DEER

Figure 1. White-tailed doe. Photo by Greg Clements.

OBJECTIVES

1. Explain key elements about deer biology important for their control.
2. Effectively communicate control options to clients.
4. Identify various risks involved with controlling deer.

SUMMARY OF DAMAGE PREVENTION AND CONTROL TECHNIQUES

HABITAT MODIFICATION

Plant vegetation with resistance or less susceptibility to deer damage

Harvest crops as early as possible

Use lure crops

EXCLUSION

Individual tree: woven wire or plastic cylinders

Non-electric fencing: 8-foot woven wire fence; Tensar®/ polypropylene mesh; wooden fence around small plots

Electric Fencing: vertical five, seven, or nine-wire; slanted seven-wire; single strand; offset

FRIGHTENING

Gas exploders

Pyrotechnics

Gunfire

Tethered dogs

Bio-acoustics

REPELLENTS

Smell: area repellents such as **Putrescent whole egg solids**

Taste: contact repellents such as **Capsaicin**

TOXICANTS

None are registered

FUMIGANTS

None are registered

SHOOTING

Regulated hunting

Sharpshooting

TRAPPING

Cage trapping

Drop Netting

Cannon Netting

OTHER METHODS

Chemical immobilization

Net gunning

Contraception

SPECIES PROFILE

IDENTIFICATION

The volume of literature on deer ecology and management exceeds that for any other wildlife species. The following review is as a brief summary of deer control methods and techniques, using the white-tailed deer as an example.

Deer are widely distributed and well-recognized large mammals in North America. The white-tailed deer (*Odocoileus virginianus*) (Figures 1 and 2) is found throughout much of North America.

PHYSICAL DESCRIPTION

Deer are even-toed ungulates of the family Cervidae. At birth, fawns are rust-colored with white spots. Their spotted coats are shed in three to four months and are replaced by a grayish-brown fall and winter coat. The summer coat of adult deer is reddish-brown. Under parts of the tail, belly, chin, and throat are white during all seasons. Antlers grow on males (bucks) from April to August. Antler development is nourished by a layer of soft, vascularized "velvet" on the antlers. The dried velvet layer is rubbed off and the antlers polished during the rut (breeding season). Antler size depends on nutrition, age, and genetics. The tines of a white-tailed deer's antlers arise from a central beam. White tailed deer have deciduous antlers that are shed in late winter to early spring. White-tailed deer lack upper incisors.

White-tailed deer

Figure 2. White-tailed deer face, metatarsal glands, tail, and rump patch. Image by PCWD.

Adult size varies throughout its range. In Alabama, a mature buck may weigh 150 to 250 pounds. Does typically weigh 25% to 40% less than bucks.

SPECIES RANGES

White-tailed deer are found in almost every state in the US except Alaska and Hawaii. They occur throughout the southern provinces of Canada, across the US, and into Central and South America (Figure 3). There are several subspecies of white-tailed deer.

Figure 3. Range of white-tailed deer. Images by PCWD.

VOICE AND SOUNDS

Deer emit a warning snort and a bleat or bawl when in distress.

TRACKS AND SIGNS

Deer are easily recognized by their tracks (Figure 4), trails, and abundant droppings. A single white-tailed deer can deposit 25 pellet groups per day.

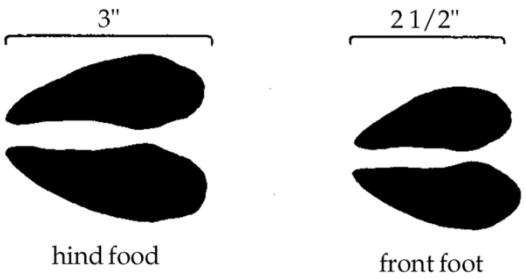


Figure 4. Deer tracks. Image by PCWD.

GENERAL BIOLOGY

REPRODUCTION

Breeding in white-tailed deer occurs from October to February, depending on location. Peak breeding activity is in January. Does are in heat for 24 hours every 28 days for three or more consecutive cycles. One buck may inseminate several does and no pair bonding takes place. Most does breed during their second fall, although in good habitat up to 30% of doe fawns (6 months old) will be bred. Gestation is about 202 days. Most fawns are born in July or August. Most reproducing fawns give birth to a single fawn, but adult does typically bear twins. Reproductive potential is sensitive to nutrition. Fawns weigh 7 to 8 pounds at birth and increase in weight for 5½ to 6½ years.

NESTING/DENNING COVER

Bedding varies based on time of year and location and is found in woodland, grassland, and agricultural fields..

BEHAVIOR

Deer typically have a home range of several hundred to over one thousand acres that varies with season, sex, and habitat quality. Life expectancy depends on hunting pressure. Records show white tailed deer living for up to 20 years, although 10 to 12 years is above average in the wild.

HABITAT

Ideal deer habitat is forest edge rather than dense, old-growth forest. They thrive in agricultural areas interspersed with woodlots and riparian habitat. Deer favor early successional stages where brush and sapling browse are within reach. Many populations have adapted to living in urban areas.

FOOD HABITS

Browse (leaves, stems, and buds of woody plants) is available all year and is a staple food for deer. Plant species vary considerably in quality and regional availability, so a list is not presented here. Forbs are eaten in spring and summer when available. Fruits and nuts (especially acorns) are seasonally important, while grasses are relatively unimportant in the diet. Agricultural crops such as corn, soybeans, small grains, clovers, vegetables, and fruit trees are readily eaten when available. Local food habit studies are available in most states; consult your local wildlife agency for more information.

Nutrient requirements and the amount of food consumed vary with age of the animal, season, and reproductive cycle. Daily dry matter consumption averages 2 to 4 percent of live body weight. For adult bucks, daily consumption is greatest in spring and averages 4.4 to 6.4 pounds of food per day. Consumption drops to about half during winter. Greatest daily food consumption by does occurs in early fall, just prior to the breeding season.

