A GUIDE TO DEER MANAGEMENT IN DEVELOPED AREAS OF PENNSYLVANIA

Version 2.2
October 2009

Pennsylvania Game Commission's Deer & Elk Section
www.pgc.state.pa.us

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Section I: Introduction

Managing benefits and conflicts of a wildlife population requires balance. White-tailed deer (*Odocoileus virginianus*) management in urban and suburban areas illustrates this balancing act. White-tailed deer are one of the most widespread and popular wildlife species in North America and provide significant public recreational and aesthetic value. However, deer in urban and suburban environments can cause substantial conflict and controversy.

The suburbs are attractive to deer for some of the same reasons they are attractive to people. There are natural areas, greenways, and parks, that provide bedding areas, escape cover, and birth sites. Homes are landscaped with trees, shrubs, and herbaceous cover, which are appetizing and nutritious to deer. Wild and domestic predators have been extirpated or controlled. Deer are afforded the same conveniences and protection as suburban residents.

Deer populations in developed areas can grow rapidly. The combination of the above circumstances lead to high reproductive rates, low mortality rates, and small home range sizes for deer in urban and suburban areas (Swihart et al 1995, Kilpatrick and Spohr 2000, Etter et al 2002). The result can be a rapid increase of a deer herd that is not actively managed. The speed with which a deer population can increase is demonstrated by a classic example of deer population growth potential. In 1927, 6 deer were released into an enclosure in Michigan. By 1933 those 6 deer had increased to 160 deer (McCullough 1979). With growth potential like this, a deer population can quickly overwhelm an area unless management efforts are put in place.

Long before a deer herd reaches its maximum size, it wears out its welcome in the neighborhood. Common deer-human conflicts include increased deer-vehicle collisions and increased damage to gardens, ornamentals, landscaping, and woodlots.

When deer-human conflicts increase to a certain level, landowners and communities often turn to the Game Commission for help. At this point, it is important for landowners and communities to understand the role of the Game Commission in resolving deer-human conflicts in developed areas. Although the Game Commission cannot come into a community and solve deer-human conflicts, it can provide technical assistance and approved management tools. The Game Commission will assist landowners and communities in helping themselves, but it cannot single-handedly solve deer-human conflicts.

Managing a deer herd requires knowledge of deer biology, familiarity with public attitudes about deer in the area, and adequate tools to address the issue. To assist landowners and communities in acquiring the necessary knowledge and information, the Game Commission has developed this guide.

Other valuable resources for communities regarding wildlife conflict, deer biology and management in developed areas is *Human-Wildlife Conflict Management*, *Community-Based Deer Management: a practitioners' guide*, and *Managing White-tailed Deer in Suburban Environments: a technical guide* produced by Northeast Wildlife Damage Management Research and Outreach Cooperative. Copies of these publications may be found at the following web addresses:

http://wildlifecontrol.info/pubs/documents/Human-Wildlife/H-W%20Guide.pdf
http://wildlifecontrol.info/pubs/Documents/Deer/DeerGuide.pdf
http://wildlifecontrol.info/pubs/Documents/Deer/Deer_management_mechs.pdf

The Game Commission encourages interested landowners and communities to become familiar with these publications prior to initiating deer management efforts.

Every community needs a plan to address deer-human conflicts. Guidelines and recommendations for creating such a plan can be found in Section II.

A summary of management techniques is provided in Section III. This section provides a general outline of individual deer management methods that could be used in developed areas.

Section II: Developing a Deer Management Plan for your Community

What can be done to solve deer-human conflicts? This is a question often asked by individual landowners and communities in developed areas. Unfortunately, there is no quick fix, one-time solution to reducing deer-human conflicts in developed areas. A successful deer management program will require sustained effort and commitment from landowners and the community.

Initially, it is important to assess the situation and develop a management plan. Developing a plan will require gathering information on the extent of deer-human conflicts, the attitudes of local residents, and the availability of management options (Table 1). Once developed, your community deer management plan will set goals, list management options, provide recommendations, and direct implementation. It will require a commitment of time and resources. However, it will provide your community with the guidance needed for years into the future.

As communities and deer populations are dynamic, a static and rigid management plan which does not consider changing community needs or new management tools would not be the most efficient or useful strategy. Therefore, using an adaptive resource management approach seems most appropriate in this case. Adaptive management is characterized by establishing clear and measurable goals, implementing management actions, monitoring those management actions, evaluating management actions based on established goals, and adapting policy and management actions as necessary (Figure 1).

