

Solving Problems with Deer

A template conflict management and
coexistence plan for white-tailed deer



THE HUMANE SOCIETY
OF THE UNITED STATES

HOW TO USE THIS DEER CONFLICT MANAGEMENT & COEXISTENCE PLAN

This deer conflict management and coexistence plan has been prepared by The Humane Society of the United States (HSUS) for use by communities (including, but not limited to, cities, villages, towns, counties, homeowners associations, etc.) in humanely and effectively preventing and solving conflicts with white-tailed deer. The information in this plan has been gathered from scientific and peer-reviewed articles, from experts in the field of human-deer conflict resolution, and from successful deer conflict management models across the U.S. We invite you to use this plan as your own or modify it as necessary to suit the needs of your community.

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Introduction

As cities and towns develop land and make changes to the landscape that make it more attractive to white-tailed deer, the inevitable result is a growing number of human-deer conflicts, ranging from garden and ornamental browse damage to roadway collisions. One of the most publicly supported and sustainable ways for communities to resolve these conflicts is by promoting policies of co-existence, which acknowledge the need to resolve conflicts while also encouraging appreciation of wildlife. Community leaders can and should promote ways to resolve conflicts with deer effectively and humanely, on both an individual and community level.

The goal of this deer conflict management plan is twofold: 1) to provide a framework for evaluating community issues with white-tailed deer and 2) to recommend step-by-step actions that address conflicts with deer through a comprehensive, practical, effective, science-based, humane, long-term and community-supported plan.

The end result of putting a plan in place is a community that's more knowledgeable and better equipped to co-exist with deer and other wildlife.



Biology of white-tailed deer

White-tailed deer are North America's most abundant large herbivore, with a range extending from southern Canada down to South America. Because of their ability to adapt to human-dominated landscapes, white-tails are also the deer species most commonly encountered in urban and suburban areas. For this reason, this conflict-management plan focuses on white-tailed deer (referred to from here on as "deer"), although much of the content presented also applies to issues with other deer species.

Deer are most active around dawn and again at dusk but may be active at any time of day, traveling well-used trails to their preferred feeding and bedding areas. Their diet changes seasonally and varies locally based on what is available. As ruminants, their 4-chambered stomachs are very good at breaking down both high and low quality food, digesting a varied diet including leaves, buds, twigs, fruits and nuts, grass, corn, alfalfa, and even lichens and other fungi. They eat a wide variety of green succulent plants in spring and summer, and in the fall eager consumption of acorns, corn and other tree nuts allows them to build up a store of fat that enables them to survive the winter season, when only low-quality foods such as the buds and twigs of woody plants are available.

Deer prefer "edge" habitat, the boundary between forest and field, where abundant browse is accessible. Because suburban landscapes mimic this desired type of habitat, providing food, water, and safe bedding sites close together, it's no wonder deer exist at high densities in suburbs.

Deer live in matrifocal family groups consisting of the doe and her female offspring from this and previous years. Bucks may aggregate at some times of the year in small groups, but during the mating season are more solitary. In places like Canada and the northern U.S. (which have long winters with high snow cover), deer may "yard up" temporarily in large groups to limit exposure to weather. A deer's home range is usually less than a square mile, sometimes considerably less for does living in suburbs.

Mating season (or "rut") begins in November in the northern parts of their range and in January or February in the southern parts of their range. This rutting behavior, combined with the onset of hunting season, means deer are on the move, resulting in increased roadway crossings at this time of year.

Deer are highly adaptable; they adjust easily and quickly to changing environmental conditions. In lean years, deer tend to have just one fawn or none, reabsorbing their embryos when their nutritional status is poor. When their food supply is good, twins or triplets may be born.

When fawns are born they are reddish-brown, weighing about as much as a small cat, with those classic white spots on their sides and back that serve to camouflage them. They need this camouflage because the doe "parks" her fawns somewhere (often a suburban backyard) and only visits her fawns twice a day to nurse them, usually around dawn and dusk.

At about a month old, the fawns will start traveling around with their mother, and imitate what she does. In this way, they learn the features of their habitat, what and where to browse, who their predators are, and how to

avoid them. They are weaned sometime after ten weeks old. Male fawns usually leave after a year, but female offspring separate from their mothers over a couple of years and may share their mother's home range as adults.

Deer have quite a few predators, including coyotes, wolves, bobcats, dogs and people. They use speed and agility to outrun these predators, sprinting up to 30 miles per hour and leaping as high as 10 feet and as far as 30 feet in a single bound. Although they are great jumpers, fences that are 8 feet or higher typically deter them.



Deer conflicts and solutions

ROOT OF CONFLICTS BETWEEN DEER AND PEOPLE:

There are several root causes of conflicts between deer and people in urban and suburban areas:

- **Suburban development:** Conversion of farmland and forest to suburbs brings people and deer together in an environment where both species thrive, inviting conflict. Suburbia's golf courses, parks, grassy lawns and tree-lined or hedge borders and the flowers, ornamentals, bird feeders and vegetable gardens in suburban backyards provide more food for deer in suburbia than mature woods where most vegetation is out of reach in the forest canopy. For the deer, good nutrition means excellent physical condition and a high reproductive rate; for people, proliferating deer in suburbs means browse lines, depleted gardens, and road hazards.
- **Wildlife feeding:** Safe from harassment and hunting, suburban deer can quickly lose their fear of people and pets and make themselves at home in backyards and on playing fields. Intentional backyard feeding emboldens them even more, concentrating deer and worsening conflicts.
- **Clashing values and perceptions:** People vary in their values, perceptions and attitudes towards deer. Hunters, wildlife watchers, animal advocates and deer feeders see and relate to deer differently. As a result, residents will differ in their views on how deer issues should be handled, on what the deer conflict is, and even if one even exists! Their desires and perceptions may be incompatible, leading to discord and controversy.

BACKYARD AND GARDEN COMPLAINTS:

Much to the displeasure of gardeners, deer enjoy browsing on many of the ornamental plants (such as tulips, roses, and hostas) commonly and widely used in urban and suburban landscaping. The best way to prevent deer damage to gardens is to replace plants attractive to deer with more deer-resistant native species and to protect highly desirable plants with repellents or fencing.

SOLUTIONS:

1. **Alternative plantings:** Encouraging residents to plant deer-resistant flowers and ornamental varieties will bring the best results. There is a wide variety of less tasty yet equally beautiful flower and ornamental options, and many gardening resources which your community website can link to, such as the local Cooperative Extension Service, nurseries, and deer-resistant gardening specialty lists (see Resources).
2. **Repellents:** A variety of repellent products, used singly (or better yet) in combination, can create a very effective multi-sensory deterrent to repel deer. Commercial repellents work by creating unpleasant tastes or odors, gastrointestinal discomfort, or a sense of pain (hot pepper or peppermint) when the active ingredient comes in contact with the eyes, nose, or mucous membranes of the deer. There are a variety of repellents on the market, yet some work better than others. Some of the more effective repellents contain a sulphurous odor (e.g., rotten eggs), believed to induce fear by giving off smells that deer associate with rotten meat or a predator. The trick is to not only choose the right repellent, but to also apply it diligently – which means every 2 weeks and after any heavy rains. (Please see Appendix E for recommended repellents and application instructions.)

3. **Physical Barriers:** There are many options for protecting garden and landscaping plants. An 8 foot woven wire fence will keep deer out of larger areas, plastic netting can be used over particular bushes, and individual protective “tubes” and fencing can be placed around prized seedlings until they grow out of reach of the deer. There are also various options with electric fences. Some contain scent attractants (to ensure quick contact with electrified material) or moveable polytape “fences,” which consist of nylon material with electric fibers running through it.
4. **Scare-based devices:** There are various scare-based products on the market, such as a motion-sensing “Scarecrow” sprinkler device that is hooked up to a hose and blasts any animal moving within a set range with a strong burst of water. Other devices pose a mild electric shock or emit deer distress calls. Although deer may acclimate to scare devices over time, if moved around and put on an alternating schedule, the deterrent effect will last longer.