LEGAL STATUS

Deer are protected year-round in Alabama, with the exception of legal harvest during appropriate hunting seasons. Where severe or persistent damage occurs, farmers and landowners may be issued special permits (wildlife control permits) to shoot deer at times other than the legal hunting seasons. Restrictions on how and when deer may be shot, as well as requirements for disposal of dead animals, are detailed on the permit. The popularity of deer as game animals and the need to curb poaching have led to the development of severe penalties for illegal possession. As a general rule, lethal control of deer cannot be initiated before consulting the Division of Wildlife and Freshwater Fisheries (ADWFF). The Wildlife Section of ADWFF provides technical assistance for dealing with deer damage.

DAMAGE IDENTIFICATION

Deer often are observed “in the act” of causing damage. Deer lack upper incisors and often leave a jagged or torn surface on twigs or stems when they browse. Conversely, rabbits and rodents leave a clean-cut surface (Figure 5). Deer tracks are very distinctive (Figure 4). The height of damage from the ground (up to 6 feet) often rules out any mammal other than deer.

Figure 5. Torn branch typical of deer browse (left) compared with clean 45° angle cut of rabbits (right). Photo by Stephen M. Vantassel.

DAMAGE TO STRUCTURES

In general, deer do not damage structures. They occasionally run through and break fences.

DAMAGE TO LIVESTOCK AND PETS

As herbivores, deer pose little threat to other animals. Their feeding habits compete with livestock and, on rare occasions, raises the risk of disease transfer.

DAMAGE TO LANDSCAPES

Deer damage a wide variety of row crops, forage crops, vegetables, fruit trees, nursery stock, and ornamentals. In addition to the immediate loss of the crop, there is often residual damage in the form of future yield reduction of fruit trees or row crops, such as soybeans. Ornamental trees and nursery stock may be permanently disfigured by deer browsing. High densities of deer may severely impact native plant communities and impair regeneration of some forest tree species.

HEALTH AND SAFETY CONCERNS

Deer-vehicle strikes are the most significant safety threat posed by deer. In addition to the economic loss in damaged vehicles, 100 to 200 humans die each year in the U.S., along with thousands who are injured by hitting or avoiding deer (Figure 6). Reduce your chances of a deer-strike by: 1) following the speed limit and wearing a seatbelt, 2) being extra vigilant during the fall and winter mating season and spring movements, 3) driving cautiously at dusk and dawn, 4) anticipating that other deer may be following the one you just missed, and 5) avoiding swerving to miss deer, as this frequently leads to injuries due to rollovers and travel into the opposite lane.

Deer are susceptible to a number of diseases, but only a few are of concern to humans. Deer assist in the movement and development of ticks that carry Lyme disease. Deer can be reservoirs for bovine tuberculosis, which threatens livestock and humans.

Figure 6. Deer-vehicle strikes constitute a significant threat to human safety. Photo by Scott E. Hygnstrom.

NUISANCE PROBLEMS

Deer damage control is a difficult social, political, biological, and logistical problem. Control methods are built around effective herd management.

DAMAGE PREVENTION AND CONTROL METHODS

INTEGRATED PEST MANAGEMENT

TIMING, ECONOMICS, AND METHODS

The fall and winter hunting season is the best time to manage deer, though other time periods are acceptable provided they do not occur when fawns rely on their mothers.

The positive economic value of deer through license fees, meat, and hunter expenditures for equipment, food, and transportation can be measured in hundreds of millions of dollars. With the additional aesthetic value of deer to landowners and vacationers, the importance of deer as a wildlife resource cannot be disputed.

Despite their economic and aesthetic values, deer also have a variety of negative economic impacts. They damage crops and personal property and harbor diseases common to humans and livestock.

Unlike moles, rats, and other nuisance wildlife, deer cannot be casually eliminated when in conflict with humans. Similarly, individual landowners cannot be expected to bear the entire burden of support for this valuable public resource.

A national survey conducted in 1992 by the USDA's National Agricultural Statistics Service identified deer damage as the most widespread form of wildlife damage. Forty percent of the farmers reporting had experienced deer damage.

Deer damage nurseries, landscape plantings, and timber regeneration. However, deer are a valuable public resource. A cost/benefit analysis is always advisable before initiating a control program.

Two additional economic aspects are worth consideration. One involves farmer tolerance for deer damage. Two summaries of social science research related to deer damage in the early 1990s demonstrated that a majority of farmers are willing to tolerate several hundred dollars in deer damage in exchange for the various benefits of having deer on their land. Therefore, "total damage" figures are misleading because only a small percentage of farmers statewide or nationwide are suffering sufficient damage to warrant control or compensation.

HABITAT MODIFICATION

Habitat modification is not recommended. Destruction of wooded or brushy cover in hopes of reducing deer numbers destroys valuable habitat for other wildlife. Also deer forage over a large area so it is unlikely that all available deer cover is on a single landowner's land.

Damage to ornamental plants can be minimized by selecting landscape and garden plants that are less preferred by deer. In many cases, original landscape objectives can be met by planting species that have some resistance to deer damage. Table 1 provides a list of plants ranked by susceptibility to deer damage. This list, developed by researchers at Cornell University, is applicable for most eastern and northern US states.

Harvest crops as early as possible to reduce the period of vulnerability to deer. Plant favored crops as far from wooded cover as possible to reduce the potential for severe damage.

Lure crops can be planted to attract deer away from highways and crop fields where deer traditionally caused damage. The effectiveness is variable and there is concern that artificial food sources may eventually increase deer densities and problems. Specific recommendations are not yet available regarding plant selection, timing, and proximity of lure crops.