There are many approaches that may be taken to produce a community deer management plan. A comprehensive review and guide to these approaches can be found in *Community-Based Deer Management: a practitioners' guide* produced by Northeast Wildlife Damage Management Research and Outreach Cooperative. A copy of this publication may be found at the following web address: http://wildlifecontrol.info/pubs/Documents/Deer/DeerGuide.pdf

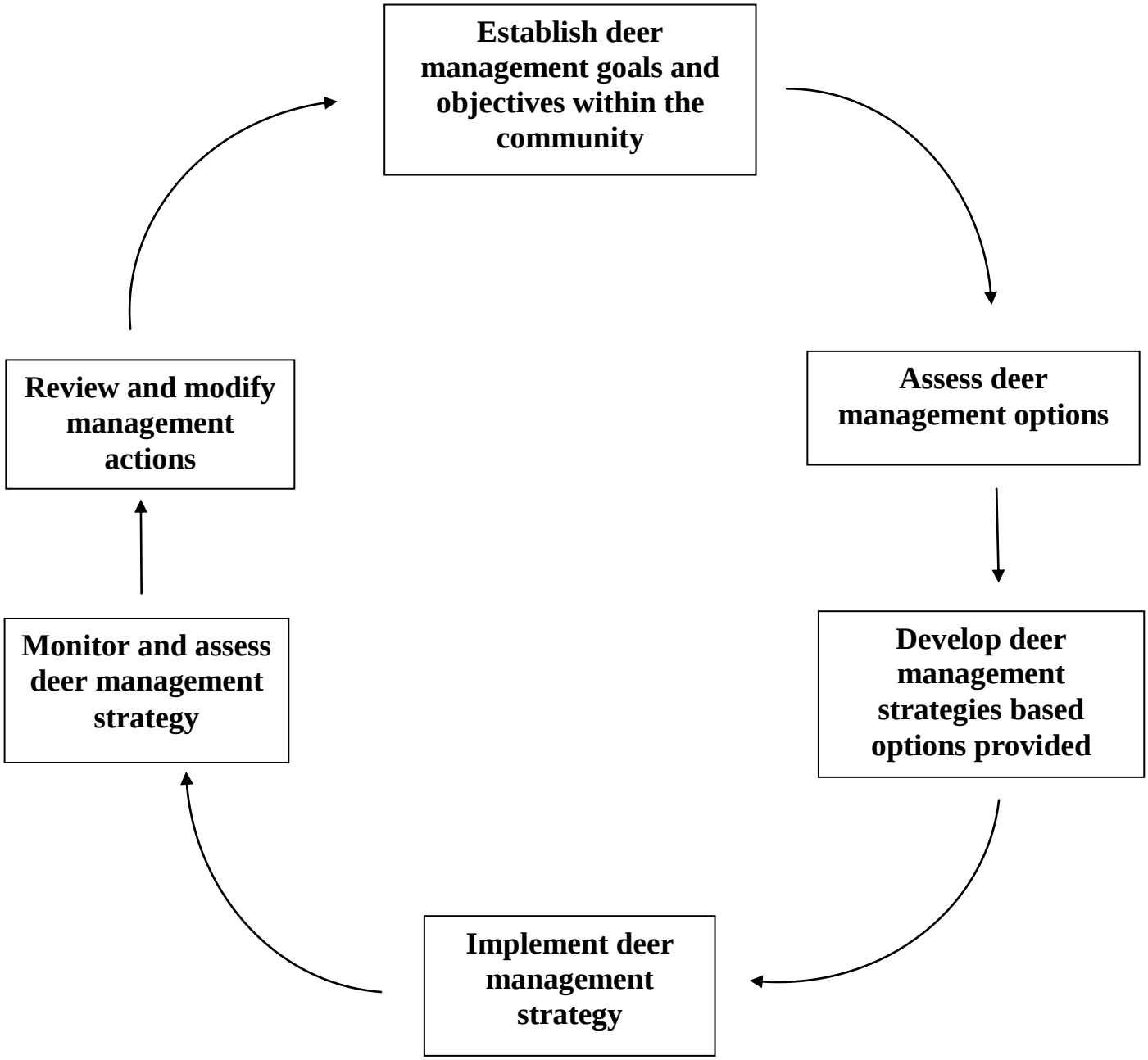
Components of a Deer Management Plan

1. Introduction and problem statement: Brief description of the area, its location or address and size. Definitive statement of the problem(s) caused by deer.
2. Program goal: Long term purpose of the management program.
3. Program Objective(s): Specific description of the management objectives to be accomplished by this plan.
4. Site Description: Detailed description of the area (human population, housing density, open space, parks, etc) and history of deer management activities.
5. Documentation of deer related damage, potential safety hazards, and complaints: Quantitative and cost estimates of damage; potential or actual safety hazards to the public; number and scope of complaints.
6. Proposed methods and procedures: Techniques to accomplish the short and long term goals; number of animals to be removed; names and phones numbers of urban officials to be contacted by the media and general public concerning the project.
7. Evaluation of management program: Description of the quantifiable criteria used to determine the progress of the management program.
8. Schedule: Timetable for implementation of the program.
9. Supporting Documents: Additional support documents as necessary.