DEER- VEHICLE COLLISIONS

It is estimated that each year there are roughly 1.5 million deer/vehicle collisions on U.S. roadways. Many factors contribute to deer-vehicle collisions, such as traffic volume, driver speed and distraction, extent to which roads bisect habitat, development patterns, extent of visual barriers, and speed limit.

Fortunately, there are many humane and effective ways to reduce the number of collisions involving deer, ranging from increasing individual awareness and caution to implementing new technology and structures. One community (Rochester Hills, MI) that implemented these solutions found a large drop in deer-car collisions in the first year, and has experienced success with a multi-faceted approach for approximately \$5000 a year (see Appendix D for more information).

SOLUTIONS:

1. **Public education:** Some of the best collision-reducing efforts focus on public education of both current and new drivers. The messaging should focus on the following points:
 - Be vigilant. Watch from side to side as you drive, especially in areas of low visibility or where shrubs or grasses are near the road.
 - Watch for group behavior. Deer often travel in groups. If one deer crosses the road, slow down and watch for more to follow. Females travel together in winter, and fawns follow their mothers in spring and summer.
 - Be extra cautious in the fall, when bucks are on the move due to rutting and hunting seasons, and in the spring (May to June), when yearlings are seeking new territories.
 - Be especially watchful at dusk and dawn, when deer tend to be more active.
 - Use your high beams at night and turn down interior lights to see farther ahead. Slow down and watch for the eye-shine of deer near road edges.
 - Try to drive straight, avoiding swerving around wildlife; rather, try to brake firmly and blow your horn. Animals are easily confused. If you swerve, deer may run into the vehicle rather than away from it. And swerving could mean driving into another vehicle or off the road into poles or fences.
 - Slow down! Speeds below 45 mph result in fewer accidents with deer.

2. **Enforce speed limits** in areas with deer. The lower the speed, the fewer collisions with deer.
 3. **Erect fences.** One of the most successful techniques for alleviating deer/vehicle collisions is to use fencing to prevent deer from crossing roads. Fences must be at least 8 feet high to deter deer from jumping over.
 4. **Install wildlife crossing overpasses or underpasses** to help deer and other wildlife safely cross busy roads and intersections.
 5. **Install devices** that warn deer of oncoming cars:
 - Streiter Lite® reflectors, which reflect headlights to create an optical illusion of a fence and alert deer to oncoming vehicles, have been reported to reduce deer/vehicle collisions by 60 to 100 percent.
 - Deer Deter devices alert deer to oncoming vehicles by combining a strobe light effect with ultrasonic high-pitched sounds. (Learn more at <http://deerdeter.com>)
6. **Place moveable, changeable message boards** at accident hotspots to alert drivers to pending roadway dangers, and to broadcast seasonal tips such as when fawns are likely to be crossing the road behind their mothers, or during the November “rut” when bucks are on the move and likely to be crossing roadways in pursuit of does).

LYME DISEASE

Every year, 300,000 people in the United States contract Lyme disease. This tick-borne disease may begin by causing a telltale “bullseye” rash and flu-like symptoms which can later lead to various debilitating conditions. The culprit in the spread of Lyme disease is *Ixodes scapularis*, the Black-legged tick. Originally, the tick was called a “deer tick,” a misnomer that has perpetuated the false belief that deer alone are responsible for Lyme disease. In truth, Lyme disease has a complex ecology in which multiple hosts and varying landscapes affect both its presence and its impact on people.

This tick carries a disease-causing bacterium (*Borrelia burgdorferi*) in its bloodstream. The tick has 3 life stages; it transforms from a *larvae* into a *nymph* and then into an *adult* over a 2 year span. At each life stage, the tick takes a blood meal while injecting bacterium into a new host. Then the tick drops off and molts into the next life stage.

The black-legged tick is carried on many different species of birds, some lizards and all mammals. It seems to prefer a progressively larger host; small rodents like white-footed mice are the primary host for larvae and nymphs, while deer are a preferred host for adult ticks. The tick distributes itself widely through the movements of all these hosts. Birds help transport the tick, and therefore the disease, to new areas. Even though the black-legged tick has so many hosts, deer are the most visible, which led to the tick being mistakenly called the “deer tick.” Communities often advocate for deer culls in an attempt to reduce the number of disease-spreading ticks.

However, there are reasons that killing deer doesn’t reduce the population of Lyme-disease causing ticks:

“Installing signs is just one step we can take to lessen potential conflicts between drivers and wildlife.”

—LANCE DEVOE, PARK RANGER,
ROCHESTER HILLS, MI

1. The Black-legged tick has well over 100 hosts, including all mammals, lizards, and many popular songbirds.
2. Studies have shown that the removal of one host isn't enough to suppress the Lyme-disease causing tick (Ostfeld, 2011, Jordan et al, 2007). Even when a high proportion of deer are removed from a location, the ticks switch to other hosts or congregate in higher densities on the remaining deer.
3. Deer removal programs may also put the public more at risk by creating disease "hot spots" (S. Perkins et al, 2006; Ostfeld, 2011). That is, mature ticks that normally latch onto large hosts (i.e., deer) are more likely to end up on people and dogs after deer populations have been reduced.

There's good reason why the Centers for Disease Control (CDC) and health authorities don't recommend hunting to control Lyme disease - because it hasn't been shown to work.

SOLUTIONS:

1. **Public education campaign** about the need to routinely check oneself and family members for ticks after being outdoors, taking precautions like wearing light-colored clothing, tucking in sleeves and socks, using tick-repelling products on your skin and insecticidal sprays on properties, doing habitat alteration to reduce tick and tick-host habitat, and consulting a doctor immediately when signs of Lyme disease or the characteristic rash occur. (see CDC website: www.cdc.gov/lyme/index.html)
2. **The 4-poster:** This device uses deer to kill ticks. It contains a corn bait to attract deer, and when they eat the corn, a chemical (10% permethrin) is applied (by rollers) to their necks and shoulders, killing 95%-98% of the adult ticks. This device has been tested by the USDA in a 5 state, 7 year research program and has proven extremely effective in reducing tick numbers (McGraw and McBride, 1991). A study done at the Goddard Flight Center also found that by using the 4-Poster system, adult ticks were completely eliminated by the 2nd year of the study; and all stages were reduced 91-100% by year 3 (Solberg et al, 2003). The advantages granted by this kind of device seem to outweigh any disadvantages stemming from the supplemental feeding of deer. This device is well suited to a community level approach.
3. **Damminix Tick Tubes** consist of cardboard tubes filled with permethrin-treated cotton balls which mice use for nesting material. The ticks that feed on mice in the spring and fall are exposed to permethrin and killed. This product is commercially available and well suited to a property-level approach.

AGGRESSIVE DEER

Rarely, there have been cases of deer being aggressive towards dogs and people. The cause of this is often protectiveness over fawns, or sometimes humans going into enclosures where bucks are in rut. These incidents are very rare, not always verified, and often associated with different individual perceptions.

SOLUTIONS:

Educating the public about:

- Not approaching a deer with fawns
- Keeping dogs on a leash (particularly during fawn-rearing season, which occurs late spring to summer)
- Hazing methods such as approaching a deer and opening and closing an umbrella, clapping hands and yelling, or shaking an aluminum can with coins inside.

BIODIVERSITY LOSS/FOREST REGENERATION:

Deer can certainly impact ecosystems and have a strong influence on forest biodiversity. However, many other factors impact forest biodiversity in largely invisible ways, such as acid rain, insect damage, parasitic organisms, invasive and other competing plant species, pollution, and weather extremes. In addition, the natural process of forest growth stages (i.e. succession) means that as forests grow, trees mature and their canopies shade out the slower growing plants below. The result is that forests become less diverse as they age. Sun-loving flowers may be shaded out of existence with or without deer.