Table 1. Ornamental plants, listed by susceptibility to deer damage[1]

Plant Species	Common Name
Rarely Damaged:	
Berberis spp.	Barberry
Berberis vulgaris	Common Barberry
Betula papyrifera	Paper Birch
Buxus sempervirens	Common Boxwood
Elaegnus angustifolia	Russian Olive
Ilex opaca	American Holly
Leucothoe fontanesiana	Drooping Leucothoe
Picea pungens	Colorado Blue Spruce
Pieris japonica	Japanese Pieris
Seldom Severely Damaged:	
Betula pendula	European White Birch

Calastrus scandens	American Bittersweet
Cornus sericea	Red Osier Dogwood
Cornus florida	Flowering Dogwood
Cornus kousa	Kousa Dogwood
Crataegus laevigata	English Hawthorn
Enkianthus campanulatus	Redvein Enkianthus
Fagus sylvatica	European Beech
Forsythia spp.	Forsythia
Gleditsia triacanthos	Honey Locust
Ilex glabra	Inkberry
Ilex cornuta	Chinese Holly
Juniperus chinensis	Chinese Junipers (green)
Juniperus chinensis	Chinese Junipers (blue)
Kalmia latifolia	Mountain Laurel
Kolkwitzia amabilis	Beautybush
Picea abies	Norway Spruce
Picea glauca	White Spruce
Pinus nigra	Austrian Pine
Pinus rigida	Pitch Pine
Pinus mugo	Mugo Pine
Pinus resinosa	Red Pine
Pinus sylvestris	Scots Pine
Prunus serrulata	Japanese Flowering Cherry
Salix matsudana tortuosa	Corkscrew Willow
Sassafras albidum	Common Sassafras
Syringa vulgaris	Common Lilac
Wisteria floribunda	Japanese Wisteria

Occasionally Severely Damaged:

Abies concolor	White Fir
Acer griseum	Paperbark Maple
Acer rubrum	Red Maple
Acer saccharinum	Silver Maple
Acer saccharum	Sugar Maple
Aesculus hippocastanum	Common Horsechestnut
Amelanchier arborea	Downy Serviceberry
Amelanchier laevis	Allegheny Serviceberry
Campsis radicans	Trumpet Creeper
Chaenomeles speciosa	Japanese Flowering Quince
Cornus racemosa	Panicled Dogwood
Cotinus coggygria	Smokebush
Cotoneaster spp.	Cotoneaster
Cotoneaster apiculatus	Rockspray Cotoneaster
Cotoneaster horizontalis	Cranberry Cotoneaster
Cryptomeria japonica	Japanese Cedar
Forsythia (x) intermedia	Border Forsythia
Hamamelis virginiana	Common Witchhazel

Hibiscus syriacus	Rose of Sharon
Hydrangea arborescens	Smooth Hydrangea
Hydrangea anomala petiolaris	Climbing Hydrangea
Hydrangea paniculata	Panicle Hydrangea
Ilex crenata	Japanese Holly
Ilex (x) meserveae	China Girl/Boy Holly
Juniperus virginiana	Eastern Red Cedar
Larix deciduas	European Larch
Lonicera (x) heckrottii	Goldflame Honeysuckle
Ligustrum spp.	Privet
Magnolia (x) soulangiana	Saucer Magnolia
Metasequoia glyptostroboides	Dawn Redwood
Parthenocissus quinquifolia	Virginia Creeper
Philadelphus coronaries	Sweet Mock Orange
Pinus strobus	Eastern White Pine
Potentilla fruticosa	Bush Cinquefoil
Prunus avium	Sweet Cherry
Pseudotsuga menziesii	Douglas Fir
Pyracantha coccinea	Firethorn
Pyrus calleryana 'Bradford'	Bradford Callery Pear
Quercus alba	White Oak
Quercus prinus	Chestnut Oak
Quercus rubra	Northern Red Oak

Rhododendron spp.	Deciduous Azaleas
Rhododendron carolinianum	Carolina Rhododendron
Rhododendron maximum	Rosebay Rhododendron
Rhus typhina	Staghorn Sumac
Rosa rugosa	Rugosa Rose
Salix spp.	Willows
Spiraea (x) bumalda	Anthony Waterer Spiraea
Spiraea prunifolia	Bridalwreath Spiraea
Syringa (x) persica	Persian Lilac
Syringa reticulate	Japanese Tree Lilac
Syringa villosa	Late Lilac
Tilia cordata 'Greenspire'	Greenspire Littleleaf Linden
Tilia americana	Basswood
Tsuga canadensis	Eastern Hemlock
Tsuga caroliniana	Carolina Hemlock
Viburnum (x) juddii	Judd Viburnum
Viburnum rhytidophyllum	Leatherleaf Viburnum
Viburnum plicatum tomentosum	Doublefile Viburnum
Viburnum carlesii	Koreanspice Viburnum
Weigela florida	Oldfashion Weigela
Frequently Severely Damaged:	
Abies balsamea	Balsam Fir
Abies fraseri	Fraser Fir

Acer platanoides	Norway Maple
Cercis canadensis	Eastern Redbud
Chamaecyparis thyoides	Atlantic White Cedar
Clematis spp.	Clematis
Cornus mas	Cornelian Cherry
Euonymus alatus	Winged Euonymus
Euonymus fortunei	Wintercreeper
Hedera helix	English Ivy
Malus spp.	Apples
Prunus spp.	Cherries
Prunus spp.	Plums
Rhododendron spp.	Rhododendrons and azaleas
Rhododendron catawbiense	Catawba Rhododendron
Rhododendron periclymenoides	Pinxterbloom Azalea
Rosa (x) hybrid	Hybrid Tea Rose
Sorbus aucuparia	European Mountain Ash
Taxus spp.	Yews
Taxus baccata	English Yew
Taxus brevifolia	Western Yew
Taxus cuspidate	Japanese Yew
Taxus (x) media	Hybrid Yew
Thuja occidentalis	American Arborvitae

[1]from MJ Fargione, PD Curtis, and ME Richmond. 1991. Resistance of woody ornamental plants to deer damage. Cornell Coop. Ext. Fact Sheet. Ithaca, NY. 4pp.

EXCLUSION

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.

Baited, temporary electric fences are simple, inexpensive, and useful for protecting garden and field crops during snow-free periods. Deer are attracted to these fences by their appearance or smell and are lured into contacting the fence with their noses. The resulting shock is a very strong stimulus and deer learn to avoid the fenced area.