Table 1. Recommended steps for communities in addressing deer-human conflicts in developed areas. The Game Commission can provide technical assistance throughout this process, but will not complete any actions on behalf of the community.

Step	Community Actions	Comments
1.	Establish Deer Management Committee	Deer management can be an emotionally charged and difficult task, especially in developed areas. As a result, we recommend a group be established to address the challenges of deer management.
2.	Committee becomes familiar with deer biology and management issues and options	Refer to "*Managing White-tailed Deer in Suburban Environments: a technical guide"* and "*Community-Based Deer Management: a practitioners' guide"*
3.	Assess and monitor deer management measures	Deer management measures should reflect the concerns and deer-human conflicts in the community and be based on quantifiable data collection. For example, the number of deer is less important than the impacts of those deer.
4.	Review deer management tools and options	References to tools and options may include: 1. Section III of this guide 2. "Managing White-tailed Deer in Suburban Environments"
5.	Develop a deer management plan (DMP)	See Appendix A: Examples of Community Deer Management Plans. Also refer to "Community-based Deer Management" for additional information.
6.	Based on deer management measures and DMP goals and objectives, decide whether control measures are needed?	
7.	If control measures needed, follow DMP	
8.	If control measures not needed, continue to assess and monitor deer management measures and return to Step 5	

Figure 1. Flow chart for Adaptive Resource Management



Section III: Summary of Techniques and Tools

Non-lethal Management Options

Habitat Modification

Definition:

Large-scale habitat alteration, which removes elements necessary for deer survival, i.e. reduce biological carrying capacity by removing cover, removal of food sources, or simulating conditions which are indicative of severe over population

Advantages:

a) Requires knowledge of deer/habitat interactions

Disadvantages:

a) Only applicable to intensely developed urban areas
b) People prefer landscapes which contain woodlots and habitat diversity
c) Requires intense maintenance
d) Decrease current deer herd health
e) Will negatively impact desirable wildlife species

Application:

a) Urban area with dense human population

Expectations for Success:

a) Rarely practical
b) Unproven technique to control deer-human conflicts

Landscaping Alternatives

Definition:

Selection of unpalatable (less preferred) herbaceous and woody plants to reduce deer browsing on ornamentals

Advantages:

a) Deer species preference lists are readily available
b) Can be practiced at the landowner level

Disadvantages:

a) People and deer often prefer the same plants
b) Few ornamentals are classified as rarely damaged by deer
c) Displaces the problem to neighboring areas
d) Only useful in areas with low to moderate deer feeding pressure
e) Could negatively impact desirable wildlife species

Application:

a) Individual landowner

Expectations for Success:

a) Limited in areas with high deer density
b) Unproven technique to control deer-human conflicts

Ban Deer Feeding

Definition:

Outlaw the supplemental feeding of deer by residents of the community

Advantages:

a) Reduce artificially high deer populations in problem area
b) Possible reduction in reproductive rates
c) Discourage deer tolerance of people

Disadvantages:

a) Unpopular with residents
b) Difficult to enforce

Application:

a) Community with ordinance authority as it requires the passing of an ordinance

Expectations for Success:

a) Limited without community education program (see *Please Don't Feed the Deer* (PGC Brochure) and *Feeding Wildlife. . .Just Say NO!* by Scott Williamson, A Wildlife Management Institute Publication http://www.wildlifemanagementinstitute.org/store/product.php?productid=16165&cat=3&page=1) and concerted effort by law enforcement

Repellents

Definition:

Product applied to plants that reduces attractiveness and/or palatability of treated plants to deer

Advantages:

a) Individual plants may be protected (orchards, nurseries, gardens, and ornamentals)
b) May be used prior or upon observation of damage
c) Substantial scientific literature on effectiveness

Disadvantages:

a) High application cost
b) Impractical for row crops, pastures, or low-value commodities
c) Effectiveness depends on availability of other forage
d) Must be reapplied repeatedly during growing season
e) Performance reduced with high deer density
f) Only reduces damage, does not eliminate it