While we may want to see a certain flower grow somewhere, this doesn't mean it "should" be there. There is no forest blueprint for what should grow. What we want to see in the natural world is influenced by our aesthetic preferences—which may not be grounded in any biological reality. It's vital that community leaders have baseline data collected so that deer impacts can be measured, and make sure any action plan is tailored to achieving very defined and realistic goals which can be reliably assessed.

SOLUTIONS:

There are various ways to increase biodiversity and forest regeneration. Borrowing from the field of forestry, one can utilize the following techniques: permanent or moveable fencing, overstory thinning, small patch cuts, liming, fertilization of soil, stem protectors, etc. The first step, however, is defining exactly what is to be achieved, and understanding the growing conditions and type/extent of habitat manipulation required for the desired plant species and assemblages.



The Comprehensive Approach

There is no one solution to conflicts with deer. A good deer conflict mitigation program will be comprehensive and multifaceted. The focus needs to be on managing deer *conflicts*, not deer numbers. Many communities get mired in arguments about how many deer they have and how many deer they want, and lose sight of more effective, less costly, and more publicly acceptable ways to manage deer conflicts.

THE PROBLEM WITH NUMBERS

One of the biggest challenges with focusing on deer numbers, rather than deer conflicts, is that it's extraordinarily difficult to determine how many deer "should" live in an ecosystem or community. Often, the terms "biological carrying capacity" and "cultural carrying capacity" are used, but what do those terms mean?

Biological carrying capacity (BCC) is the number of deer a given piece of land (or ecosystem) can support. If BCC is exceeded, that means there's not enough food for all and some deer will starve. Except in the most extreme and prolonged winters, adult deer rarely starve in suburbs; before deer populations reach that point, fawn production and survival drop off. However, the term is often misapplied. You may hear that "BCC has been exceeded" because people see localized signs of heavy browsing. However, this doesn't necessarily mean that the deer are in critical condition – or that they are anywhere near exceeding their biological carrying capacity. It may just mean that they are eating certain kinds of plants more heavily than others. Likewise, you may hear that 25 deer per square mile (or another number) is what your community "should have." This one-size-fits-all recommendation is a political judgment that has nothing to do with biology. Depending on the type and quality of food and cover, different kinds of habitats can support different numbers of deer –there's no one magical number that any community "should" have.

Cultural carrying capacity is the number of deer that is desired or tolerated by people in a given community. Yet this concept is impossible to define because no one level of deer will satisfy all residents. For a gardener, 2 deer may be too many, yet for a nature lover or hunter, 25 deer might be welcome. Surveys show us that people tend to assume that wildlife numbers are parallel with conflict occurrence and severity. That is, people's desires for more or fewer deer are dependent on whether they're experiencing conflicts, and the severity of those conflicts. If the conflict is resolved without removing deer, their tolerance level goes up and they perceive there to be fewer deer, even if the number of deer remains exactly the same. Community leaders need to be aware of this phenomenon, and be careful to focus programs on reducing wildlife conflicts, rather than overly focusing on wild animal numbers.

Another problem with focusing solely on deer numbers, rather than conflicts, is that progress can be difficult to measure. Obtaining an accurate count of the number of deer in a community can be both expensive and difficult (with all survey methods involving biases and varying margins of error).

CRUCIAL ELEMENTS OF A DEER CONFLICT MITIGATION PLAN

The focus for an effective deer conflict management plan needs to be on addressing the root cause of conflicts with deer by using an adaptive management framework, i.e. one that is flexible and allows for modification as conflicts or unforeseen issues arise.

There are several elements that are crucial to the success of any deer conflict mitigation plan:

- **Collect site-specific data to indicate the localization and seriousness of the conflict.** The focus needs to be on assessing and defining your community's specific deer-related conflicts.
- **Set clear, achievable and measurable goals.** These goals need to be **tailored** to address specific conflicts and have clear benchmarks to assess program success.
- **Use strategies that are long-term and site specific.** Avoid “quick fix” strategies that don’t provide long-term benefits.
- **Create an ongoing monitoring program.** A solid monitoring system is vital for assessing whether the program has achieved its goals, in addition to seeing what changes need to be made. This could be as simple as setting up a resident complaint and/or collision reporting system.
- **Clearly spell out the long term-costs and time-line.** The public needs to know how much public money is supporting the program, over what time period, and where and when certain activities will occur (including those which might impact them, such as park closings).
- **Public outreach, education and involvement are pivotal to program success & community support.** Make sure the public is part of the process, is solicited for their input, informed of all key meetings and decisions, is educated about how to co-exist with deer and resolve conflicts, and if possible directly involved in providing data and assessing outcomes. The community’s web site and all other outreach and media avenues should be used to achieve this goal.



What communities can do: A step by step guide

The goal is to create a Deer Conflict Management Plan which clearly outlines the community's deer-related conflicts and attempts to resolve them in a site-specific manner. The focus needs to be on managing deer conflicts, not deer numbers!

STEP 1: GATHER LOCAL DATA:

- a. **Conduct resident surveys:** Surveys can be distributed through a town-wide mailing with either the survey itself attached (with a return envelope) or through a link to an online survey platform (such as SurveyMonkey). These surveys need to objectively measure residents' attitudes towards deer, the type and severity of their conflicts with deer, and their preferences regarding ways to manage these conflicts. Sample survey questions are included in Appendix B.
- b. **Deer-car collision data** should be collected through a robust accident-reporting system, with data collected by the Public Works or police department which includes date, time of day, exact location of accident, injuries (and severity), damage to vehicle, light conditions, etc. (see Appendix D- sample Collision Report form). Using this data, identify collision hotspots for warning sign/device placement and mitigation measures and flag the locations of roadway sightline barriers which need to be removed.
- c. A **complaint reporting system** is helpful for centralizing all deer- related complaints into one central source and logging them into a universal database which includes type of complaint (damage to garden/ornamentals, collisions, orphaned fawn, deer sighting), level of severity, and exact location.
- d. **Collect information on the location and type of deer attractants** in town, such as location of public flower exhibits, roadside or roadway- divider floral beds and who maintains them (ex: Garden Club), and to what extent they contain deer preferred flower species. Also record location of people who feed deer for follow-up visits.
- e. **Deer habitat** can be assessed by plotting on a map or Geographic Information System all parcels of public and private green space, noting areas of high deer density and possible deer corridors.
- f. **Deer feeder locations** and any areas where feeding stations have been reported should be identified.

STEP 2: DO MAP OVERLAYS

Once all the above data is collected, map overlays can be created showing accident hotspots, location and type of complaints, location of deer feeding activities, and where certain attractants are that entice deer into roadways. Plotting this type of data will give you a clear picture of what and where your community's specific deer conflicts are, and where solutions can be applied in a site-specific manner.

STEP 3: CREATE PUBLIC INPUT CHANNELS

The extent to which any deer program is accepted by residents mostly depends on their perception of how fair and open the process was and if their concerns were heard. To this end, the following can be done:

- a. **Conduct resident survey** (as outlined above)

- b. **Set up a deer task force.** To be effective and credible, this committee should be balanced, with all important stakeholder positions fairly represented.
- c. **Have open public forums** to discuss the deer situation. Residents should be encouraged to speak at these forums. Guest/expert speakers can also be very helpful, but again, credibility requires that diverse views are represented among speakers.
- d. **Present easily accessible information to public:** The town or city's website and other outreach/ media connections can be utilized to provide good information to the public about deer conflict management methods such as how to deer-proof your garden or yard and avoid collisions, and why not to feed deer. It can also be used to keep the public apprised about what the town is considering, any key meetings, and the work of its deer committee. Make sure that any report or information includes long and short-term costs (direct, indirect) and a specific timeline. The media and other information distribution channels should be utilized to maximize public awareness, education and outreach.