Permanent, high-tensile electric fences provide year-round protection from deer and are best suited to high-value specialty or orchard crops. The electric shocking power and unique fence designs present both psychological and physical barriers to deer.

Permanent woven-wire fences provide the ultimate deer barrier. They require little maintenance but are very expensive to build. Consider the following points before constructing a fence:

History of the area. Assemble information on past claims, field histories, and deer numbers and movements to help determine an appropriate abatement method.

Deer pressure reflects both the number of deer and their level of dependence on agricultural crops. If deer pressure in your area is high, you probably need fences.

Crop value. Crops with high market values and perennial crops where damage affects future yields and growth often require protection provided from fencing.

Field size. In general, fencing is practical for areas of 40 acres or less. The cost per acre for fencing usually decreases, however, as the size of the area protected in-creases.

Cost-benefit analysis. Weigh the value of the crop to be protected against the acreage involved, costs of fence construction and maintenance, and the life expectancy of the fence.

Rapidly changing fence technology. If you intend to build a fence yourself, supplement the following directions by consulting an expert, such as a fencing contractor. Detailed fencing manuals are available from most fencing manufacturers and sales representatives.

Temporary Electric Fencing provides inexpensive protection for crops during periods without snow. Fences are easy to construct, do not require rigid corners, and the materials are readily available. Install fences at the first sign of damage to prevent deer from establishing feeding patterns in your crops. Weekly inspection and maintenance are required. Different types of temporary electric fences are described below.

Peanut Butter Fence. The peanut butter fence is effective for small gardens, nurseries, and orchards (up to 3 to 4 acres) subject to moderate deer pressure. Deer are attracted by the peanut butter and encouraged to make nose-to-fence contact. After being shocked, deer avoid fenced areas. Cost, excluding labor, is about $0.11 per linear foot. This fence is not widely used.

To build a peanut butter fence (Figure 7), follow the steps below:

1. Install wooden corner posts.
2. String one strand of 17-gauge smooth wire around the corners and apply light tension.
3. Set 4-foot $^{3}/_{8}$-inch round fiberglass rods along the wire at 45-foot intervals.
4. Attach the wire to insulators on the rods 2-½ feet above ground level and apply 50 pounds of tension.
5. Attach 3 x 4 inch foil strips to the wire at 3-foot intervals, using 1 x 2-inch strips of cloth adhesive tape.
6. Apply a 1:1 mixture of peanut butter and vegetable oil to the adhesive tape strips and fold the foil over the tape.
7. Connect the wire to the positive (+) post of a well-grounded fence charger.

For fields larger than 1 acre, it is more practical to apply the peanut butter mixture directly to the wire. You can make a simple applicator by mounting a free-spinning, 4-inch pulley on a shaft inside a plastic ice cream pail. Fill the pail with a peanut butter-vegetable oil mixture that has the consistency of very thick paint. Coat the entire wire with peanut butter by drawing the pulley along the wire. Apply peanut butter once a month. Attach foil flags to the fence near runways or areas of high deer pressure to make the fence more attractive. Check the fence weekly for damage by deer and grounding by

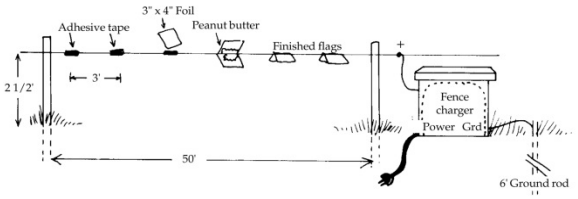


Figure 7. Peanut butter fence. Image by PCWD.

vegetation.

Polytape Fence. Various forms of polytape or polywire, (e.g., Visible Grazing Systems® (VGS), Baygard®, and Turbo-tape®) are very strong and portable. Use these fences to protect up to 40 acres of vegetable and field crops under moderate deer pressure. Deer receive shocks through nose-to-fence contact and they learn to avoid fenced areas.

To build a polytape fence (Figure 8), follow the steps below:

1. Drive $^{5}/_{8}$-inch round fiberglass posts 2 feet into the ground at the corners.
2. String 2 strands of polytape (white or yellow are most visible) around the corners and apply light tension (one strand that is about 2½ feet high can be used).
3. Use square knots or half-hitches to make splices or to secure the polytape to corner posts.
4. Set 4-foot $^{3}/_{8}$-inch round fiberglass rods along the wires at 45-foot intervals.
5. Attach the two strands of polytape to insulators on the rods at 1 and 3 feet above ground level and apply 50 pounds of tension.
6. Connect the polytape to the positive (+) post of a well-grounded fence charger.
7. Use the applicator described under Peanut Butter Fence to apply 2-foot swatches of peanut butter to the polytape every 6 feet where deer presence is expected to be high.
8. Check the fence weekly for damage by deer and grounding by vegetation.

Figure 8. Polytape fence. Photo courtesy of UNL.

Permanent High-Tensile Electric Fencing. High-tensile fencing provides year-round protection from deer damage. Many designs are available to meet specific needs and require strict adherence to construction guidelines concerning rigid corner assemblies and fence configurations. Frequent inspection and maintenance are required. High-tensile fences are expected to last 20 to 30 years.

Different types of high-tensile electric fences are described below.

***Offset or Double Fence*.** This fence is mostly for gardens, truck farms, or nurseries up to about 40 acres that experience moderate deer pressure. Deer are repelled by the shock and the three-dimensional nature of the fence. You can add wires if deer pressure increases.

To build an offset or double fence (Figure 9), follow the steps below:

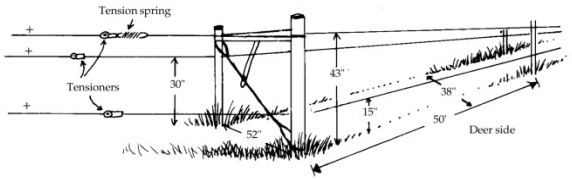


Figure 9. The offset or double fence. Image by PCWD.

