

**Report of the West St. Louis County Deer Task Force**



**October 2004  
Revised May 2005**

## Executive Summary

The dilemma of suburban deer management is not unique to the St. Louis area; metropolitan regions throughout the United States face similar issues related to the growth of white-tailed deer populations in the suburbs. In order to address this issue that crosses municipal boundaries and property lines, the West St. Louis County Deer Task Force was formed. Over the course of 18 months, representatives from the Task Force met to review information on a wide variety of issues related to suburban deer. The Task Force is comprised of a single representative from 10 municipalities, 3 government agencies, and one non-profit organization. Each municipal representative was directly or indirectly appointed by the mayor.

The objective of the Task Force is to identify the nature and extent of problems caused by high deer densities in west St. Louis County, and to recommend any appropriate solutions. Deer management is an regional issue that necessitates a regional approach. The Task Force endeavors to provide information and recommendations facilitating a regional response to this issue which spans west St. Louis County.

A survey of west St. Louis County residents indicates that many believe the number of deer in their area is “about right” or “too many.” Based on this resident survey and aerial population surveys conducted in west county we can conclusively state that, while deer densities vary between neighborhoods and municipalities, there are large portions of west St. Louis County that have higher than desirable deer densities. Recent population surveys estimate deer densities in portions of west St. Louis County to be between 40 and 86 deer/mi<sup>2</sup>. Missouri Department of Conservation (MDC) recommends 15-20 deer/mi<sup>2</sup> as an appropriate level to maximize the benefits associated with deer while minimizing the negatives.

Areas of high deer densities tend to have a higher incidence of deer-vehicle collisions, landscape damage due to deer browse, and degraded habitat quality. Deer-vehicle collisions are greater for areas of high deer densities, with St. Louis County seeing a very high number each year. MDC estimates it receives at least 200 complaints of deer damage each year. Some residents report having hundreds of dollars damage annually due to deer browse. Finally, above about 20 deer/mi<sup>2</sup>, deer can have a detrimental effect on the overall ecosystem by overbrowsing woody and herbaceous vegetation. Studies and observation from deer exclosures (both locally and in similar areas throughout the country) show that this overbrowse further affects other wildlife species, especially songbirds and insects.

Given the various difficulties presented by high deer densities, the West St. Louis County Deer Task Force has conducted an extensive review of various deer management alternatives. The Task Force will make recommendations for deer management after hearing public comment during forums held in early 2005 (forum summary found in Appendix 2). The management alternatives under consideration include non-lethal alternatives to control damage such as fencing, repellants, and road side reflectors, as well as lethal forms of deer management such as archery hunting, firearms hunting, sharpshooting, and trap and euthanasia.

After the Task Force final report is complete, municipalities and St. Louis County should carefully review the report and determine, after public input, the specific steps that they should take to implement a deer management plan.

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## **West St. Louis County Deer Task Force**

Jeff Mitchell, Chair

### Representatives:

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### Task Force Problem Statement:

West St. Louis County residents have expressed concern with the perceived high deer populations, citing problems such as deer-vehicle collisions, property damage, threats to personal safety, decline in environmental quality, threat of disease, and potential decline in the health of the deer herd. The management of deer in West St. Louis County is complicated by many factors including social conflicts regarding management, prohibitive ordinances, public safety concerns, large number of landowners and managers, the mobility of deer across political and individual boundaries, and the cost and responsibility of management.

### Task Force Mission Statement:

The West St. Louis County Deer Task Force seeks to investigate the concerns identified above, and if determined to be valid, will define the problem, involve the public in making management recommendations, identify management options, offer public education and information about deer and deer management, all aimed at restoring a balance of flora and fauna to West St. Louis County.

### Objectives:

1. Examine the deer population, the problems caused by high deer densities in West St. Louis County, the complicating issues of suburban deer management, and West County residents' attitudes toward deer and deer management.
2. Cooperatively produce a final report with findings and recommendations for deer management in West St. Louis County.

## **Introduction**

The West St. Louis County Deer Task Force was initiated by MDC and St. Louis County in September 2003 in response to wide-spread claims of deer damage to property and concerns about the health of the local environment due to high deer densities. The Task Force members representing municipalities were each appointed by their respective mayors to represent their community. One non-profit organization, Beaumont Scout Reservation, also serves on the Task Force. Beaumont is one of the largest land owners in west St. Louis County and faced questions about deer management. Management decisions on the Beaumont Scout Reservation affect surrounding areas of the county; participation by the Beaumont representative benefited the overall objectives of the Task Force. Task Force representatives for government agencies were generally asked to participate due to the nature of their positions and experience with suburban deer management.

### Background on white-tailed deer

The white-tailed deer is one of Missouri's most widely enjoyed and appreciated natural resources. Statewide, Missouri has nearly one million deer, with densities generally higher in suburban areas than rural areas. Prior to human settlement in Missouri, deer densities are thought to have been about 10 to 30 deer/mi<sup>2</sup>. Deer survival was affected by competition with other species and predation. Historically, deer coexisted with elk, bison, wolves, bobcats, black bears, and mountain lions. Deer, black bears and bobcats are the only free-ranging members of that group left in Missouri today. Pressures on the population and survival of individual deer now come from people, cars, coyotes, domestic dogs, and other deer.

Forests, agricultural lands, and residential areas all provide foraging opportunities for deer. An individual deer may require as little as 10 acres of land to provide the food, water, and shelter necessary for survival. Deer eat many types of plants, but tend to select those which provide the most energy and nutrition and are palatable, such as fruit, flowers, herbaceous plants, grasses, and agricultural crops. Extensive research on deer browse in forest ecosystems indicates that deer densities over 20 deer/mi<sup>2</sup> may have a detrimental effect on the survival of certain tree saplings and flowering forest species due to overbrowsing.

Deer are most active during the early morning and evening, but variation in daily activity depends on the weather. Typically, deer can be found in wooded areas during the day and open areas at night. Breeding, or the rut, takes place from October through January, peaking in November. Bucks and does will increase their activity during this time and a buck will travel great distances to search out and breed with several does. Throughout the winter, adult does form family groups comprised of offspring from several generations and will spend the winter in the same area each year as long as food is available. Bucks form bachelor groups or travel alone. In the spring, does often leave wintering ranges in search of an area to give birth.

Fawns are born in late May and early June. Does usually give birth to twins, but occasionally produce a single fawn or triplets. Fawns will spend several weeks lying in a spot and separated from the doe between nursing periods. The fawns have white spots and no scent during their first 3 to 4 months of life, helping them to better blend with their surroundings and elude predators. The following spring, these yearlings will disperse from their mother's home range. In some suburban areas, yearlings will not disperse far due to barriers such as highways, fences, and large urban areas.

Deer reproduction rates are calculated by studying pregnancy, birth, and recruitment. Recruitment is the best measure of deer population growth and is a count of how many fawns born in the spring have survived until the first autumn season. Recruitment is measured by visually locating does and their fawns when the fawns are traveling with their mother but capable of surviving on their own.

Studies in Missouri show that deer are very efficient reproducers. A quarter to one-half of fawns will be pregnant in their first year of life, with a lower recruitment rate than yearlings and adult does. Between 80 and 96 percent of yearlings and adult does are impregnated annually, with an average recruitment rate of 1.5 fawns per doe. When new white-tail deer from recruitment outnumber losses from emigration or death, there is population growth. Under ideal conditions in Missouri, a deer herd may double its population in 3 years. During the fall of 1997, does were collared and studied in Queeny Park and Town & Country. Recruitment rates were estimated based on observation of 57 adult, yearling, and fawn does. Recruitment rate for adults and yearlings was 1.47 fawns per doe. Rates for fawn does was 0.21 fawns per doe.