STEP 4: CREATE ACTION PLAN: UTILIZE RANGE OF NON-LETHAL OPTIONS FOR SITE-SPECIFIC APPLICATION

After completing the Evaluation phase, set out the Action Plan as approved by the Deer Task Force and community leaders, and based on public input. One designated person should be in charge of overseeing the deer program (i.e. serve as the Deer Program Coordinator). The Coordinator could develop a master list of volunteers who, after appropriate training, can speak to those residents who call with complaints, do site visits, and even give samples of repellents or information about deer-resistant plants for those who are having backyard deer issues. The deer program can and should be promoted as a source of community pride, as something that is achievable with some effort on the part of all residents, and something that can bring about a harmonious relationship between residents and their community wildlife. Components of the action plan should be specific, measurable, and specific to the root causes of conflicts with deer in the community:

A. Deer Damage to Gardens

- a. Public Education: Put conflict-solving information on community website (including web links to local resources), and informative flyers in community mailings on where to find deer-resistant plant lists, repellents, and fencing options. Local Cable TV and news media, electric bill inserts, and other information distribution channels should be considered along with special public presentations given for residents on conflict-solving methods.
- b. Host deer-resistant gardening workshops for residents which are presented in the evening or on weekends by an expert and also include site visits to homes for private consultations.
- c. Promote deer-resistant flower and ornamental species in all community landscaping and floral displays. Collaborate with garden club and local beautification committees to ensure that all town floral displays contain deer-resistant species and use these to publicize preventative gardening strategies.
- d. Set up town study plots. Have a deer-resistant garden plot next to a deer-attracting garden plot, plus various plots to which certain repellants are applied (along with control plots for comparison). Put photos of deer damage (or lack of) on website and use study plots to educate residents how to garden defensively.
- e. Host deer-proofing demonstration days – Utilize boy scouts and other local volunteer groups to put up fencing or tree guards at local parks and have “deer discount days” at local garden stores (i.e. where deer deterrent products are discounted on certain days, etc).

- B. Deer-Car Collisions:** Once local deer collision data has been collected and analyzed, the following solutions can be applied. Coordinate a roadway maintenance plan which is overseen by a designated person:
- a. Do educational outreach (i.e. “Don’t Veer for Deer” campaign): put information on community web site, PSAs, local media. Focus on peak months (Nov-Dec rut and May-July fawn rearing). (See Appendix D for more information)
 - b. New driver education: get driving tips and Don’t Veer for Deer campaign literature to all new driver education programs (partner with high school, driving school, programs for the elderly, etc).
 - c. Reduce visual barriers on roadways: do vegetative management and brush removal to increase visibility on major roadways and negotiate with private landowners about reducing roadway brush on private property adjacent to major roads or accident hotspots.
 - d. Treat collision hot spots, utilizing speed bumps, fencing, movable changeable message boards, warning devices (ex: Streiter lites, Deer Deter Wildlife Crossing Guard (<http://strieter-lite.com> ; <http://deerdeter.com>), and evaluating hot spots for possible lower speed limit designation
 - e. Investigate possible salt replacement alternatives for winter.
 - f. Set up and maintains accident-reporting system and continue mapping accident locations and other details.
 - g. Use Rochester Hills MI “Don’t Veer for Deer” campaign as a model – see <http://www.rochesterhills.org/index.aspx?NID=569>
- C. Deer feeders**
- a. Develop educational literature, publicizing how feeding is not good for the deer.
 - b. Encourage neighbor-to-neighbor sit-downs and have town personnel conduct diplomatic visits to offenders.
 - c. A deer feeding ban ordinance can be passed to discourage the feeding of deer, and contact information provided for the reporting of violators.
- D. Lyme disease**
- a. Public education campaign focusing on personal prevention steps, including links on community website to CDC and other expert resources regarding disease prevention methods (personal protection measures, landscaping practices, etc).
 - b. Tick Management: Consider drawing up community –based plan for strategic placement of 4-Posters (see Lyme disease section for more information on 4-posters).
- E. Biodiversity issues**
- a. Seek out collaboration with local Natural Resource schools/universities to have college students do field survey work to objectively assess deer impacts and browsing levels on local flora and establish baseline data.
 - b. Consider use of forestry methods (fertilizing, temporary or permanent fencing, stem protectors, etc) to protect valued plant communities.
- F. Aggressive/Habituated deer**
- a. Assessment: Have local animal care and control professional evaluate the situation.

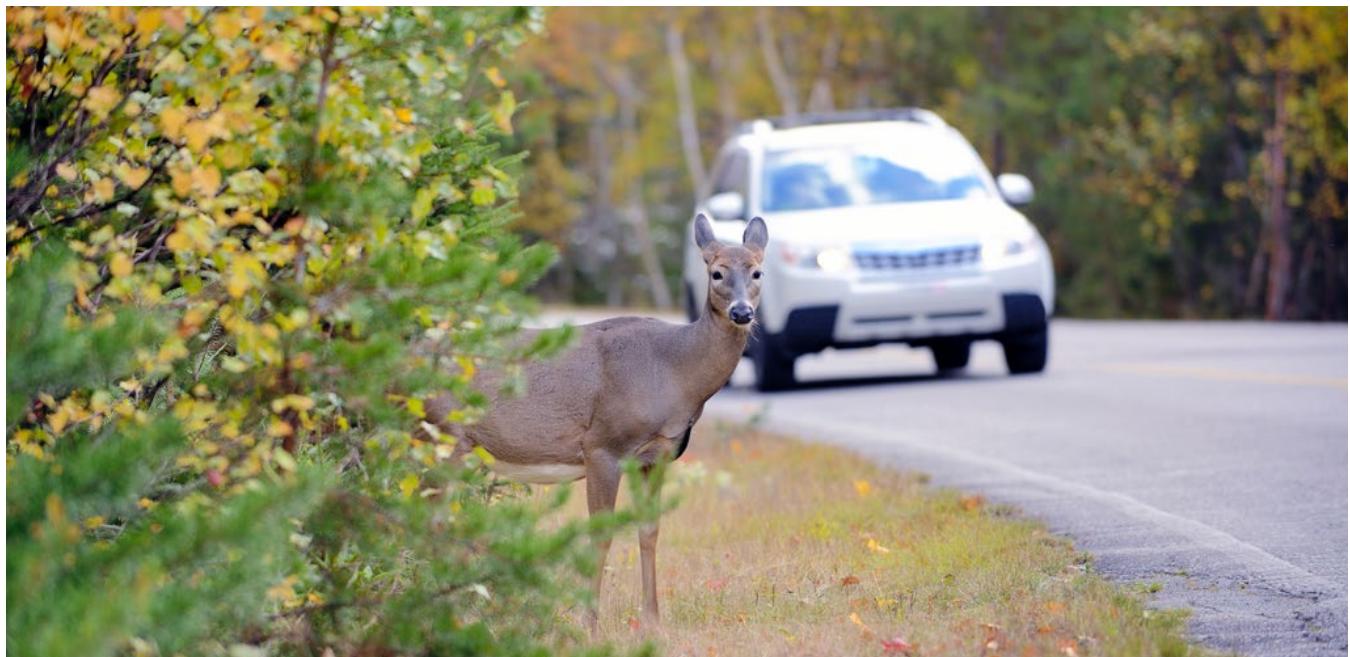
- b. Educate residents about temporary and rare nature of aggressive deer situations, importance of keeping dogs and people away from fawns, and describe hazing methods they can use if a deer comes too close or becomes threatening.

G. **Orphaned fawns:** This topic should be included in all educational materials and in spring-summer media (See Appendix F for more information):

- That the vast majority of seemingly “orphaned fawns” are NOT orphaned and should be left alone.
- It is common to have fawns “parked” in yards and fields by their mother and as they rely on environmental camouflages for protection. The doe will nurse her fawn twice a day but stays away the rest of the time since her odor will attract predators (fawns are odorless). Once the fawn is about a month old, it will travel around with its mother.
- Only if the fawn is injured, wandering and vocalizing all day, and/or a dead lactating doe is found in the road should the fawn go to a licensed wildlife rehabilitator.
- If the fawn is picked up by a well-intentioned resident, the resident needs to be advised to quickly return the fawn to the original site for the mother to reclaim.