For the outside fence:

1. Install swing corner assemblies where necessary (see the section on fence construction: rigid brace assemblies).
2. String a 12-½ gauge high-tensile wire around the outside of the swing corner assemblies and apply light tension.
3. Set 5-foot line posts along the wire at 40 to 60 foot intervals.
4. Attach the wire to insulators on the line posts, 15 inches above ground level and apply 150 to 250 pounds of tension.
5. String a second wire at 43 inches and apply 150 to 250 pounds of tension.

For the inside fence:

6. String a wire around the inside of the swing corner assemblies and apply light tension.
7. Set 5-foot line posts along the wire at 40- to 60-foot intervals.
8. Attach the wire to insulators on the line posts at 30 inches above ground level.
9. Attach all wires to the positive (+) post of a well-grounded, low impedance fence charger.

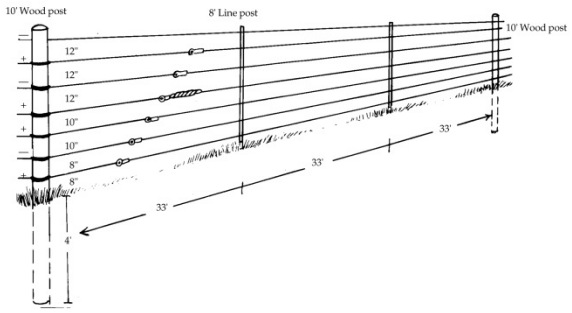
10. Clear and maintain a 6 to 12-foot open area outside the fence so deer can see it.

Maintenance includes weekly fence and voltage checks.

***Vertical Deer Fence*.** Vertical fences are effective at protecting large truck gardens, orchards, and other fields from moderate to high deer pressures. When deer attempt to go through the fence they are shocked or physically impeded by the barrier via the prescribed wire spacing. Vertical fences use less ground space than three-dimensional fences, but may be less effective at inhibiting deer from jumping over fences. There is a wide variety of materials, wire spacing, and specific designs you can use. We recommend employing a local fence contractor.

To build a 7-wire vertical deer fence (Figure 10), follow the steps below:

1. Install rigid corner assemblies where necessary (see the section on fence construction: rigid brace assemblies).
2. String a 12-½ gauge high-tensile wire around the corner assemblies and apply light tension.
3. Set 8-foot line posts 2 feet deep (or just shy of that since your top wire is at 6 feet).



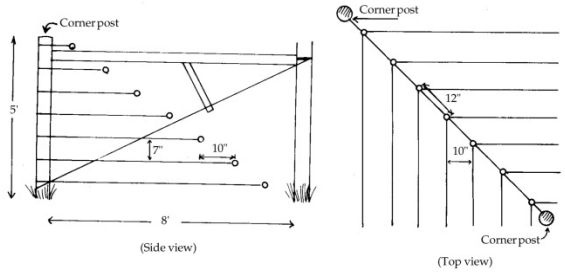


Figure 10. Seven strand deer fence. Images by PCWD.

4. Attach a wire to insulators at 8 inches above ground level and apply 150 to 250 pounds of tension.
5. Attach the remaining wires to insulators at the spacing indicated in Figure 10 and apply 150 to 250 pounds of tension.
6. Connect the second, fourth, fifth, and seventh wires from the top, to the positive (+) post of a well-grounded, low-impedance fence charger.
7. Connect the top, third, and sixth wires directly to ground. The top wire should be negative for lightning protection.
8. Clear and maintain a 6 to 12-foot open area outside the fence so deer can see the fence.

Maintenance includes weekly fence inspection and voltage checks.

Slanted Seven-Wire Deer Fence. This fence is used where high deer pressures threaten moderate-to-large sized orchards, nurseries and other high-value crops. It presents a physical and psychological barrier to deer because of its electric shock and three-dimensional nature.

To build a slanted seven-wire deer fence follow the steps described below:

1. Set rigid, swing corner assemblies where necessary, (see the section on fence construction: rigid brace assemblies).
2. String 12-½gauge high-tensile wire around the corner assemblies and apply light tension.
3. Set angle braces along the wire at 90-foot intervals.

4. Attach a wire at the 10-inch position and apply 150 pounds of tension.
5. Attach the remaining wires at 12-inch intervals and apply 150 pounds of tension.
6. Place fence battens at 30-foot intervals.
7. Connect the top, third, fifth, and bottom wires to the positive (+) post of a well-grounded, low-impedance fence charger.
8. Connect the second, fourth, and sixth wires from the top directly to ground.
9. Clear and maintain a 6- to 12-foot area outside the fence so deer can see it.

Maintenance includes weekly inspection and voltage checks.

***Permanent Woven-Wire Fencing*.** Woven-wire fences are used for year-round protection of high-value crops subject to high deer pressure. These fences are expensive and difficult to construct, but easy to maintain. Before high-tensile electric fencing, woven-wire fences were used most often to protect orchards or nurseries where the high crop value, perennial nature of damage, acreage, and 20-year life span of the fences justified the initial costs.

To build a woven-wire fence (Figure 11), follow the steps below:

1. Set rigid corner assemblies where necessary (see the section on fence construction: rigid brace assemblies).
2. String a light wire between two corners and apply light tension.
3. Set 16-foot posts along the wire at 40-foot intervals, to a depth of 4 to 6 feet.
4. Roll out an 8-foot roll of high-tensile woven wire along the line posts. Attach one end at ground level to a corner post with steel staples.
5. Apply 100 pounds of tension to the wire with a vehicle or fence strainers and attach the wire to line and corner posts with steel staples.
6. Repeat steps 4 and 5 as necessary around the perimeter of the fence.
7. Attach two strands of high-tensile smooth wire to the top of the fence to raise the height of the entire fence to 9 to 10 feet.

Minimal maintenance is required. Inspect for locations where deer can crawl under the fence.