White-tailed deer are a generalist species, which means they can survive in edge habitat, or areas where the forest, agriculture lands, and/or suburbs interface. Increased suburbanization has provided a patchwork of habitat suitable for deer. Habitat loss and degradation have favored those wildlife species that exhibit adaptive survival strategies. These circumstances have created some negative economic impacts and safety concerns related to deer populations in suburban communities.

Deer are welcome in most yards at least occasionally. It can take some time before the welcome wears thin, and then the potential for controversy may make it difficult for landowners and land managers to take any population control measures. Throughout most of the state where they are hunted, deer densities are between 5 and 15 deer/mi<sup>2</sup>. In areas of west St. Louis County, deer densities have been measured between 40 and 86 deer/mi<sup>2</sup>.

In suburban areas across the country, managing wildlife presents unique challenges to communities and wildlife agencies. Traditionally, deer have been managed based on biology and population dynamics, with hunting as the primary population control mechanism. In suburban communities, deer management is a problem rooted in social values, legal issues, and misinformation regarding humaneness, and safety of wildlife management techniques. Residents of suburban areas often hold a wide diversity of values, beliefs, and attitudes regarding deer, hunting, and wildlife management.

#### Role of Missouri Department of Conservation in urban deer management

The role of MDC in a citizen deer task force is defined in the *Guidelines for White-tailed Deer Management on Urban Lands in Missouri* (Appendix 1) to:

“Serve as technical advisor to communities where urban deer populations require management. MDC guides deer population assessment and goal setting, informs individuals and communities on methods of minimizing conflict between deer and humans, advises regarding statutory language that is compatible with deer management goals, cultivates public awareness of deer population impacts, and authorizes management efforts.”

In short, MDC is an advisory agency whose role is to provide scientific information and guidance about wildlife, wildlife regulations, and sound wildlife management practices. MDC is not a facilitator

for a citizen task force on deer management, but acts as a meeting recorder and is the focal point for public inquiries about the task force. Because the guidance of MDC does not supercede local ordinances regarding the use of firearms, projectiles, traps, and harassment techniques (i.e., use of pyrotechnics), community leaders must take an active role in the deer management of their municipalities.

The *Guidelines for White-tailed Deer Management on Urban Lands in Missouri* states the control measures available to individuals and communities. These alternatives include non-lethal and lethal methods. Non-lethal methods are habitat modification, repellants, fencing, no action, and reproductive control with required permit. Lethal methods are hunting, sharpshooting, and trapping and euthanasia, all of which require a permit from MDC. MDC is committed to working with individuals and communities to reach wildlife management goals. Any costs associated with wildlife management outside of MDC-owned areas are the responsibility of the landowner, whether the owner is an individual or community (e.g., a resident's backyard or a city/county park).

#### Role of Community Task Force in urban deer management

The concept of a citizen task force to address deer population issues in suburban areas may be relatively new but it has been implemented by many communities throughout the country since the early 1990s. Biologists, who for a generation strived to restore the deer to Missouri, now face a situation of too many deer in suburban areas where traditional management tools such as hunting are not as socially acceptable as in rural areas. Suburban areas face various obstacles to employing traditional management for deer control such as restrictive ordinances, varied acceptability of hunting as deer management, residents' general unfamiliarity with hunting, and concerns about public safety.

The West St. Louis County Deer Task Force was formed to pull community resources and diverse viewpoints together to address the concerns of residents. A community task force calls for dedicated community leaders to form a highly-focused and task-driven group to address an issue that crosses municipal boundaries and property lines. Implementation of deer management alternatives in most areas of west county would involve ordinance revision, education of residents and hunters, and evaluation of the effectiveness of deer management. These tasks require the cooperation of municipal governments, residents, and wildlife biologists.

The general objectives of the task force are to identify the nature and extent of problems caused by deer and to recommend any appropriate solutions. The task force has deferred conclusive discussion of solutions until a thorough evaluation of the nature and extent of problems have been accomplished. The specific steps taken by the task force include a review of published materials from studies on suburban deer populations in other areas of the country and examination of local data on deer population and incidences of human-deer conflicts (i.e., deer-vehicle collisions, landowner complaints). The task force investigated deer populations in St. Louis County and conducted a public opinion survey. Representatives reviewed data from these surveys and is seeking public comment on deer populations and potential management actions. Finally, the task force will make recommendations in the form of a final report.

White-tailed deer will continue to be a valuable resource to all Missourians, even as suburban areas continue to expand and the landscape changes. Successful deer management aims to balance the benefits of a healthy deer herd (e.g., the opportunity to occasionally see deer in your own

neighborhood) with the negatives (e.g., deer-vehicle collisions and browse damage). Though deer management has no magical solution that will please everyone, there are effective management options available that integrate population control and damage abatement. The Task Force provides west St. Louis County municipalities and governments an opportunity to choose tools to address deer management issues in the area.



## **DEER POPULATION**

To determine whether or not a problem exists regarding the deer population, the Task Force reviewed population survey methods, conducted population surveys, and compiled information from previous population surveys in St. Louis County. Based on population survey results from helicopter counts, several areas of west county have excessive deer populations that are causing problems to residents.

### **Deer Population Survey Methods**

Task Force reviewer: Joe Williamson

#### Summary of Findings

The most important consideration in selecting deer population survey methods is how the results are to be used. "Once the objectives are clearly defined then the sampling protocol can be determined. Scientific methodology must be followed to reduce the variability of the population estimate and/or develop estimates for specific areas of interest" (McAninch 1995).

There are advantages and limitations to each of the following population survey methods. Not all methods listed are suitable for residential areas.

1. Roadside/ Spotlight Counts: Counting deer using spotlight from vehicles at night.
2. Fecal/ Pellet Counts: Useful for determining population fluctuations and seasonal habitat use.
3. Drive Counts: Involves rounding up all deer in an area for counting.
4. Track Counts: Counting deer tracks on corridors/ game trails for estimating population trends.
5. Dead Deer Surveys: Primarily used to evaluate winter severity and fawn survival.
6. Aerial Surveys: Deer are counted by observers in low flying helicopters over snow.
7. Thermal Imagery: Deer images are recorded on infrared film by cameras in airplanes.
8. Camera and Trail Monitors: Motion sensors trigger cameras at bait sites to count deer.
9. Vegetation/ Browse Monitoring: Vegetation surveys compare exclosed versus open plots to determine extent and trend in deer browse.

Drive counts, aerial surveys, and thermal imagery have the potential to count all deer in a specific area. Since some deer are always missed, it is important to determine a reliable detection rate to accurately estimate the total number of deer.

The aerial survey method is the method of choice. Deer densities are measured by low-flying helicopter over at least four inches of snow cover. Replicate counts with this method are much more reproducible than replicate counts using infrared sensor methods. Detection rates with aerial surveys using helicopters over snow are considerably higher than infrared sensor methods.

Other methods listed above are less accurate in estimating the number of deer in selected sites. Accuracy and usefulness of counts depends on whether the numbers of deer in the areas sampled correspond to the number of deer in the total area of interest. These methods are useful for monitoring population trends and variation in deer density in the area of interest over years.

It is also important to note that deer surveys are not comparable between methods. In other words, to obtain reliable trend data (whether the deer population is increasing, decreasing, or stable), researchers

need to be consistent in the survey methods used. Aerial survey data cannot be reliably compared to spotlight survey data, for example.

Literature reviewed

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McAninch, J. 1995. Guidelines for monitoring vegetation and deer in parks. Minnesota Department of Natural Resources Technical Report. 8pp.

## Population Surveys

Task Force reviewer: Erin Shank

### Summary of Findings

The most recent population surveys in St. Louis County took place on January 28, 2004. Three areas were surveyed over four inches snow cover in an MDC helicopter. Aerial deer population surveys are conducted by using a helicopter flying low to the ground at slow speeds. At least four inches of snow must cover the ground to conduct an aerial survey because the snow cover improves detection of deer on the ground. The estimated deer densities per square mile are averages for the entire area surveyed; actual densities can vary within the survey area. Counters were MDC wildlife biologists Lia Bollmann, Erin Shank, and John Vogel.