STEP 5: PROGRAM ASSESSMENT AND MONITORING:

1. Set up a robust resident complaint and deer-car collision reporting system and monitor over time to see if goals are achieved and if accidents and “nuisance” complaints decline over time (See Appendices B, C and G)
 - a. **Resident complaints:** record type, extent, duration, location of complaint, time and date
 - b. **Collision reporting:** accident location (exact), time of day, if injuries, damage to car(s), if just dead deer in road, etc.
2. Conduct resident survey every year to measure resident satisfaction with program, see if satisfaction ratings increase.



Lethal Removal

It is commonly assumed that hunting or organized deer culling will decrease the deer population; however, there are issues with this approach:

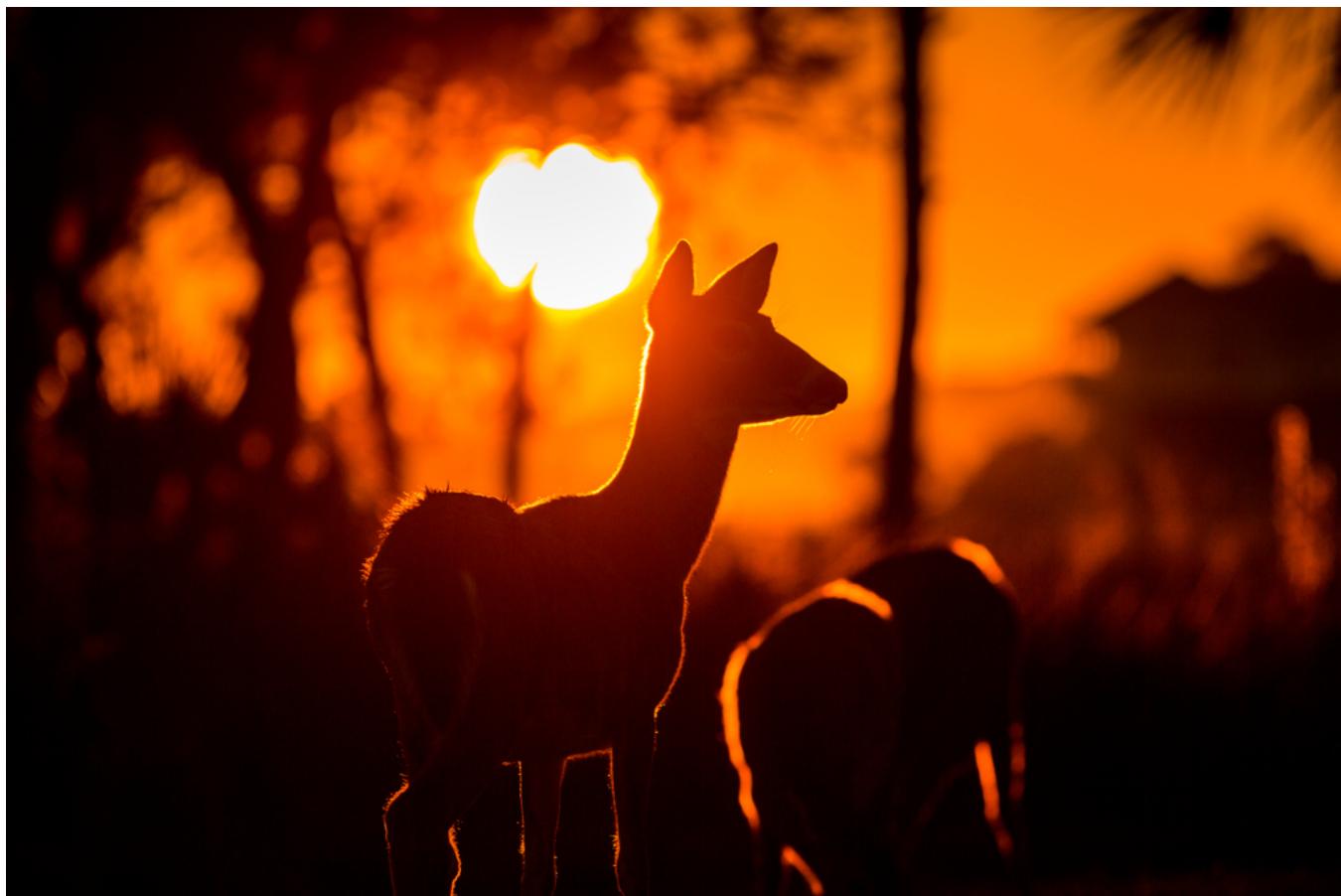
1. **Increased reproduction:** Deer are very adaptable, and their productivity is keenly tied to their food resource. When there are fewer deer in an area and abundant food, they will maximize their reproduction – i.e. having twins and triplets in the spring instead of a single fawn. This causes their numbers to rebound quickly after any deer removal. Therefore, even if deer numbers can be lowered, they don't stay at that level.
2. **Immigration of new deer to area:** Deer from the surrounding area may take advantage of any vacated niche. This, combined with a high reproductive rate, can lead to deer numbers bouncing back quickly after any depopulation effort.
3. **Deer moving to sanctuary areas once hunting or professional culling commences:** Deer will move into unhunted “safe” areas within their habitat (or even make long distance movements) in response to hunting or culling activities. Once lethal control has ceased, they move right back into their original territory.
4. **Increased removal effort:** Even if deer numbers are lower after lethal removal efforts, it then requires more effort by hunters or sharpshooters to take out the same number of deer (since the deer will be scarcer and warier) in subsequent years. Lower deer numbers also make the environment less attractive to hunters, and drive up costs for professional culling.
5. **Recurring challenge:** Getting deer numbers to a low level, and then keeping them at that level, can be extremely difficult and result in the need for perpetual annual hunts or culling activities.

SPECIAL CHALLENGES FOR COMMUNITY LEADERS TO CONSIDER BEFORE INITIATING LETHAL CONTROL:

1. **Inaccessible hunting areas:** Many community hunts or culls are limited to larger public green space areas for safety reasons. This is particularly problematic in densely populated areas. Even where density is lower, some private landowners will not want hunters on their properties. These challenges of access, combined with localized deer home ranges in urban and suburban areas, mean that deer killed in one area may not be the ones causing conflicts elsewhere.
2. **Safety concerns:** Residents in urban and suburban communities may be concerned about safety issues such as stray arrows or shotgun slugs going into their yards or homes, and panicked or wounded deer darting onto roadways.
3. **Ethical concerns:** Before instituting any lethal control program, it should be determined that there are no humane alternatives available that could be used instead. Lethal control should only be used when necessary to protect human safety and when no humane alternatives are available. If lethal control is deemed necessary, any control method should predictably and effectively cause the least amount of harm to the least amount of animals.
4. **Controversy:** Any sort of cull or hunt will result in a certain amount of controversy. In the worst cases, for example when wounded animals are seen by distressed citizens, the public can become

divided and angry, drawing time and attention away from other issues of public concern.

5. **Logistical issues:** Wounded deer may run off huntable property onto private land. Therefore the town may need to consider:
 - Will adjoining landowners be asked to allow hunter trespass for blood trail tracking purposes?
 - Will public parks be closed during hunting periods?
 - Will other recreational activities be impeded?
 - Will set-back restrictions (pertaining to firearms discharge within a certain distance of a dwelling) be amended to allow for more hunter access?
6. **Additional liability insurance:** Town attorneys need to explore if the town or community is covered for all liability in regard to culling activity.
7. **High direct and indirect costs:** If sharpshooters are used, there will be a recurring annual cost. If public hunters are used, there are indirect costs for the community such as law enforcement staff time and overtime, and restricted use of town green space.
8. **Use of public funds:** Doing “something” (e.g. a deer cull) may appease those who want to see action taken, but if the conflicts aren’t solved, then it’s ultimately a waste of taxpayer dollars.