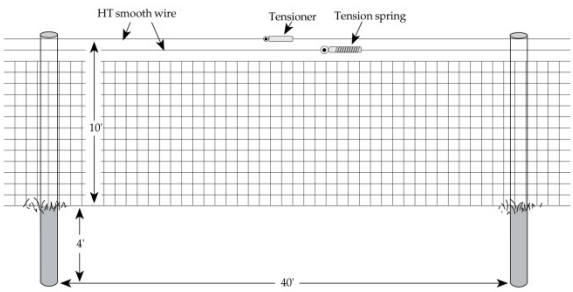


Figure 11. Woven-wire fence. Image by PCWD.

Fencing Tips

***Materials*.** Do not buy low quality materials to reduce costs; it will reduce the effectiveness and life span of the fence. We recommend:

1. Round fiberglass or treated wood posts.
2. High-quality galvanized wire and steel components. For high-tensile fences, use 11- to 14-gauge wire (minimum tensile strength of 200,000 pounds and a minimum breaking strength of 1,800 pounds), tension springs, and in-line tensioners.
3. Compression sleeves for splicing wires and making electrical connections.
4. Lightning arresters and diverters to protect chargers.
5. High-quality fence chargers. Chargers must be approved by Underwriters Laboratories (UL) or the Canadian Standards Association (CSA). We highly recommend 110-volt chargers. Six and 12-volt chargers require battery recharging every two to four weeks. Use solar panels in remote areas to charge batteries continuously. For high-tensile fences, use high-volt-age, low-impedance chargers only (3,000 to 5,000 volts and current pulse duration of at most 1/1,000 second).

6. Gates. There is no universal gate design because of the many different fence types.
7. Gates should be electrified, well-insulated, and practical for the type of farming operation. Gates range from single strands of electrified wire with gate handles to electrified panel or tubular gates (Figure 12).

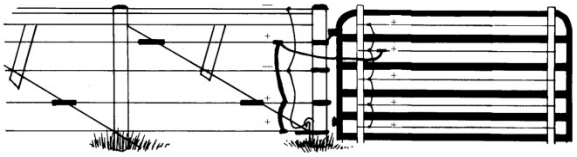


Figure 12. Fence with electrified gate. Image by PCWD.

***Fence Construction*.** Fences must be properly constructed. Do not deviate from fence construction guidelines.

1. Prepare fence lines before construction. It is easier and less expensive to install and maintain fences on clear, level runs. Minimize corners to increase strength and reduce costs.
2. Ensure that the electrical system is well grounded at the fence charger and every ½-mile of fence line. To ground high-tensile fences, drive four to six ground rods 5 to 6 feet deep and 6 feet apart. Connect the ground post of the fence charger and the negative (-) wires of the fence to the grounding system (Figure 13).

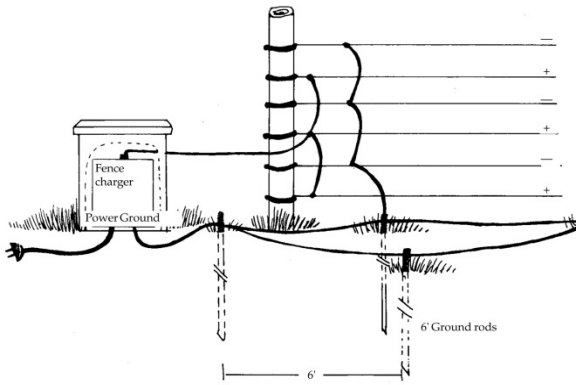


Figure 13. Electrical and grounding system for high tensile fences. Image by PCWD.

3. The wiring system in Figure 14 illustrates a positive-negative fence. Such a design is especially useful with dry or frozen ground. A fence with all positive (hot) wires may be advantageous under average crop and soil moisture conditions. Consult with a fencing contractor or expert regarding the best choice for your needs.
4. Install the grounding systems and fence charger before fence construction. Energize completed parts of the fence when you are not working on the fence to gain early protection.
5. Rigid brace assemblies (corners, ends, and gates) are the backbone of all high-tensile fence systems (Figure 14). They must be entirely rigid, constructed of the best materials, and strictly conform to design guidelines. The single-span brace assembly is the basis of all high-tensile strainer assemblies, regardless of location in the fence or fence design. This basic design is then modified to create double "H" braces, swing corners, and gate ends.
6. Allow wires to slide freely through insulators on fence posts. Fence flexibility is necessary to endure frequent temperature changes, deer hits, and obstructions.
7. Identify an electric fence with warning signs that are affixed at 300-foot intervals or less.

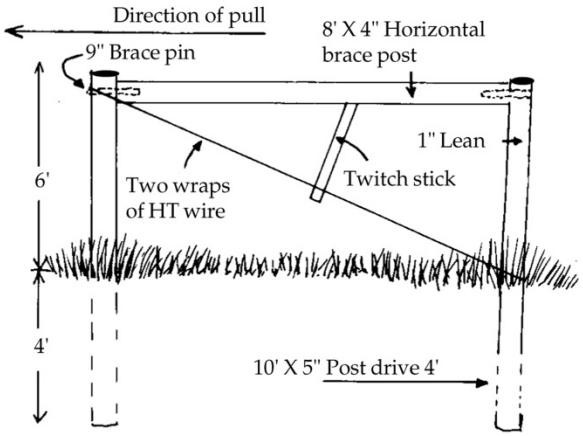
***Maintenance*.** Regular inspection and maintenance are necessary to ensure the effective operation and longevity of most fences.

1. Control vegetation near fences by mowing or applying herbicides to avoid excessive fence grounding by weeds.
2. Maintain a good sod cover.
3. Always keep the fence charger on. Check the voltage weekly with a voltmeter. Maintain at least 3,000 volts at the furthest distance from the fence charger. Disconnect the lower wires if they are covered by snow.