Table 1: Results from January 28, 2004 Aerial Surveys

| Site   | Area<br>mi <sup>2</sup> | Actual<br>count | Estimated deer<br>population* | Estimated<br>Deer/mi <sup>2</sup> * | Estimated<br>average Deer/mi <sup>2</sup> * |
|--|-------------------------|-----------------|-------------------------------|-------------------------------------|---|
| Rockwoods Reservation,<br>Greensfelder County Park, &<br>section of Wildwood | 10.8                    | 499             | 616 - 657                     | 57 - 61                             | 59  |
| Powder Valley &<br>Emmenegger Nature Park                                    | 0.45                    | 17              | 21 - 22                       | 47 - 49                             | 48  |
| Sections of Chesterfield &<br>Clarkson Valley                                | 3.4                     | 231             | 285 - 304                     | 84 - 89                             | 86  |

\*Assuming detection rate of 78.5% ± 2.5%

Other recent area population surveys include:

### April 2002 Population Estimates for Town and Country

*Conducted by Holterra Wildlife Management, Clayton K. Nielsen and R. Gray Anderson*

Holterra Wildlife Management used distance sampling to estimate deer population size in Town and Country and Queeny Park during March 19-21, 2002. They estimate the population size to be 471 +/- 94 deer, or 43.4 +/- 8.7 deer/mi<sup>2</sup>.

Distance sampling is based on the theory that all deer will not be detected during ground surveys. By sampling perpendicular distances from the deer to the vehicle, a mathematical function is generated which describes how detection of objects changes with increasing distance from the transect. Density of deer is computed as the number of deer encountered divided by the effective area sampled. Total population size can then be calculated from this value.

Researchers drove 62.6 miles of road, representing 24% of total road mileage in Town and Country, during the survey period. Surveys were conducted between 9pm and 6am. Researchers also observed a greater number of deer south of Clayton Road.

This population estimate involved entirely different methods than aerial surveys for determining population densities. It therefore cannot be used as a comparison for population growth or decline from past years. Should Town and Country repeat these methods for population estimates in future years, a comparison could be made.

### February 2002 Aerial Survey of Rockwoods Reservation and Forest 44 Conservation Area

*Conducted by MDC*

MDC conducted an aerial survey on February 27, 2002 to estimate the deer population of Rockwoods Reservation and Forest 44 Conservation Area, both in St. Louis County. Surveyors estimated the population to be 551-586 deer, or 54.5-58.0 deer/mi<sup>2</sup>.

Two surveyors counted 446 deer during the aerial survey. The helicopter covered 10.1 square miles of land, with approximately 80% deer habitat. The detection rate for aerial surveys over four inch snow cover was 78.5% +/- 2.5%. This detection rate was used to calculate the estimated deer population and density in the area.

### December 2000 Aerial Survey of Town and Country

*Conducted by MDC*

MDC conducted an aerial survey, using the same methods explained above, to estimate the deer population in Town and Country on December 19, 2000. The helicopter covered 8 square miles and 441 deer were counted. Assuming the 78% +/- 2.5% detection rate, population estimate was 544-580 deer, or 68.0-72.5 deer/mi<sup>2</sup>.

### January 2000 Infrared Survey of Town and Country and Queeny Park

*Conducted by Air Scan, Inc., Susan Bernatas, Director of Environmental Programs*

Air Scan, Inc. conducted a survey of deer in Town and Country and Queeny Park in January 2000. Air Scan used a twin engine aircraft to detect deer in 1 mile circular orbits using an infrared technique. Due to a highly variable detection rate, the survey produced a large range in population estimates. Researchers counted 486 deer in the sample area, with deer densities per orbit ranging from 0 to 64. Given a detection rate between 50-90%, population was estimated to be 540- 972 deer, or 60- 108 deer/mi<sup>2</sup>.

### January 1999 Aerial Survey of Town and Country and Queeny Park

*Conducted by MDC*

MDC conducted an aerial survey of Town and Country and Queeny Park in January 1999, using the helicopter survey technique explained above. Surveyors counted 518 deer in 9 square miles. Assuming the 78% +/- 2.5% detection rate, population was estimated at 640-682 deer, or 71.1-75.8 deer/mi<sup>2</sup>.

### February 1997 Spotlight Survey of Town and Country and Queeny Park

*Conducted by White Buffalo, Inc., Dr. Anthony J. DeNicola, Director*

In February 1997, White Buffalo, Inc. conducted a spotlight survey of deer in Town and Country and Queeny Park. Given a 75% detection rate and 25% margin of error, surveyors estimated the population to be 472-788 deer, or 52-88 deer/mi<sup>2</sup>.

## **DEER DAMAGE**

Biologists and local officials can gauge the seriousness of problems caused by deer through tracking public complaints, mapping deer-vehicle collisions, and examining damage to private property and natural areas. Deer damage due to browse and antler rub causes extensive landscape damage on private property in some cases. Deer-vehicle collisions in St. Louis County are excessive and are a concern of many west county residents. Additionally, there are indications that extensive deer browse in natural areas may be detrimental to the health and fitness of other plant and wildlife species in areas of west county.

### **Deer Damage Abatement Techniques**

Task Force reviewer: Joe Vujnich

#### Summary of Findings

Missouri Department of Conservation St. Louis area offices (Powder Valley, Busch, Rockwoods Reservation, and Soulard) receive a large volume of deer damage complaints each year. Tracking exact numbers of complaints is difficult due to the number of staff and volunteers handling deer complaints. Based on the number of calls taken by Urban Wildlife Biologists and Wildlife Damage Biologists in recent years, MDC receives at least 200 deer damage complaints from St. Louis area residents each year. This estimate does not include calls made to Conservation Agents or other organizations like Missouri Extension, municipal animal controls, or Wildlife Rescue Center.

Deer are browsing animals. They eat a variety of plants, fruits, vegetables, and grains. Six hundred plant types have been documented as deer food. Most of the complaints received from residents note that deer are eating vegetation they have planted. Well fertilized and watered landscapes and gardens can be much more desirable to the deer than surrounding common ground areas that are not watered or fertilized. Deer browsing can kill or remove smaller trees and some plants or plant beds entirely. Bucks often damage smaller trees when they rub their antlers on trees as fall approaches. In areas of high deer densities, overall landscape damage or destruction can be a problem, as deer create a pronounced browse line in forested areas. A browse line is evident when vegetation is striped from the ground to approximately 5 feet high, indicating deer are heavily grazing an area. Agricultural crop fields can be depredated severely if adjacent deer densities are high or if adjacent food sources are poor. Other complaints have been vehicles-struck deer dying in yards, concerns about Lyme disease, and deer herds frequently traveling through communities as new developments remove habitat.

Deer damage abatement techniques are useful to control or lessen the amount of property damage caused by deer. There are a wide variety of damage abatement techniques which are most effective when employed in combination. Deer damage abatement does not reduce the population, but only focuses on lessening damage caused by deer in an area.

1. Use certain plants and trees that are not preferred by deer.

*Advantages:* provides alternatives for landowners who experience severe plant damage by deer and allows for ground cover and understory to be restored after heavy grazing.

*Disadvantages:* No plant is truly deer resistant. Deer will browse the best of what's around, and individual preferences are based on other available food sources and previous experience. There is no definite way to predict what deer will or will not eat.

2. Install fencing, single stranded electrified or shelters for individual plots.

*Advantages:* prohibits deer from accessing an area and can protect specific sites.

*Disadvantages:* can be expensive. Aesthetics of an area can be affected by fencing. Some local ordinances may prohibit the use of fences, including traditional fences and electric fences.

3. Use repellants or chemicals to control overuse of areas.

*Advantages:* can be effective over a limited time period in a localized area.

*Disadvantages:* can be expensive. Research indicates that deer can become habituated to repellants over time, or come to disregard them altogether.