A Note on Deer Fertility Control

Deer fertility control is an innovative and advancing field with demonstrated applicability to suburban and urban deer populations. Options range from immunocontraception (using a vaccine that induces an immune response to block reproduction) to surgical sterilization (which involves surgically removing reproductive organs or interrupting the fertilization pathway).

Most of these tools are still in experimental phases, and thus are not available for general use at this writing. However, researchers are refining and field-testing deer fertility control methods, while policy managers pursue federal and state registration to allow for future management applications.

A more detailed description of fertility control methods is provided in Appendix I.

For more information about fertility control options or to further discuss the process of conducting a pilot project, please contact HSUS via email: wildlife@hsus.org.

Additional resources may also be found through The Botstiber Institute for Wildlife Fertility Control: www.wildlifefertilitycontrol.org, or through the Science and Conservation Center: www.scczp.org.



Appendix A: Sample Resolution

Resolution No._____

A Resolution Approving a Deer Conflict Management Plan

WHEREAS the City of _____ has a duty and responsibility to protect their health, safety and welfare of its residents; and

WHEREAS it is recognized that deer are a natural part of the landscape and the ecology of the region, despite human encroachment upon their habitat; and

WHEREAS deer provide great pleasure to residents and are beneficial to the community as a whole, and

WHEREAS deer may create conflicts due to their browsing activities and movements and certain human activities may serve to unintentionally create or exacerbate such deer-human conflicts; and

WHEREAS due to the varied interests of persons and organizations regarding actions that can be taken in the management of deer, a written management plan is desirable to ensure that the varied interests are evaluated and considered when seeking to address conflicts with deer, and;

WHEREAS the purpose of the Deer Conflict Management & Coexistence Plan is to provide effective long term solutions to deer conflicts, including education, habitat modification, hazing, exclusion, repellent methods, and tolerance, to resolve and reduce human-deer conflicts within the City in a humane, ecologically sound, and effective manner; and

WHEREAS deer-related conflicts can be resolved through public education about deer-resistant gardening, defensive driving, tick-borne disease prevention, and feeding bans along with effective roadway signage and maintenance practices, among other recommended actions; and

WHEREAS the City is directed to prioritize nonlethal methods, including education and methods listed within the Deer Management Plan, as primary methods in deer management; and ,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF _____ that the Deer Conflict Management Plan attached hereto and incorporated herein by reference, is hereby approved. The resolution shall be effective immediately.

Adopted and approved this _____ day of _____

Attest _____

Appendix B: Sample Public Survey

Name _____

Address _____

Phone (cell) _____ (home) _____ Email: _____

1. Do you enjoy seeing deer in the community?

- a) Yes
- b) No
- c) Sometimes
- d) In the community, but not in my yard

2. Are you experiencing any deer issues currently?

____Yes ____No

3. What deer-related issues are you/ have you experienced in the past year? (*Browsing = eating of vegetation)

- a) Deer-auto collision
- b) Browsing* of vegetable gardens
- c) Browsing* on ornamentals/ flowers
- d) Browsing* of crops
- e) Human-habituated “too tame” deer
- f) Neighbor feeding deer and attracting them to my yard
- g) Other: _____

4. Rate the level of severity of any deer issue you’ve experienced in the past year:

Use a 1-5 scale here, with 1 being caused no problem to 5 being caused a severe problem:

- a) Deer-car collision ____
- b) Browsing on vegetable garden ____
- c) Browsing on ornamentals/ flowers ____
- d) Browsing of crops ____
- e) Human-habituated “too tame” deer ____
- f) Neighbor feeding deer ____
- g) Other: _____

5. Have you taken any actions to alleviate the deer issues?

Yes__ No__

6. What actions have you taken? (circle all that apply, and indicate how successful the action was on a 1-5 scale—with 1 being ineffective and 5 being highly effective)

- a) Tolerance / no action
- b) Switched to planting deer-resistant flower/ plant varieties
- c) Used fencing / netting / barriers
- d) Used repellents
- e) Scare devices
- f) Hazing – i.e. using scare tactics to re-instill natural fear of humans
- g) Other: _____

7. What kind of deer conflict management program is acceptable to you?

- a) Prefer non-lethal (no killing of deer) options only
- b) Prefer Lethal (killing of deer) options only
- c) Combination of both options above for managing issues
- d) No opinion/Don't care
- e) Other: _____

8. What specific actions are acceptable to you?

- a) Do nothing/ leave deer alone
- b) Non-lethal population control measures –dart deer with contraception vaccine or use surgical sterilization
- c) Non-lethal conflict mitigation measures – public education and workshops on deer resistant gardening, prevention of Lyme disease, preventing deer-vehicle collisions, etc.
- d) Lethal measures – archery hunting
- e) Lethal measures – shotgun hunting
- f) Lethal measures –sharpshooting program
- g) Other: _____

9. How do you feel about deer?

- a) I enjoy the presence of deer,
- b) I enjoy the presence of deer, BUT I am experiencing some conflicts
- c) I do not enjoy the presence of deer and regard them as nuisances
- d) I'm concerned about collisions
- e) I'm concerned about Lyme disease
- f) Other: _____

10. Please provide additional comments or a description of issues that you would like to make the committee aware of regarding deer.

Appendix C: Sample Deer-Vehicle Collision Report Form

DATE OF ACCIDENT (month/day/year):

EXACT LOCATION (street intersection or address):

TIME OF ACCIDENT (specify a.m. or p.m.):

TYPE OF VEHICLE:

ROAD CONDITIONS:

Wet Dry Dirt

LIGHT CONDITIONS:

Dawn Daylight hours Dusk Evening

WEATHER:

Dry Rain Snow Ice Windy

INJURY SEVERITY:

Human injury Human fatality Deer Injury Deer Fatality

VEHICLE DAMAGE?

None Minor Significant Severe

DEER INFO:

Fawn Adult (M or F)

Did driver hit deer _____ or swerve/ not hit deer _____?

Deer run off? _____ yes _____ no

ANY SIGNAGE/WARNING DEVICE NEARBY?

Yes No

ADDITIONAL INFORMATION:

Appendix D: Tips for Avoiding Deer/Vehicle Collisions

This kind of information can be put into educational materials, posters, fliers and web site text to help residents reduce the likelihood of collisions with deer:

BE VIGILANT: When you drive, make a habit of watching from side to side, especially in areas of low visibility or where roadside shrubs or grasses are close to the road.

WATCH FOR GROUP BEHAVIOR: Deer tend to travel in groups. If one deer crosses the road, watch for more to follow. Female deer tend to stay together as “doe groups” in winter and have young fawns following them in the spring.

BE AWARE OF SEASONS: In the fall (Nov –Dec), bucks are on the move due to rutting and hunting seasons. In spring (May- June), fawns are following their mothers. Be extra careful driving at these peak times of year.

BE AWARE OF TIME OF DAY: Deer are most active at dusk and dawn. Be watchful, especially during early morning and evening, when wildlife may be moving across roads.

USE HIGH BEAMS: At night, use your high beams to see farther ahead. Slow down and watch for the eye-shine of deer near the road edges.

DRIVE STRAIGHT! Do not swerve to avoid wildlife but stay in your lane, brake firmly, and blow your horn. Animals are easily confused. If you swerve, you may collide with another car, telephone pole, fence or other roadside object. Also deer may run into the vehicle rather than away from it.

IF YOU HIT A DEER: Pull off the roadway. Turn on the vehicle hazard flashers, and be careful of other traffic when you leave your car. Don’t attempt to drag a deer off the roadway unless you know it’s dead and it’s safe to do so. An injured deer can cause serious injury.