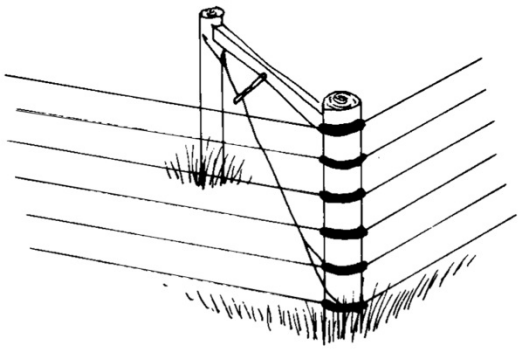
4. In late fall and early summer, adjust the fence tension (150 to 250 pounds) for high-tensile fences.

Tree Protection. Use Vexar®, Tubex®, plastic tree wrap, or woven-wire cylinders to protect young trees from deer. Four-foot woven-wire cylinders can keep deer from rubbing tree trunks with their antlers. When using tubing, install a screen at the top of the tube to prevent entrapment of cavity nesting birds.

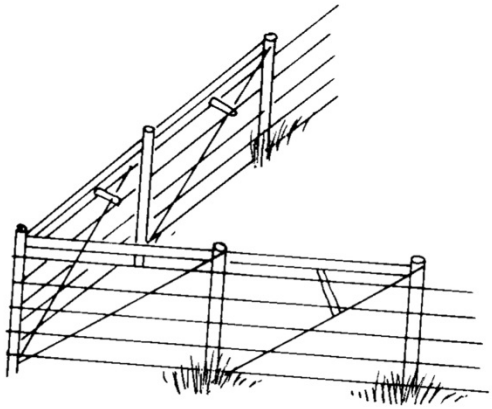
Two-inch rigid fencing (5 feet tall) secured to posts can provide excellent protection against deer browsing (Figure 15). Heavy black plastic fencing can be a suitable alternative for single trees or planting beds in urban areas.



Single span brace assembly



Swing corner
(vertical fence)



Double H brace assembly
(corner)

Figure 14. Rigid brace assemblies. Image by PCWD.

Figure 15. Fencing to protect a tree from deer browse. Photo by Stephen M. Vantassel.

FRIGHTENING DEVICES

Take action at the first sign of a problem. It is difficult to break the movement or behavioral patterns of deer once they have been established. Use frightening devices and repellents when crops are most susceptible to damage (e.g., the silking to tasseling stages for field corn or the blossom stage for soybeans).

Gas exploders set to detonate at regular intervals are the most commonly used frightening devices for deer. They can be purchased from several commercial sources. The devices may be available on loan from wildlife refuges or agencies, as they are frequently used to control waterfowl damage. To maximize the effectiveness of exploders, move them every few days and stagger the firing sequence. Deer quickly become accustomed to regular patterns. The noise level can be increased by raising exploders off the ground. Motion-activated firing mechanisms are being explored to increase the effectiveness of exploders.

Shell crackers, fireworks, and gunfire can provide quick, temporary relief from deer damage. Equip mobile units with pyrotechnics, spotlights, and two-way radios. Patrol farm perimeters and field roads at dusk and through-out the night during times of the year when crops are most susceptible to damage. These tactics cannot be relied on for an entire growing season.

A dog restricted by an electronic invisible fence system can keep deer out of a limited area, but care and feeding of the dog can be time-consuming. Use one dog for up to 30 acres and two for up to 50. Free-running dogs are not advisable and may be illegal.

A bio-acoustic frightening device has recently been developed by the University of Nebraska-Lincoln. It employs motion-activated sounds designed to frighten deer. Early testing of this device demonstrated high efficacy for a small plot. Further research is needed to determine deer habituation.

REPELLENTS

Repellents are best suited for use in orchards, gardens, and on ornamental plants. High cost, limitations on use, and variable effectiveness make most repellents impractical on row crops, pastures, or other large areas. Success with repellents is measured in the reduction, not total elimination, of damage.

Repellents are described as “contact” or “area” repellents. Contact repellents, which are applied directly to the plants, repel by taste. They are most effective when applied to trees and shrubs during the dormant period. New growth that appears after treatment is unprotected. Contact repellents may reduce the palatability of forage crops and should not be used on plant parts destined for human consumption. Hinder® is an exception in that it can be applied directly on edible crops.

Area repellents are applied near plants and repel deer by odor alone. They usually are less effective

than contact repellents but can be used in perimeter applications and some situations where contact repellents cannot.

During the winter or dormant season, apply contact repellents on a dry day when temperatures are above freezing. Treat young trees completely. It is more economical to treat only the terminal growth of older trees. Treat to a height of 6 feet above expected maximum snow depth.

The effectiveness of repellents depends on several factors. Rainfall will dissipate some repellents, so reapplication may be necessary after a rain. Some repellents do not weather well even in the absence of rainfall. Deer hunger and the availability of other, more palatable food has a great effect on success. In times of food stress, deer are likely to ignore taste and odor repellents. The best repellents tend to reduce deer damage for four to six weeks under moderate deer feeding pressure.

Always follow label instructions, but do not overlook new preparations or imaginative ways to use old ones. The following discussion of common repellents is provided only as a survey of the wide range of repellent formulations available. Repellents are grouped by active ingredient. Many other formulations are available for sale, and some have not been tested under controlled, replicated experiments. No repellent will control deer damage under all conditions.

Deer-Away® Big Game Repellent (*37% putrescent whole egg solids*). This contact (odor/taste) repellent has been used extensively in western conifer plantations. It is reported in field studies to be 85% to 100% effective. It is registered for use on fruit trees prior to flowering, as well as ornamental and Christmas trees. Apply it to all susceptible new growth and leaders. Applications weather well and are effective for two to six months. One gallon of liquid or 1 pound of powder covers 400, 3-inch saplings or 75, 4-foot conifers.

Hinder® *(15% ammonium soaps of higher fatty acids).* This area repellent is one of the few registered for use on edible crops. Apply it directly to vegetable and field crops, forages, ornamentals, and fruit trees. Its effectiveness is usually limited to two to four weeks, but varies because of weather and application technique. Reapplication may be necessary after heavy rains. For small fields and orchards, treat the entire area. For large areas, apply an 8 to 15-foot band around the perimeter of the field. Apply at temperatures above 32°F. Four gallons of liquid when mixed with 100 gallons of water will cover 1 acre. Hinder is compatible for use with most pesticides.