4. Employ scare tactics, such as loud noises or bright lights, to force deer to other locations.

*Advantages:* Eliminates problem deer in an immediate timeframe in a localized area.

*Disadvantages:* Deer can become habituated to scare tactics.

5. Incorporate design considerations into new roadways that address areas where existing deer trails cross roads.

*Advantages:* addresses deer-vehicle collisions by locating or designing new roadways away from known crossings or providing alternatives at accident-prone locations.

*Disadvantages:* not applicable to existing roadways where deer have established routes.

6. Manage deer numbers through lethal methods.

*Advantages:* can be economical and effective for long-term solutions to reduce deer numbers.

*Disadvantages:* many suburban residents are unfamiliar with lethal control of deer and may find it distasteful. Local ordinances may prohibit hunting.

For more information on deer damage abatement techniques and deer resistant plants, see the deer resistant plants section in this report or visit the University of Missouri Extension Service website on controlling deer damage:

<http://muextension.missouri.edu/explore/miscpubs/mp0685.htm>

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## Deer Resistant Landscaping

Task Force reviewer: Erin Shank

### Summary of Findings

White-tailed deer browse on a large variety of plants, but exhibit some preference for certain plants over others. It is impossible to predict exactly what plants deer will or will not eat; preferences can be based on a number of factors including a whitetail's previous experience and other available food sources. If stressed for food resources, deer can eat nearly any kind of plant. The following list can be used as a guide for homeowners landscaping in areas of high deer densities.

### Trees & Shrubs

#### *rarely damaged*

|                 |                               |                      |                               |
|-----------------|-------------------------------|----------------------|-------------------------------|
| Barberry        | <i>Berberis spp</i>           | American Holly       | <i>Ilex opaca</i>             |
| Common Barberry | <i>Berberis vulgaris</i>      | Japanese Pieris      | <i>Pieris japonica</i>        |
| Paper Birch     | <i>Betula papyrifera</i>      | Colorado Blue Spruce | <i>Picea pungens</i>          |
| Common Boxwood  | <i>Bexus sempervirens</i>     | Drooping Leucothoe   | <i>Leucothoe fontanesiana</i> |
| Russian Olive   | <i>Elaeagnus angustifolia</i> |                      |                               |

#### *Seldom damaged*

|                      |                              |                           |                                 |
|----------------------|------------------------------|---------------------------|---------------------------------|
| American bittersweet | <i>Calastrus scandans</i>    | Japanese wisteria         | <i>Wisteria floribunda</i>      |
| Red osier dogwood    | <i>Cornus sericea</i>        | Common lilac              | <i>Syringa vulgaris</i>         |
| Kousa dogwood        | <i>Cornus kousa</i>          | Common sassafras          | <i>Sassafras albidum</i>        |
| English hawthorn     | <i>Crataegus laevigata</i>   | Corkscrew willow          | <i>Salix matsudana tortuosa</i> |
| Forsythia            | <i>Forsythia spp</i>         | Japanese flowering cherry | <i>Prunus serrulata</i>         |
| Honey locust         | <i>Gleditsia triacanthos</i> | Scots pine                | <i>Pinus sylvenstris</i>        |
| Inkberry             | <i>Ilex glabra</i>           | Red pine                  | <i>Pinus resinosa</i>           |
| Chinese holly        | <i>Ilex cornuta</i>          | Mugo pine                 | <i>Pinus mugo</i>               |
| Chinese junipers     | <i>Juniperus chinensis</i>   | Austrian pine             | <i>Pinus nigra</i>              |
| Beautybush           | <i>Kolkwitzia amabilis</i>   | White spruce              | <i>Picea glauca</i>             |
| Norway spruce        | <i>Picea abies</i>           |                           |                                 |

### Annuals

#### *Rarely damaged*

|                |   |                |                               |
|----------------|---|----------------|-------------------------------|
| Ageratum       | <i>Ageratum houstonianum</i>            | Verbena        | <i>Verbena x hybrida</i>      |
| Snapdragon     | <i>Antirrhinum majus</i>                | Marigold       | <i>Tagetes spp</i>            |
| Wax begonia    | <i>Begonia x semperflorensclortorum</i> | Thistle        | <i>Silybum spp</i>            |
| Cleome         | <i>Cleome hasslerana</i>                | Dusty miller   | <i>Senecio cineraria</i>      |
| Dahlia         | <i>Dahlia spp</i>                       | Blue salvia    | <i>Salvia farinacea</i>       |
| Thorn apple    | <i>Datura spp</i>                       | Parsley        | <i>Petroselinum crispum</i>   |
| Foxglove       | <i>Digitalis spp</i>                    | Zonal geranium | <i>Pelargonium x hortorum</i> |
| Blanket flower | <i>Gaillardia pulchella</i>             | Poppy          | <i>Papaver spp</i>            |
| Heliotrope     | <i>Heliotropium aborencens</i>          | Sweet Basil    | <i>Ocimum basilicum</i>       |
| Morning glory  | <i>Ipomoea spp</i>                      | Forget-Me-Not  | <i>Myosotis sylvatica</i>     |
| Edging lobelia | <i>Lobelia erinus</i>                   | Four-O'-Clock  | <i>Mirabilis jalapa</i>       |
| Sweet alyssum  | <i>Lobularia maritima</i>               |                |                               |