Application:

a) Individual plants
b) Orchards
c) Nurseries
d) Gardens

Expectations for Success:

a) Short term solution
b) Problem will escalate each year

<u>Fencing</u>

Definition:

Construction of a physical or electric barrier to exclude or direct deer movements from an area

1. Barrier fencing (minimum 8-foot high, woven wire or individual wire cages 1.5-feet in diameter and 3-4-foot high)

Advantages:

a) Provides long term deer exclusion
b) Can be used for individual trees or blocks larger than 50 acres
c) Perform well under intense deer pressure

Disadvantages:

a) Expensive ($5-7 per linear foot)
b) Permanent structure
c) Changes aesthetics of area
d) Difficult to use across water gaps and flood plains
e) Deer must be removed from inside the area

Application:

a) Individual trees
b) Orchards
c) Nurseries
d) Gardens
e) Airports

f) Areas larger than 6 acres where public health issues exist due to high prevalence of tick-borne diseases (ie school yards, play grounds, nature parks)

Expectations for Success:

a) High

2. Electric fencing (electric current passed through wire fence at regularly timed pulses)

Advantages:

a) Less expensive than barrier fence ($0.15 per linear foot)
b) Easy to remove
c) Several designs to suit area and needs

Disadvantages:

a) Requires regular maintenance
b) Possible injury to people, pets, and wildlife
c) Deer learn to avoid contact

Application:

a) Orchards
b) Nurseries
c) Gardens

Expectations for Success:

a) Short term solution
b) Problem will escalate each year

<u>Hazing and Frightening Techniques</u>

Definition:

Use of audible, visual, or other sensory cues to frighten deer from specific areas

Advantages:

a) Effective before or at the initial stages of conflict
b) Provide quick relief

Disadvantages:

a) Deer habituate to disturbances
b) Deer movements or behavior patterns are difficult to modify once established
c) Disturbance of surrounding residents

Application:

a) Small farms near suburban areas

Expectations for Success:

a) Short term solution

Fertility Control Agents

Definition:

Use of contraceptive drug or vaccine to reduce reproductive rate of deer population within a community

Advantages:

a) Acceptable to many urban/suburban residents

Disadvantages:

a) Fertility control agents are classified as "restricted use pesticides"
b) Federal and state permits are required
c) All treated must be marked
d) Expensive ($500 - $1,300 per deer)
e) Large proportion of females (70 - 90%) must be treated to stop or reduce population growth
f) May alter health and behavior of deer population
g) Does not address existing population problems and may take a decade or more to have an impact on deer abundance

Application:

a) Communities with limited huntable area
b) Requires a permit from the Pennsylvania Game Commission

Expectations for Success:

a) Limited to localized areas

Trap and Relocate

Definition:

Capture animals and remove them from one area and transfer them to another.

Advantages:

a) Reduces population
b) Acceptable to many urban/suburban residents

Disadvantages:

a) Results in high mortality during transfer and after release
b) Potential for spreading disease
c) Stressful to animals
d) Expensive ($380 - $2,900 per animal)

e) Urban/suburban deer usually seek out comparable residential locations from which they came defeating the purpose of the program

Applications:

a) Currently not approved for use in any area in Pennsylvania

Expectations for Success:

a) Limited to localized areas

Lethal Management Options

Hunting within statewide regulations (See Game Commission website, www.pgc.state.pa.us)

Definition:

Hunting within the community as defined by PGC regulations set forth each year, including the Deer Management Assistance Program (DMAP).

Advantages:

a) Reduces population
b) Proven effective technique
c) No cost

Disadvantages:

a) May be unpopular with some residents
b) Limited hunter access

Applications:

a) Any huntable area (150 yard safety zone around structures for gun hunters and 50 yard safety zone for archers without landowner permission)

Expectations for Success:

a) Practical solution to deer population control
b) High expectation for success where hunter access is adequate

Community Managed Hunts

Definition:

Hunting within PGC regulations with access limited by community or landowner defined criteria.

Advantages:

a) Reduces population
b) Proven effective technique
c) Low cost
d) Access defined by managing group (ie, # hunters, # of days)

e) Equipment could be restricted or liberalized to influence effect on deer population or address public safety concerns

Disadvantages:

a) May be unpopular with some residents
b) Public concern over safety
c) Not effective where hunting is prohibited from large areas of good habitat

Applications:

a) Effective in large areas (ie, parks, watershed areas, homeowners groups, etc)

Expectations for Success:

a) Practical solution to deer population control
b) High expectation for success where hunter access is adequate

Deer Control Permits/Sharpshooters

Definition:

Permitted control agent hired to remove deer from specified areas within a community.

