage by scaring deer away from the plants you are trying to protect. Scare devices have had inconsistent results in controlling deer damage, but the possibility of success is greater if action is taken when the problem is first noticed. Once deer establish a pattern of behavior, it is very hard to break, and scare devices are less effective. Gas exploders, guard dogs, gunfire, and fireworks are scare devices that may help reduce the possibility of deer damage.

Gas exploders set to go off at regular intervals are the most common scare devices. They are most successful when moved every few days so the deer do not become accustomed to the firing pattern. Exploders are effective for only one to two weeks and should be regarded as a temporary control measure. Exploders with more randomized firings may be effective longer.

The presence of a guard dog in an area suffering deer damage also may be effective as a scare device. Dogs will chase the deer, preventing them from browsing on plants in the area. If the dog is tied, deer may move in closer when they learn the boundaries marking the limit of the dog's movement.

Gunfire and fireworks can provide quick, temporary relief from deer damage as the noise scares the deer away. This technique is not recommended as a means of controlling damage for an entire growing season.

## Fences

Fences intended to exclude deer are the most effective way of reducing deer damage. Because of the high installation cost, fences usually are limited to small areas such as orchards, gardens, Christmas tree farms, and other very high-value crops, or areas where deer are particularly abundant. Several different fence designs are available that can meet the needs of specific situations. These fences fall into two general categories: passive and active exclusion.

**Passive exclusion fences** generally are woven-wire fences that are too tall for deer to jump. These fences must be at least 8 feet high since deer can jump over fences less than 8 feet. The standard design consists of 12-foot posts placed at 40-foot intervals and set to a depth of about 4 feet, with woven wire attached to the posts. The bottom of the fence should be at ground level so deer cannot crawl under it. Two 4-foot widths of hog wire fencing joined one on top of the other and attached to the posts can be used to effectively keep deer out of the area. If a taller fence is desired, a strand of high

tensile electrical wire can be strung above the woven wire. A fence that slants away from the area to be protected is another design that successfully excludes deer from an area.

While passive exclusion fences are expensive, they are permanent structures that can protect an area year-round and should last about 20 years. In addition, little upkeep is needed to maintain this type of fence. These factors make passive exclusion fences a very effective management alternative for preventing deer damage. This approach is recommended for areas that have recurring problems with deer damaging valuable crops and ornamental plants.

**Active exclusion fences** use electricity to keep deer out of an area. The deer are attracted to these fences by their appearance or smell. When they touch the fence with their noses, deer receive an electrical shock that conditions them to avoid the fenced area. While active exclusion fences are less expensive to build than passive exclusion ones, they may be somewhat less effective, since hungry deer may learn to jump over them. These fences also may require more maintenance than passive exclusion fences.

Many different designs of active exclusion fences are available to keep deer out of an area. For example, the Visible Grazing Systems fence attracts deer to the electric fence by its yellow color. The Minnesota DNR fencing system includes peanut butter placed on foil flags that are attached to a traditional electric fence with the wire 2½ feet off the ground. Several other designs for high-tensile and multi-wire electric fences also are effective in excluding deer from a designated area. The list of references at the end of this bulletin includes several sources that provide more information about both passive and active exclusion fences.

In addition to excluding deer from an area, fence-like structures can be used to limit damage to individual trees. To protect trees from deer damage, position plastic mesh tubes around small saplings, and place cylinders of welded wire mesh at least 6 feet tall around larger trees. To protect trees from antler rubbing, drive three wooden stakes or fence posts around the tree about 18 inches apart. This design hinders the buck's access to the tree, thus protecting it from damage.

## Education

Understanding the biology and ecology of white-tailed deer in Iowa is an important step in reducing the effects of deer damage throughout the state. Once people under-



Photo by Jim Pease

*An electric exclusion fence.*

stand the reasons that deer damage agricultural crops, landscape and garden plants, trees, and shrubs, they can take appropriate measures to reduce the damage.

Learning about the ecological relationships between deer and their environment makes it easier to understand the effectiveness of alternatives available to manage

deer damage problems. Plant species that provide high quality, palatable food for deer are the most likely to be damaged. Non-preferred species are less susceptible to damage but will suffer when food is scarce or deer population densities are extremely high. Crops and landscape plantings near prime deer habitat may be severely damaged simply because they are positioned

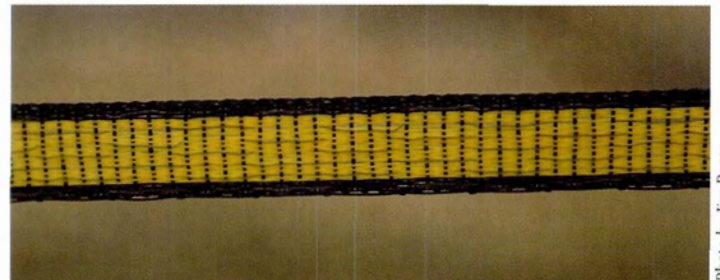


Photo by Jim Pease



Photo by Jim Pease

*Deer fence by Visible Grazing Systems protecting high value apple crop.*

adjacent to deer habitat. Even non-preferred species are more likely to suffer when located close to deer.

These relationships between white-tailed deer and their environment have very important implications for the alternatives that will most successfully manage deer damage problems in Iowa. On the large scale, hunting is the most effective management tool. On a smaller scale where limited areas need protection and hunting is not a viable option, exclusion fences are recommended. Although the initial cost of installing a fence may seem prohibitive, a permanent fence can effectively eliminate deer damage and the economic losses associated with this damage, often paying for the fence.

Understanding the ecological links between deer and the rest of the natural environment also may increase appreciation for these animals, resulting in an increased tolerance of slight deer damage and a better relationship between the people and deer of Iowa.

## References on Managing Deer Damage

*Controlling Deer Damage in Wisconsin* by Scott Craven and Scott Hygnstrom. 1986, University of Wisconsin-Extension.

*Controlling Deer Damage* by William F. Andelt, Keith Sexton, and F. Robert Henderson. 1986, Kansas State University, Cooperative Extension Service.

*Resistance of Woody Ornamental Plants to Deer Damage* by M. J. Fargion, P. D. Curtis, and M. E. Richmond. 1991, Cornell Cooperative Extension.

## Who to Contact for More Help

- Willie Suchy, Iowa DNR deer biologist, (515) 774-2958
- Local DNR office/field headquarters, district DNR biologist, or conservation officer
- Jim Pease, ISU Extension wildlife specialist, (515) 294-7429
- County ISU Extension education director

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