## Perennials

### *Rarely damaged*

|                     |                                   |                      |                                    |
|---------------------|-----------------------------------|----------------------|------------------------------------|
| Yarrow              | <i>Achillea spp</i>               | Chives               | <i>Allium schoenoprasum</i>        |
| Ornamental onion    | <i>Allium spp</i>                 | Garlic chives        | <i>Allium tuerosum</i>             |
| Basket of gold      | <i>Alyssum saxatile</i>           | Amsonia              | <i>Amsonia tabernaemontana</i>     |
| Anemones            | <i>Anemone spp</i>                | Angelica             | <i>Angelica archangelica</i>       |
| Columbine           | <i>Aquilegia canadensis</i>       | Jack-in-the-pulpit   | <i>Arisaema triphyllum</i>         |
| Wormwood            | <i>Artemisia spp</i>              | Goatsbeard           | <i>Aruncus dioicus</i>             |
| Butterfly weed      | <i>Asclepias tuberosa</i>         | Astilbe              | <i>Astilbe spp</i>                 |
| False indigo        | <i>Baptisia spp</i>               | Bergenia             | <i>Bergenia spp</i>                |
| Botonia             | <i>Boltonia asteroides</i>        | Butterflybush        | <i>Buddleia davidii</i>            |
| Heather             | <i>Calluna spp</i>                | Tussock bellflower   | <i>Campanula carpatica</i>         |
| Knapweed            | <i>Centurea spp</i>               | Plumbago             | <i>Ceratostigma plumbaginoides</i> |
| Turtlehead          | <i>Chelone spp</i>                | Painted daisy        | <i>Chrysanthemum coccineum</i>     |
| Shasta daisy        | <i>Chrysanthemum superbum</i>     | Feverfew             | <i>Chrysanthemum parthenium</i>    |
| Bugbane             | <i>Cimicifuga racemosa</i>        | Coreopsis            | <i>Coreopsis spp</i>               |
| Hay-scented fern    | <i>Dennstaedtia punctilobula</i>  | Pinks                | <i>Dianthus spp</i>                |
| Bleeding heart      | <i>Dicentra exima</i>             | Gas plant            | <i>Ditamnus albus</i>              |
| Purple coneflower   | <i>Echinacea purpurea</i>         | Globe thistle        | <i>Echinops spp</i>                |
| Heath               | <i>Erica spp</i>                  | Joe-Pye weed         | <i>Eupatorium spp</i>              |
| Spurge              | <i>Euphorbia spp</i>              | Queen-of-the-prairie | <i>Filipendula spp</i>             |
| Crown imperial      | <i>Fritallaria imperialis</i>     | Avens                | <i>Geum spp</i>                    |
| Baby's breath       | <i>Gypsophila paniculata</i>      | Helleborus           | <i>Helleborus spp</i>              |
| Candytuft           | <i>Iberis sempervirens</i>        | Kirengeshoma         | <i>Kirengeshoma palmata</i>        |
| Lavender            | <i>Lavandula spp</i>              | Spike gayfeather     | <i>Liatris spicata</i>             |
| Tiger lily          | <i>Lilium lancifolium</i>         | Statice              | <i>Limonium latifolium</i>         |
| Toadflax            | <i>Linaria spp</i>                | Perennial Blue Flax  | <i>Linum perenne</i>               |
| Lupine              | <i>Lupinus spp</i>                | Ostrich fern         | <i>Matteuccia struthiopteris</i>   |
| Pennyroyal          | <i>Mentha pulegium</i>            | Beebalm              | <i>Monarda didyma</i>              |
| Forget-me-not       | <i>Myosotis scorpioides</i>       | Sweet cicely         | <i>Myrrhis odorata</i>             |
| Daffodil            | <i>Narcissus spp</i>              | Catmint              | <i>Nepeta spp</i>                  |
| Sundrops            | <i>Oenothera tetragona</i>        | Evening primrose     | <i>Oenothera spp</i>               |
| Sensitive fern      | <i>Onoclea sensibilis</i>         | Oregano              | <i>Origanum spp</i>                |
| Cinnamon fern       | <i>Osmunda cinnamomea</i>         | Interrupted fern     | <i>Osmunda claytoniana</i>         |
| Royal fern          | <i>Osmunda regalis</i>            | Oriental poppy       | <i>Papaver orientale</i>           |
| Ribbon grass        | <i>Phalaris arundinacea</i>       | Balloon flower       | <i>Platycodon grandiflorus</i>     |
| Jacob's ladder      | <i>Polemonium caeruleum</i>       | Christmas fern       | <i>Polystichum acrostichoides</i>  |
| Cinquefoil          | <i>Potentilla spp</i>             | Primrose             | <i>Primula spp</i>                 |
| Lungwort            | <i>Pulmonaria spp</i>             | Buttercup            | <i>Ranunculus spp</i>              |
| Rhubarb             | <i>Rheum spp</i>                  | Rosemary             | <i>Rosmarinus officinalis</i>      |
| Sage                | <i>Salvia spp</i>                 | Soapwort             | <i>Saponaria spp</i>               |
| Scilla              | <i>Scilla spp</i>                 | Goldenrod            | <i>Solidago spp</i>                |
| Lamb's ear          | <i>Stachys byzantina</i>          | Tansy                | <i>Tanacetum spp</i>               |
| New York Fern       | <i>Thelypteris noveboracensis</i> | Mullein              | <i>Verbascum spp</i>               |
| Hungarian speedwell | <i>Veronica latifolia</i>         | Greater periwinkle   | <i>Vinca major</i>                 |
| Labrador violet     | <i>Viola labridorica</i>          | Yucca                | <i>Yucca spp</i>                   |

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## **Traffic Safety Devices to Reduce Deer-Vehicle Collisions**

Task Force reviewer: Jerry Klein

### Summary of Findings

Various traffic safety devices are available to aid in reducing deer-vehicle collisions on roadways. The most common and traditional type of traffic safety device for this purpose is the warning sign. The standard deer crossing sign can also be animated with the addition of a flashing light to help get the attention of motorists. These devices can be used on major highways or neighborhood streets.

The roadside reflector is another device that has been tested many times over the past twenty years. The reflectors are positioned so that when headlights hit them, they throw red light toward the roadside. The red reflection is designed to frighten deer and thereby prevent or delay them from crossing the road. The most prevalent brand of reflector is the Swareflex or Streator lights. A number of studies have been done on the effectiveness of roadside reflectors and the results have been mainly disappointing. The results from various roadside reflectors tests were mixed in their findings but the overall consensus is that these reflectors are not effective in the long run to reduce deer vehicle collisions. MDC conducted a study in St. Charles County on the effectiveness of roadside reflectors and did not find a decrease in deer-vehicle collisions along roads with reflectors.

An Iowa summary of many types of traffic safety devices concluded that reflectors have produced mixed results and that most of the studies have serious flaws. The flaws included a short testing period and not accounting for such things as changes in deer population, traffic levels, and other environmental trends. This study concluded that properly maintained fencing is the only sure way to dramatically reduce deer-vehicle collisions.

A study of two Minneapolis suburbs examined roadside landscaping as a potential factor influencing the incidence of deer-vehicle collisions. The study recommended a reduction of forest cover and shrubby areas on public land near roads in order to reduce habitat suitability and increase driver visibility. Researchers recommended landscape modification in combination with fencing and population reduction to achieve the greatest reduction in deer-vehicle collisions.

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## Deer- Vehicle Collisions in St. Louis County

Task Force reviewer: Wendy Geckeler

### Summary of Findings

Though deer-vehicle collisions occur statewide, they are most frequent in suburban areas of St. Louis and Kansas City. Between 350 and 500 deer vehicle collisions are reported in St. Louis County each year, with average automobile repairs ranging from \$2000 to \$3500 (Burns, pers. comm.). Removal of dead deer as a result of these accidents costs cities, Missouri Department of Transportation (MODOT), and MDC tens of thousands of dollars annually. The current cost of one dead deer disposal through MDC is \$80.00. Based on this price, Table 2 gives an estimate of dead deer removal costs in St. Louis County for recent years.

Table 2: St. Louis County deer carcass removal

| Pick up agency     | 2000 <sup>1</sup> |             | 2001 |             | 2002 |             | 2003 |             | 2004 <sup>3</sup> |             |
|--------------------|-------------------|-------------|------|-------------|------|-------------|------|-------------|-------------------|-------------|
|                    | #                 | Cost (\$75) | #    | Cost (\$80) | #    | Cost (\$80) | #    | Cost (\$80) | #                 | Cost (\$80) |
| MDC                | 65                | \$4,875     | 132  | \$10,560    | 107  | \$8,560     | 91   | \$7,280     | 60                | \$4,800     |
| MODOT <sup>2</sup> |                   |             |      |             | 161  | \$12,880    | 122  | \$9,760     | 67                | \$5,360     |
| Total              | 65                | \$4,875     | 132  | \$10,560    | 268  | \$21,440    | 213  | \$17,040    | 127               | \$10,160    |

<sup>1</sup>Numbers for 2000 include only June-December.

<sup>2</sup>MODOT numbers are not available for 2000 and 2001.

<sup>3</sup>2004 numbers for January - August.