Advantages:

a) Reduces population
b) Written contract provided
c) Permitted to use tools not authorized by the general public (spot lights, small caliber rifles, etc)

Disadvantages:

a) May be unpopular with some residents
b) Expensive

Applications:

a) Small area with specific group of problem deer
b) Requires permit through the Pennsylvania Game Commission

Expectations for Success:

a) Limited solution
b) Effective in areas where public hunting would not be allowed

Literature Cited

Etter, D.R., K.M. Hollis, T.R. VanDeelen, D.R. Ludwig, J.E. Chelsvig, C.L. Anchor, R.E. Warner. 2002. Survival and movements of white-tailed deer in suburban Chicago, Illinois. J. Wildl. Manage. 66: 500-510.

Kilpatrick, H.J., and S.M. Spohr. 2000. Movements of female white-tailed deer in a suburban landscape: a management perspective. Wildl. Soc. Bull. 28: 1038-1045.

McCullough, D. R. 1979. The George Reserve deer herd: population ecology of a k-selected species. The Blackburn Press, Caldwell, New Jersey, USA.

Swihart, R.K., P.M. Picone, A.J. DeNicola, and L. Cornicelli. 1995. Ecology of urban and suburban white-tailed deer. Pages 35-44 *in* J.B. McAninch, editor. Urban deer: a manageable resource? Proceedings of a symposium of the North Central Section, The Wildlife Society, 12-14 December 1993, St. Louis, Missouri, USA.

Appendix A: Examples of Community Deer Management Plans

There are numerous examples of deer management plans posted on the internet. Several examples include

Chester County Deer Forum, Chester County, PA:
http://www.chestercountydeerforum.org/

Montgomery County, MD:
http://www.montgomeryparks.org/PPSD/Natural_Resources_Stewardship/index.shtm

Burnsville, MN:
http://www.ci.burnsville.mn.us/index.asp?nid=379

Monmouth County Parks, NJ:
http://www.monmouthcountyparks.com/page.asp?agency=127&Id=2771

Appendix B: Landscaping Alternatives, Repellants, and Fencing Resources

Further information regarding non-lethal mitigation techniques can be found at the websites listed below.

Northeast Wildlife Damage Management Cooperative website
http://wildlifecontrol.info/pubs/Pages/default.aspx

Resistance of Ornamentals to Deer Damage (Maryland Cooperative Extension)
http://extension.umd.edu/publications/PDFs/FS655.pdf

Using Commercial Deer Repellents to Manage Deer Browsing in the Landscape (Maryland Cooperative Extension)
http://extension.umd.edu/publications/PDFs/FS810-A.pdf

A Gardener's Guide to Preventing Deer Damage (California Department of Fish and Game)
http://www.dfg.ca.gov/wildlife/hunting/deer/docs/gardenersguide.pdf

Appendix C: Example Ordinance to prohibit deer or wildlife feeding

Feeding Wildlife Prohibited. It is unlawful for any person to feed a wild animal unless licensed to do so, with the exception of small seed eating birds, squirrels, and chipmunks. It is unlawful to place out mineral blocks or salt licks unless they are intended for authorized domestic livestock.

Violations and penalties. Any person, firm, or corporation violating any of the provisions in this title shall upon conviction thereof be fined a sum not to exceed XXX dollars or be imprisoned not to exceed XX days, or be both so fined and imprisoned.

That is ordinance shall take effect and be in full force from and after its passage, approval, and publication in the official city newspaper of the City of XXXX, PA, as provided by law.

Bursnville, MN – Deer Feeding Prohibition Code
http://www.ci.burnsville.mn.us/index.asp?NID=381

Appendix D: Example of Community managed hunt information

Many communities have successfully implemented managed hunts. Initial coordination of this requires a fair amount of planning. However, once the groundwork is laid, the program can run smoothly from year to year.

Fairfax County, VA:
http://www.fairfaxcounty.gov/living/animals/deer/

Chester County, PA:
http://dsf.chesco.org/ccparks/site/default.asp
Click on "Hunting Program"

Dubuque, IA:
http://www.cityofdubuque.org/index.aspx?NID=167

Ames, IA:
http://www.cityofames.org/police/UrbanDeerManagement/UrbanDeerManagement.htm

Kansas City, MO:
http://www.mdc.mo.gov/areas/kcmetro/