See: <http://www.rochesterhills.org/index.aspx?NID=569> and www.deercrash.org for more information and http://www.michigandeercrash.com/Deer_Crash_Brochure.pdf for a sample brochure

Appendix E: Repellents & Scare Devices

Repellents are products that are meant to disrupt and reduce deer browsing. However, deer are very adaptable. Therefore, the effectiveness of repellents will depend on a number of factors:

- Seasonal changes in plant palatability
- Local deer taste preferences
- Availability of alternative foods
- Time of year
- Deer density
- Type of repellent and concentration of active ingredients
- Durability of the repellent and how often it is applied

Plants are most vulnerable in winter when snow cover or extreme cold reduces food availability, and in early spring when young, succulent spring growth on ornamentals may occur before native plants. In addition, most repellents require reapplication at regular 2-3 week intervals and after heavy rains. This is why people may consider repellents to be labor-intensive and not always cost-effective, particularly over larger acreage. On the more positive side, repellents are easy to apply and invisible, thus having much aesthetic appeal.

WHAT MAKES SOME REPELLENTS MORE EFFECTIVE THAN OTHERS?

Odor-Based Repellents: The most effective deer repellents tend to be those that produce sulfurous odors and are considered “fear-inducing.” These repellents depend completely on detection through odor. It is believed that deer associate a sulphur smell with the presence (or carnage) of a predator or spoiled food. Not all sulphurous odors are equally effective, however. For example, compounds containing garlic seem to be less effective than sulphur compounds in urine.

Aside from fear-inducing odors, repellents use other modes of action (some repellents combine several modes of action) which include:

- **Taste:** These include bitter ingredients that presumably create a bad flavor. Taste receptors in deer are different from those in humans; some compounds which are very bitter to people don’t bother deer at all. Taste-based repellents must be continually applied to the growing parts of plants. Taste-based repellents seem to have a shorter duration of effectiveness than odor-based. This may be due to the lack of an associated odor cue, so deer repeatedly sample growing plants and quickly notice if the hot pepper flavor is absent from any plant parts.
- **Pain:** these include ingredients like hot pepper (capsaicin) or ammonia, which cause irritation on contact with the mucous membranes, eyes, mouth, nose or gut.
- **Conditioned aversion:** these products cause animals to form an association between the treated item and a feeling of sickness, usually gastrointestinal.

TIPS FOR SUCCESSFUL REPELLENT APPLICATION:

1. All repellents work best if applied before the deer's feeding pattern becomes established. This means applying repellents before bud-break and as new growth appears. The goal is not to break a browsing habit, but rather to prevent one from forming!
2. Repellents need to be reapplied after heavy rains. Routine reapplication every 2-3 weeks is vital so that new, growing plant parts are protected as well.
3. Deer may become accustomed to the same repellent and ignore it over time. Alternating repellents may help to keep the deer confused and more wary.
4. At the height of growing season, choose an odor repellent over a taste-based one. Taste-based repellents need to be constantly applied to any new growth to keep the whole plant tasting bad.

HOW DO I CHOOSE A REPELLENT?

Many repellents are stocked by local garden, farm supply or hardware store, and it's a good idea to ask what seems to be working best in your area.

NON-COMMERCIAL REPELLENTS:

Soap Bars: Hanging a bar of soap from a bush or tree will help protect it. Be sure to leave the soap wrapper ON and drill a hole through the center of the soap and suspend it with a string. The brand of soap must be high in tallow fatty acid, like Irish Spring. Glycerin and coconut-based fatty acid soaps do NOT seem to repel deer well. Disadvantage: the sphere of protection is limited to the immediate area around the tree/bush. Be sure to hang the soap bars no more than 3 feet apart, up to a height of 6 feet, all around the tree/bush.

Human Hair: Although hanging sachets of human hair costs very little, it does not consistently repel deer. Hair can be obtained from beauty salons and barbershops quite easily, however. Hair should be bagged in 1/8-inch mesh bags or nylon stockings, and contain at least 2 handfuls of hair apiece. Bags should be hung at least 3 feet apart from each other and up to a height of 6 feet if the tree/bush to be protected has a wide diameter. Refresh the bags monthly with fresh hair.

HOMEMADE SOLUTIONS:

- Mix 3 eggs well in a blender. Mix with 1 gallon of water. Spray on plants. Reapply after heavy rains.
Disadvantage: this solution may clog sprayer.
- Mix 4 eggs, 2 oz. red pepper sauce, 2 oz. chopped garlic. Blend with enough water to make 1 quart.
Strain and apply with spray can.

A SAMPLING OF COMMERCIAL REPELLENTS:

Deer Away Big Game Repellent (BGR): This product comes in both a powder and liquid) and has scored well in repellent studies. BGR is an odor-based repellent comprised mostly of putrescent egg solids. It is usually available in garden stores.

Miller's Hot Sauce and Deer Away Deer and Rabbit Repellent: Both of these products rely on trigeminal nerve irritation in the mouth caused by the hot pepper sensation. The effectiveness of any capsaicin-based (hot

pepper) product appears to depend largely on the concentration of capsaicin used and that the product be reapplied every 2-3 weeks (or less) so that any new plant growth is covered.

Hinder: This is an odor deterrent, based on ammonium soaps high in fatty acid. This is one of the few products that can be used on garden vegetables. It is usually available in garden stores.

Milorganite: This human sewage-based fertilizer is primarily an odor deterrent, available at most garden stores. Recommendation: Spread in a wide band around the perimeter of a garden, reapply as directed and after heavy rains. It is usually available in garden stores.

SCARE DEVICES:

Another way to deter deer is to scare them. However, deer tend to habituate to most scare devices over time. Their initial fear of a device that looks, moves, or sounds strangely may even result in curiosity followed by rapid habituation as the deer learns that the device is not harmful. Here are some examples but this list is not all-inclusive:

- **Scarecrow Motion Activated Sprinkler:** This is a motion sensor combined with a sprinkler that attaches to a spray hose. When a deer comes into its adjustable, motion detecting range, a sharp burst of water is sprayed at the animal. By combining a physical sensation with a startling stimulus, this device appears to be more effective than other devices that rely on sights or sounds alone. This device reportedly is effective for other mammals that may come into gardens.
- **Havahart #5250 “Electronic Deer Repellent”:** This highly portable “repellent” consists of 3 stake-like devices, cotton and a scent lure and is aesthetically colored to blend into the environment. The deer are attracted to the lure and receive a mild electric shock when they reach it. The concept is to train them, through aversive conditioning, to stay away from gardens. This 3-post device covers 1200 square feet of garden, according to the company. The current produced by this device has very low amperage and duration of only a few milliseconds.
- **Ultrasonic Devices:** There are several devices which are intended to repel wildlife by producing high-frequency, short-wave ultrasonic sounds that are inaudible to people but are heard by the target animals. While ultrasonic devices placed in yards and other outdoor areas can be effective for keeping deer away, devices like “deer whistles” meant to be affixed to car bumpers to prevent deer-auto collisions have not been shown to be effective.

Appendix F: Handling Orphaned Fawn Calls

In late spring and summer, residents may see a helpless-looking fawn curled up in their yard. They often assume the fawn is orphaned, and grab the animal. They don't realize that this is the worst thing they can possibly do.

What's happened is that the mother deer has "parked" her fawn somewhere that seemed safe in the night. The fawn is completely dependent on her spotted coat (blends into the landscape) and on being scent-less to avoid detection by dogs, coyotes, and other sources of danger.

Only when the fawn is a month old will she start traveling around with her mother. Until then, she stays put – more or less—and waits for her mother to come back and nurse her 2-3 times a day – usually in the early morning or at night. The doe does not stay with her fawn because she doesn't want to attract predators.

People don't realize this, and instead "kidnap" many healthy fawns, mistakenly thinking they're orphaned. They don't realize the mother is frantically looking for her baby, and that the fawn needs to be raised by its mother in order to learn vital survival skills.

If the caller has already picked up the fawn, they should be instructed to:

- **Promptly return the fawn to exactly where she was found.** (Let the caller know that, contrary to popular myth, the doe will not abandon her fawn due to human scent.)
- Do not stay at the site or the mother will stay away.

ONLY under the following circumstances should the caller be instructed to take the fawn to a licensed wildlife rehabilitator:

- If the mother is definitely dead (ex: if roadstruck – the undersides can be checked for signs of lactation).
- If the fawn has been crying and wandering around all day.
- If the fawn is definitely injured (i.e. broken leg --- not to be confused with their normal wobbly stage when they first start moving around.)