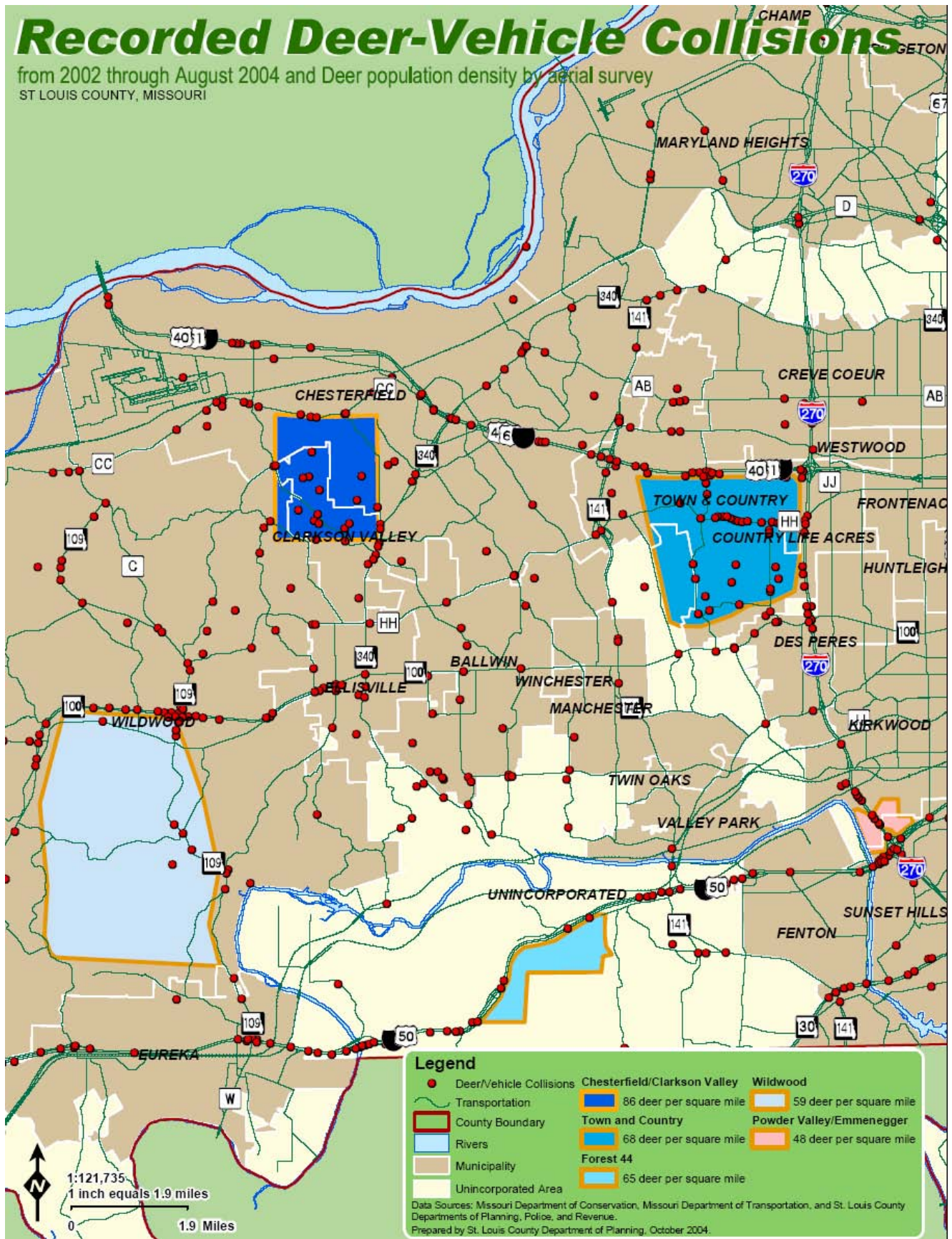
For the past six years, MDC has contracted Animal Care Services (ACS) to pick up deer that have died as a result of deer-vehicle collisions on roads that are not state or federal highways. MODOT picks up these deer on most state and federal highways. Additionally, many municipalities also contract with ACS for dead deer carcass disposal. Both MDC and MODOT keep records with the date and locations of these deer, providing MDC with a way to track deer-vehicle collisions. There is no way to track all deer-vehicle collisions in the area, since not all are reported and the deer do not always die when hit by a car. The information from MDC and MODOT, however, gives an estimate of hotspots where deer-vehicle collisions most frequently occur. The data clearly indicates that the majority of deer-vehicle collisions in St. Louis County occur in west county. Far north and south St. Louis County also see a fair number of collisions, but markedly less than west county (see map).

While deer vehicle collisions account for a small fraction of overall collisions, it is estimated that over 500 deer vehicle collisions occur in St. Louis County each year. Not all deer die along roads when they are hit and only a percentage of dead deer along roads are removed by MODOT or a contractor. Many fresh kills are donated to drivers or local residents who then process the meat, and many are simply dragged off the roads.

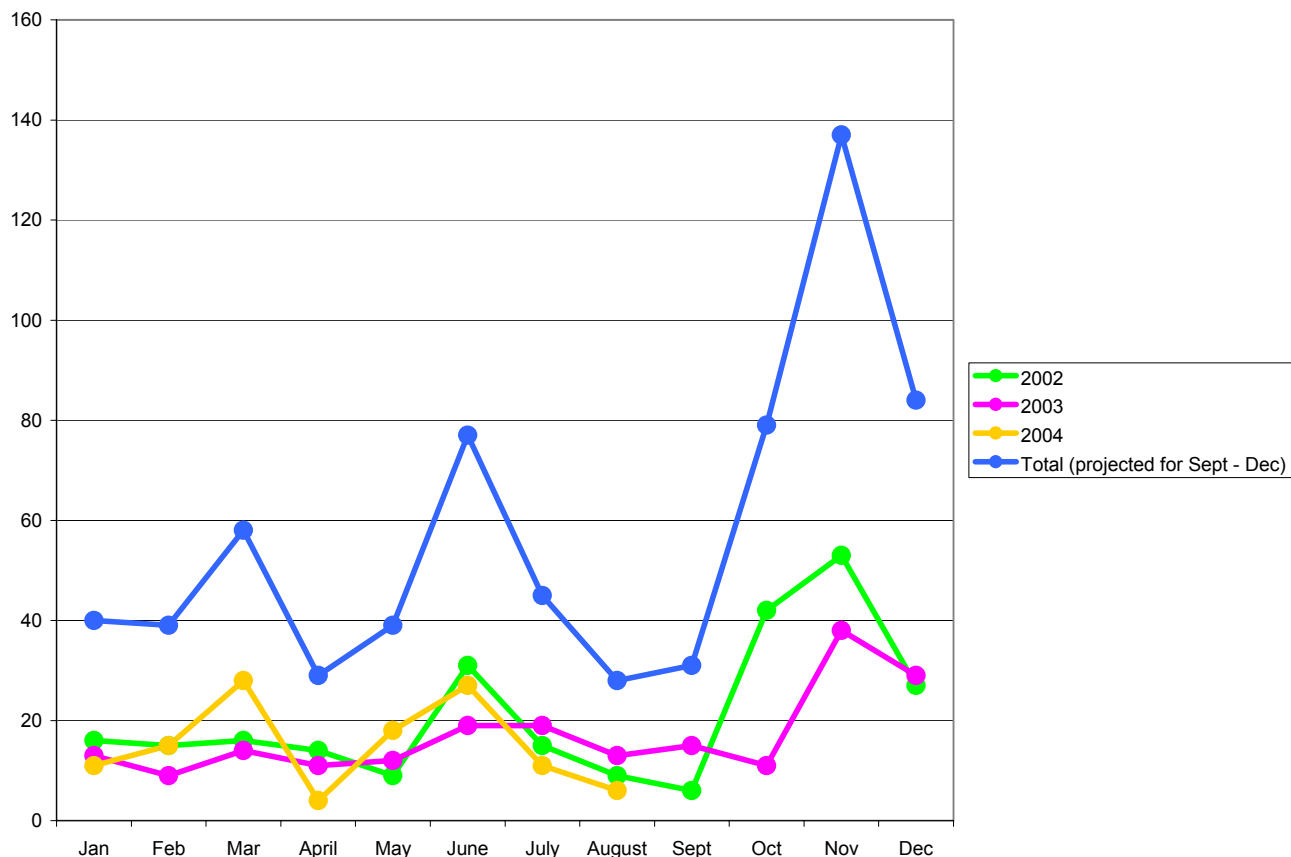
Deer-vehicle collisions occur most often during early morning and evening, and throughout the fall during the breeding season. Incidences tend to peak in November, as bucks are more active and in search of does. Another smaller but notable peak in collisions occurs again in June, when yearlings move away from parent does (Graph 1).

# Recorded Deer-Vehicle Collisions

from 2002 through August 2004 and Deer population density by aerial survey  
ST LOUIS COUNTY, MISSOURI



Graph 1: Deer carcass pickup on St. Louis County roadsides: 2002-2004



In the 2004 survey of West County residents conducted by the Task Force, residents were asked about deer vehicle collisions. Of the 2671 respondents, 15.5% said that in the past five years, they or an immediate family member had been in a car that hit a deer in West County. Reducing deer vehicle collisions was the most important goal of a deer management plan, according to respondents; 73% said reducing collisions was “very important” and 19.5% said it was “somewhat important.” Only 5% of respondents said that reducing collisions was “not important.”