Thiram *(7 to 42 percent tetramethylthiuram disulfide).* Thiram is a fungicide that acts as a contact (taste) deer repellent. It is most often used on dormant trees and shrubs. A liquid formulation is sprayed or painted on individual trees. Although Thiram itself does not weather well, adhesives such as Vapor Gard® can be added to increase its resistance to weathering. Thiram-based repellents also protect trees against rabbit and mouse damage. Two gallons of 42 percent Thiram when mixed with 100 gallons of water will cover 1 acre.

Miller's Hot Sauce® Animal Repellent *(2.5 percent capsaicin).* This contact (taste) repellent is registered for use on ornamentals, Christmas trees, and fruit trees. Apply the repellent with a backpack or trigger sprayer to all susceptible new growth, such as leaders and young leaves. Do not apply to fruit-bearing plants after fruit set. Vegetable crops can be protected if sprayed prior to the development of edible parts. Weatherability is improved by adding an anti-transpirant such as Wilt-Pruf® or Vapor Gard®. Eight ounces of Hot Sauce and 2 quarts of anti-transpirant mixed with 100 gallons of water will cover 1 acre.

Home remedies or other non-regulated products should not be used for deer control.

FERTILITY CONTROL

Promising research on the use of chemosterilants and immunocontraception to reduce or eliminate reproduction is underway. Specificity, efficacy, and delivery of contraceptive agents continue to complicate widespread usage. The use of contraception for herd control will be best suited to urban parks, refuges, and other discrete areas. It is unlikely that contraception can or will be applied in rural or agricultural landscapes.

TOXICANTS

No toxicants are registered for deer control. Poisoning deer with any product for any reason is illegal and unlikely to be tolerated by the public.

FUMIGANTS

No fumigants are registered for deer control.

SHOOTING

Hunting Season. Effective use of the legal deer hunting season is the best way to control deer populations. By permitting hunting, landowners provide public access to a public resource while at the same time reducing deer damage problems. The daily and seasonal movements of deer rarely allows for a single landowner to control of all the land a deer uses; neighboring landowners should cooperate. Landowners, state wildlife agencies, and local hunters must reach a consensus about a desirable population level for an area before deer are removed.

Mechanisms for managing populations of deer in a specific area already exist in Alabama. Either-sex seasons, increased bag limits, and a variety of other management techniques have been used successfully to reduce deer numbers below levels achieved by traditional “bucks only” regulations.

Bow hunting from stands can be an effective way to reduce deer in urbanized areas where shooting is not appropriate.

Sharp Shooting. Deer herds can be dramatically reduced through sharp shooting over bait (Figure 16). Appropriate permits are necessary from ADWFF.

Managed Hunts. Wildlife control permits issued by ADWFF allow for removal of problem deer where they are causing damage during non-hunting season periods. Some communities or landowners may use managed hunts to control deer populations. Removing female deer is the key to reducing deer numbers and associated damage.

Figure 16. Sharp shooting set up. Photo by Scott E. Hygnstrom.

TRAPPING

In special cases, such as city parks, refuges, or suburban neighborhoods where shooting is not accepted and/or safe, it may be necessary to capture deer. The following trapping techniques are expensive, time consuming, and require the expertise of professionals. They require specific training to prevent captured deer from injuring themselves. Trapping and relocating of deer requires a permit from ADWFF and is not recommended by the agency.

CAGE TRAPS

Instructions on cage trapping deer (Figure 17) can be found in the video entitled "Netted Cage-Traps for Deer: Tips and Techniques" from http://nebraskamaps.unl.edu.

Figure 17. Cage trap for deer. Photo courtesy of UNL.

DROP NETTING

Drop nets (Figure 18), depending on size, can capture a few to many deer at a time. Deer are baited under the net and when the desired number of deer are present the net is triggered to drop on top of the deer. When deer are captured, especially large numbers, it is necessary to quickly secure the animals to prevent or minimize capture myopathy.

Figure 18. Drop net for deer. Photo courtesy of UNL.

CANNON NETS

The WCS NetBlaster™ shoots a 40 x 60 foot net using compressed air. It is suitable for capturing multiple deer at a time.

HANDLING

RELOCATION

Live capture and relocation is seldom practical unless delicate public relations mandate live removal. Trapping and relocating live deer requires special permits from ADWFF. These practices are not recommended by the agency.

TRANSLOCATION

Translocation is very expensive and can lead to deer death due to capture myopathy.

EUTHANASIA

Shooting is the most convenient method of euthanasia.

DISPOSAL

Refer to Volume 1 of the National Wildlife Control Program and Alabama's regulations regarding carcass disposal.

OTHER CONTROL METHODS

CHEMICAL IMMOBILIZATION

Individual deer can be darted with special drugs designed for immobilization. These drugs are strictly regulated and their use requires special training to prevent injury to users, the public, and the deer. Both state and federal (DEA) controlled substance licenses are required to use these chemicals.

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REVIEWERS

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RESOURCES

KEY WORDS

Deer, white-tailed deer, mule deer, crop damage, wildlife control, wildlife damage, nuisance wildlife, nwco

ON-LINE RESOURCES

http://pcwd.info

http://icwdm.org

QUESTIONS FOR REFLECTIONS

OBJECTIVE QUESTIONS

DISCLAIMER

Implementation of wildlife damage management involves risks. Readers are advised to implement the safety information contained in Volume 1 of the National Wildlife Control Training Program.

Some control methods mentioned in this document may not be legal in your location. Wildlife control providers must consult relevant authorities before instituting any wildlife control action. Always use repellents and toxicants in accordance with the EPA-approved label and your local regulations.

Mention of any products, trademarks or brand names does not constitute endorsement, nor does omission constitute criticism.