Rehabilitators can be located by going to: www.humanesociety.org/wildliferehab

Appendix G: Sample Public Complaint Form

Name _____ Date: _____

Address _____ City: _____

Email _____

Phone _____

Is complaint at your home? If not, location: _____

COMPLAINT TYPES:

- Browsing flowers
- Browsing vegetable garden
- Browsing trees/ ornamental
- Collision with own vehicle
- Collision with other vehicle
- Caught in netting or fence
- Came into house or dwelling
- At birdfeeder
- Aggressive to pet

ADDITIONAL INFORMATION:

- Aggressive to person

- Neighbor feeding deer

CONCERNS (NO ACTUAL CONFLICT)

- Concern about having collision
- Concern about Lyme disease
- “Too many deer”
- Concern for deer welfare
- Orphaned fawn
- Want to hunt in town
- Don’t want hunting in town

Appendix H: Deer Fertility Control

OVERVIEW

The first step for a community considering the use of fertility control to manage deer population numbers is to closely evaluate whether it is justified based on the characteristics and severity of deer conflicts. It is important to determine whether fertility control will really address your community's particular concerns. Once this has been discussed, and your community's plan seeks to include a fertility control component, the next step would be to contact a fertility control researcher or service provider to further discuss your community's goals, problems, and possible solutions and learn about what options might be practical and logistically feasible. At this time, most fertility control programs for deer are multi-year research-based projects and require significant scientific justification and oversight in order to be carried out in the field.

Fertility control options may be initially expensive and labor intensive, but because these options result in few or no fawns being born, they provide a long-lasting effect and prevent that “bounce back” in deer numbers that would otherwise occur every spring fawning season. Laboratory and field researchers continue to develop, test, and refine deer fertility control tools and techniques. The following material will provide additional information on different methods and applications of current deer fertility control efforts.

IMMUNOCONTRACEPTION

Immunocontraception is a fertility control method that uses the body's immune response to prevent pregnancy. There are multiple immunocontraceptive products being utilized, researched, refined, and field-tested for use in deer.

The most extensively tested immunocontraceptive is **porcine zona pellucida** (PZP), a protein based vaccine that is given to females via intramuscular injection (either by hand or with a dart delivered via CO₂-powered dart gun or blowpipe). This injection causes her to produce antibodies that bind to her egg coating and block sperm attachment, thereby blocking fertilization during breeding. Currently, PZP is being tested on deer in the field under state-issued scientific use permits.

Currently developed PZP formulations utilized include:

- **Native (PZP)** –Provides a year of contraception with two initial treatments. Contraception is extended for one or more years with annual boosters. May be delivered by dart or by hand. Native PZP is EPA-Registered for use in deer as *ZonaStat-D, but is pending final revisions, state registrations, which will be needed for management use, are pending*. Native PZP is manufactured at the Science and Conservation Center in Billings, MT. <http://www.sccpzp.org/>
- **PZP- 22** – Combines the native PZP vaccine with a set of controlled-release PZP pellets that extend contraception to approximately 2 years or more with a single injection. Past studies in deer have documented the success of hand-injections. Field studies testing effectiveness and longevity of remotely delivered PZP-22 booster treatments are underway . PZP-22 is not yet registered with the EPA, nor with any individual states.SpayVac® - Is a PZP vaccine produced by Immuno Vaccine Technologies, Nova Scotia, Canada which has demonstrated multi-year effectiveness with a single dose. The mechanism of

action of SpayVac® may differ somewhat from that of native PZP and PZP-22. SpayVac® is not yet registered with the EPA, nor with any individual states.

Another immunocontraceptive agent that has been effectively used in deer fertility control programs is **GonaCon™**. In contrast to PZP-based vaccines, GonaCon™ works by specifically targeting the hormone GnRH (gonadotropin releasing hormone). GnRH is a normally occurring hormone that stimulates and regulates the production of sex hormones in males and females. Antibodies produced in response to GonaCon™ injections neutralize naturally-occurring GnRH and block the release of these sex hormones, resulting in infertility. Because the steroid hormones blocked by *GonaCon™ influence behavior and many physiological processes, it should be applied with caution until more field testing has been completed. In particular, use on males should be avoided because of its demonstrated effects on antler growth.*

- **GonaCon™** - was developed by the USDA/APHIS National Wildlife Research Center in Fort Collins, Colorado, and registered by the EPA for use in white-tailed deer in 2009. In captive studies, this vaccine has also demonstrated multi-year fertility control in female deer (approximately 2 to 4 years) with a single injection.

SURGICAL STERILIZATION

Surgical sterilization involves a much more invasive process than immunocontraception, but once performed is permanent. Like other methods of fertility control, surgical sterilization is still in the experimental stages (with the exception of the state of Maryland, where this method is permitted for deer management outside of research). This method requires the management team to have specific expertise in both chemical capture (sedation darting) and veterinary anesthesia and surgery.

Though sex-specific, there are multiple methods of surgical sterilization procedures being applied in the field, all of which are performed under anesthesia by a licensed veterinarian with adequate training in such techniques.

For female deer:

Ovariectomy - ovaries are surgically removed. This procedure yields permanent infertility, as animals cannot reproduce without ovaries and eggs present for impregnation.

Tubal Ligation - Fallopian tubes are clamped and separated so eggs won't travel from the ovary into the uterus. This method is commonly referred to as getting one's "tubes tied", and since the sex organs that produce and house eggs are still present, there is a very small chance that an egg could still find its way into the uterus and the animal could become pregnant. Therefore, since a pregnancy can technically still occur (although rare), this method does not guarantee permanent infertility 100% of the time.

For Male Deer:

Vasectomy - the vas deferens are clamped and separated to avoid the advance of sperm from the testicles into the seminal stream. Similar to tubal ligation, since the sex organs (testes) that produce and house sperm are still present, there is a very small chance that sperm could still find its way into the seminal stream. Therefore, since release of sperm can technically still occur (although rare), this method does not guarantee permanent infertility 100% of the time. Castration, or removal of both testes, is NOT recommended in deer. Given the role that testosterone plays in deer behavior and antler growth, the

testes should remain in the body to avoid potentially life threatening side effects related to inhibited antler development.

Fertility Control Field Research Requirements

At this time, most fertility control methods are only permitted for use under the auspices of research by field scientists. Regardless of the method of fertility control, research projects require sound scientific study design, where the purpose and outcomes will contribute to the existing body of research and knowledge within the field. Research permits are awarded at the discretion of the individual state's wildlife and natural resource authorities, who generally require a full research proposal be submitted. Additional review and permissions from Institutional Animal Care and Use Committees may be required under the Animal Welfare Act and other applicable laws. Depending on the technology being tested, EPA authorization may also be needed.

For management applications, fertility control project plans must still be reviewed and permitted by the state wildlife authority. Each state wildlife authority will impose requirements that they see fit for their individual state's requirements and needs.

For more information about fertility control options or to further discuss the process of conducting a pilot project, please contact HSUS Staff via email: wildlife@hsus.org

ADDITIONAL FERTILITY CONTROL RESOURCES

- Botstiber Institute for Wildlife Fertility Control: www.wildlifefertilitycontrol.org
- Science and Conservation Center: www.sccpzp.org

Resources

DEER-VEHICLE COLLISIONS:

- www.deercrash.com - put together by various DOTs with methods and reviews
- www.michigandeercrash.com/Deer_Crash_Brochure.pdf - sample brochure

DEER –RESISTANT PLANTS:

- www.deerresistantplants.com
- www.easywildflowers.com – great native flower resource
- wildlifehotline.org/deer.html
- www.humanesociety.org/deer
- www.deerproofyourgarden.com –gardening expert Sandy Baker is available to give public presentations, private landowner garden assessments, and make deer-proofing recommendations for communities
- Local garden stores
- Local Cooperative Extension Service – for listing of native deer-resistant plants

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