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## Lyme disease and white-tailed deer

Task Force reviewer: Erin Shank

### Summary of Findings

Lyme disease is often cited by west St. Louis county residents as a concern related to the large deer population. Residents worry that areas of high deer densities may increase the risk of transmission of the disease to humans. Whether or not high deer densities increase the risk of Lyme disease is questionable. This summary aims to shed light on the relationship of ticks, deer, white-footed mice, and humans as they relate to the Lyme disease agent. The concern over increased incidence of Lyme disease in areas of high deer densities may be more of a perceived risk than a real one.

Lyme disease is a systemic, tick-borne disease caused by a spiral bacteria, *Borrelia burgdorferi*. In Missouri, patients who fulfill the symptomatic definition of Lyme disease are reported as cases. However, *Borrelia burgdorferi* has not been isolated from any Missouri cases.

Diagnosis for Lyme disease is usually made by the presence of a skin lesion called Erythema migrans that appears along with flu-like symptoms. If left untreated, Lyme disease can have late, more serious manifestations such as joint swelling, neurologic disorders, and heart problems. Lyme disease is transmitted by the black-legged tick *Ixodes scapularis*, formerly called the deer tick.

*I. scapularis* follows a generalized life cycle that is relevant to the transmission of Lyme disease to humans. Larval ticks hatch from eggs in early to mid-summer and seek a host at that time. These ticks are poor crawlers and have limited mobility. At the larval stage, they are approximately the size of a pinpoint. A warm-blooded vertebrate must pass extremely close to the larval tick in order to become a host. The white-footed mouse, *Peromyscus leucopus*, is the host responsible for infecting larval ticks with the Lyme disease bacteria. The white-footed mouse is considered the principal natural reservoir for *Borrelia burgdorferi*. The larval ticks will feed through blood sucking mouthparts on a wide variety of birds and mammals, usually for a single two to three day period. Within a month after dropping off the host, larval ticks molt into the nymph stage.

Nymph *I. scapularis*, about the size of a poppy seed, actively search a warm-blooded host. They also insert mouth parts into the host to feed, this time for about three to five days. This stage of the tick lifecycle, due to the inconspicuous size of the nymphs and the timing of their emergence (May to July, when many people are outdoors), is primarily responsible for the infection of humans with the Lyme disease agent. Once the nymph drops off the host, it will molt into an adult tick within three months.

Adult ticks, about the size of a sesame seed, peak around mid-autumn. The adult tick is somewhat more mobile than it's juvenile forms and typically climbs higher to seek a host. The result of its increased mobility is that the adult tick usually parasitizes larger mammals, most notable the white-tailed deer. Adult ticks use their host for feeding and as well as mating grounds. Males will mate with feeding females, which fall off the host once engorged, overwinter, and lay eggs which hatch again in early summer.

Model simulations of the relationship between deer and ticks show that reduction in deer density results in a small reduction of *I. scapularis*. In order to drastically reduce the host tick numbers, deer would need to be almost entirely removed from the landscape. Experiments on island deer populations



indicate that with a drastic reduction of deer numbers, the host tick numbers will also decline. In a free-ranging population such as St. Louis County, it is unlikely that reduction of deer numbers would decrease the presence of *I. scapularis*, thereby decreasing the risk of Lyme disease.

Another important point is that the population-level risk of Lyme disease is extremely low. Various factors confuse the diagnosis and reporting of the disease, and there are strong arguments for both scenarios, that the disease is highly under-reported or over-reported (mis-diagnosed). However, based on Missouri Department of Health and Center for Disease Control tracking, Missouri accounts for a small portion of the annual Lyme disease cases in the United States. The following table shows the number of reported Missouri cases 1990-2002. In the United States during this time, there were 181,173 reported cases of Lyme disease; Missouri cases account for 0.6% of the total U.S. cases.

Table 3: Lyme disease in Missouri 1990-2002

| Year    | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | Total |
|---------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| # cases | 205  | 207  | 150  | 108  | 102  | 53   | 52   | 28   | 12   | 72   | 47   | 37   | 41   | 1114  |

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## Deer browse and the effect on forest systems

Task Force reviewer: Erin Shank

### Summary of Findings

When addressing the topic of overabundant deer, it is helpful to refer to three different carrying capacities. The cultural carrying capacity refers to the maximum number of deer that can coexist compatible with local human populations. The biological carrying capacity is the approximate number of deer the ecosystem can support in good physical condition. The ecological (or biodiversity) carrying capacity is the maximum number of deer that can exist without negatively affecting floral and faunal diversity. Although it is worthwhile to consider all three capacities when determining if deer are overabundant and need to be managed, this section specifically addresses ecological carrying capacity.

On urban public areas (parks, sanctuaries, some conservation areas) where deer are a major attraction, MDC recommends densities up to 40 deer/mi<sup>2</sup>. This density is high enough to provide adequate viewing opportunities for the public but low enough to minimize most problems associated with high deer densities. On sites where ecosystem integrity is a high priority (natural areas, some conservation areas) or in urban residential areas, MDC sets goals between 15-20 deer/mi<sup>2</sup>. Densities in this range should maximize the positives associated with deer while minimizing the negatives.

When deer numbers exceed the ecological carrying capacity, extensive deer browse may eliminate some species and reduce others. Usually, ecological carrying capacity is reached at lower deer densities than cultural and biological carrying capacities. Deer-vehicle collisions, crop damage, and damage to gardens & landscaping give notice that areas of St. Louis are pushing the boundaries of cultural carrying capacity. Research and observation indicate that deer densities in areas of St. Louis County may be beyond the ecological carrying capacity as well. In general, deer densities in excess of 20 deer/mi<sup>2</sup> appear to decrease species richness (the number of species present), species abundance (the number of individuals present), and species composition due to overbrowsing.

Deer browse impacts woody and herbaceous plants. In areas where deer densities are over 20 deer/mi<sup>2</sup>, mean sapling height drops significantly. Scientists in Pennsylvania found that trees inside fenced plots, protected from deer, were twice as tall as those outside after only five growing seasons. The impact of deer on tree height began at between 10 to 20 deer/mi<sup>2</sup>. In another old growth forest in Pennsylvania, researchers found that, in 1920 when the deer density was less than 20 deer/mi<sup>2</sup>, the forest supported 27 woody tree and shrub species in the understory. Today, when the herd averages 40 deer/mi<sup>2</sup>, only 11 woody species are left in the understory.

A study by in Cuyahoga National Park in 1996 examined the effect of heavy deer browse on Flowering White Trillium (*Trillium grandiflorum*). The Park Service participated in this study because previous studies had shown that heavy deer browsing can cause local populations to become extinct or experience severe declines. Much like areas around St. Louis, whitetails in Cuyahoga have experienced unchecked population increases due to the extirpation of historic predators, the prohibition of hunting, and the mixed mosaic of land use that has provided prime habitat. The results of this study indicate that browsing has a negative impact on Trillium by reducing stem height. Stems were taller in exclosures than controls in all but three sites. In these three sites, no browse was recorded.

It follows that if stems are not reaching the height required for flowering, few flowers should be recorded. In fact, of the 366 plants measured, only 7 produced flowers. Of those seven, one was browsed before fruiting. Only 3 produced fruits. For polycarpic plants (capable of flowering and fruiting an indefinite number of times), fitness is a function of reproductive success over a series of breeding seasons, and for perennials in general, the quantity of stored material has been linked to survival through unfavorable periods. Therefore, browsing can threaten the fitness and survival of Trillium and similar species by causing progressive decline of stored carbohydrates, decreases in plant size, and reduction of flowering individuals.

Another recent study in Southern Illinois Beall Woods Nature Preserve gives a more comprehensive look at the effect of deer browse on spring flowering forest species. At the beginning of the study, the average deer density was approximately 57 deer/mi<sup>2</sup> in the mature mesic forest. Biologists monitored 30, 1 square meter exclosures and 60, 1 square meter open plots to assess deer browse. An aggressive deer removal program was implemented following the first year of the study, giving a comparison of the grazing impact between years of high and low deer densities.

During the two years after the deer population was reduced, grazing decreased on all wildflower species. No deer census was conducted after the deer reduction effort due to a lack of snow, but removal efforts were extensive. Before the deer harvests, deer browsed 52% of the palatable stems sampled. After the first hunt only 7% of palatable stems were browsed and after the second hunt, this number was down to 3%.

The plants most susceptible to deer browse were purple trillium (*Trillium recurvatum*), dwarf larkspur (*Delphinium tricorne*), false Solomon's seal (*Maianthemum racemosum*), violets (*Viola spp*), and Jack-in-the-pulpit (*Arisaema triphyllum*). The mean heights of these species are valuable indicators of deer herbivory. There were noticeable differences in height between protected and unprotected plants after three years, and the heights of unprotected plants after the deer removal program. The mean height of protected false Solomon's seal plants increased from 25 to 33cm inside exclosures and from 14 to 19cm in open plots. The mean height of unprotected red trilliums was 9.8cm during the first year of the study, but increased to 10.7cm by the third year. After two years inside the exclosure, the mean heights of protected trilliums increased from 12.7cm to 17.6cm, indicating that these plants were recovering from previous grazing. The percentage of trilliums flowering inside exclosures increased from 1% to 5% between the first and second years, and then jumped to 18% in the third year.

This study also stressed that the most important measure of the effect of deer on plants is their impact on individual fitness, a function of survival and fecundity (reproduction). This study demonstrates that persistent grazing of forest herbs by deer reduces the growth and reproduction of several species, in some cases threatening their survival. By removing photosynthetic tissue during the brief critical period of growth and reproduction in the spring, repeated grazing reduces the stored energy reserves of plants such as red trillium.

Locally, a deer exclosure was constructed and monitored at Rockwoods Reservation to examine the effect of deer browse on the forest resources. The 100 square meter exclosure is adjacent to 100 square meter control plot in Rockwoods Reservation. The exclosure is located on the GreenRock Trail, about a quarter mile from the trailhead. Based on two recent population surveys, the deer density in the area is estimated to be 59 deer/mi<sup>2</sup>.

The two plots were similar in geology, soil, moisture, and light conditions, as well as plant species composition (84% similarity). Data was collected on both plots for one year prior to the construction of the enclosure, and for three years following the enclosure. The enclosed plot showed indications of higher levels of plant vigor including taller stems, larger leaves, greater number of leaves, greater number of flowers, and greater number of fruits. Flowering was noted on at least three species within the enclosure that did not flower at all in the control plot: dogtooth violet (*Erythronium albidum*), white trillium (*Trillium flexipes*), and baneberry (*Actaea pachypoda*). Fruit was later noted on all three of these species in the enclosed plot.

This data provides evidence that the current population density of whitetails is impacting the functional and structural components of diversity at Rockwoods. In a continually browsed state, individual plants and populations of plant species have reduced ability to perform functions for which they are evolutionarily predisposed. Genetic variation through cross pollination and natural propagation through seed production are unable to occur without the presence of flowering structures.

Ground level vegetation is also an important structural component of forest diversity, further affecting species composition. Degradation of ground level vegetation by over-browsing has a detrimental effect on the diversity of organisms that would be present in healthy forest ecosystems. For example, populations of forest interior nesting birds that rely on well developed ground-level for food, cover, nesting habitat, and protection from predators may be affected by overbrowsing. Examples include Worm-eating warbler (*Helmitherose vermivorus*), Kentucky Warbler (*Oporornis formosus*), and Ovenbird (*Seiurus aurocapillus*).

This domino effect goes yet another step further. As the diversity of woodland species of flowering plants decrease, this has an impact on nectar and plant feeding bees. Bees have an intricate and entirely dependent relationship with plants. In order to survive and reproduce, female bees (depending on the species) collect various plant materials, including nectar, pollen, floral oils, sections of leaves or petals, resins, and waxes, all of which are used in nesting. Some bees construct nests in or on plant stems or twigs. Certain bee species have very specific relationships with particular plant groups (genera, family), while others, like the honey bee *Apis mellifera* use almost any flowering plant to obtain pollen and any sugar source (e.g., open soda can) to obtain “nectar.”

Deer preferentially browse *Claytonia* (spring beauty) and *Mertensia* (bluebells), for example, to the point that those plants become uncommon to absent, the bees (and other nectar- or plant-feeding species that depend on them) will likewise become uncommon to absent. Missouri is home to at least 150 species of bees that are dependent on a specific plant genera or group and are found only where their plants are found. These species are clearly at the mercy of their host plants. One example is *Andrena erythronii*, which is dependent on *Erythronium* (Trout lily), occurs only in small number of communities where its host plant is present.

Other insect groups in addition to bees that are herbivores and hence potentially impacted by overbrowsing include butterflies, a few moths, and several groups of beetles and leafhoppers. For example, there are several Missouri butterfly species, collectively called fritillaries, that feed as larvae only on violets. In other words, a sizable portion of insect diversity depends on woodland flowering plants, and of course many woodland birds feed insects to their nestlings.

Another issue raised by these studies and further complicating the issue of overabundant deer is that degradation of forest ecosystems caused by deer pressure may not be readily apparent to lay persons, or even resource professionals. Awareness of existing and potential problems is integral to planning for responsible resource management.

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## **DEER MANAGEMENT**

A number of management alternatives exist to control suburban deer populations. These alternatives include lethal methods to reduce deer numbers. Complicating management are the various municipal ordinances that restrict landowners' options for deer management by prohibiting discharge of firearms and/or projectiles. Choosing a deer management strategy is made more difficult by a wide variety of attitudes toward deer and deer management alternatives. A deer management plan must address these and other complicating factors.

### **Municipal Ordinances and the Influence on Management**

Task Force reviewer: Susan Shea

#### Summary of Findings

Municipal ordinances can greatly affect deer damage control and population management in suburban areas. White municipalities do not have the constitutional authority to set wildlife regulations and harvest, city codes can restrict the use of certain tools used in wildlife management. Some municipalities in west St. Louis County have ordinances regarding fences. These ordinances can make damage control more difficult for residents in areas of high deer densities, since exclusion and electric fencing are effective damage abatement techniques. Municipal ordinances can have a positive effect on damage abatement through restrictive feeding ordinances. For more information on "No Feeding" ordinances, see the following section in this report.

Many areas of St. Louis County are not open to hunting due to restrictive ordinances prohibiting firearms and projectiles. A municipality may restrict hunting in several ways. First, the municipal code can restrict the use of firearms or archery equipment. A "no firearms" ordinance in a municipality will allow for archery hunting only, using longbows or compound bows. A "no projectile" ordinance restricts both firearms and archery equipment, making trapping and euthanasia the only legal method of lethal deer control in the area.

Municipal codes can also restrict hunting by setting acreage requirements for the use of firearms or projectiles. The most restrictive type of acreage requirement calls for a minimum number of acres under a single landowner to allow the use of firearms or archery. A less restrictive acreage requirement allows landowners to combine adjoining properties to meet an acreage requirement. For example, a municipal code may require 5 acres or more for the use of firearms, but it may also allow adjoining landowners to combine 2 or 3 acre lots to meet that requirement and thus allow hunting on the properties.

Currently in St. Louis County, hunting is allowed under varying circumstances in unincorporated areas, Clarkson Valley, Chesterfield, Hazelwood, Maryland Heights, and Wildwood. All areas of St. Louis County require the written permission of the landowner in order to hunt a property. The municipal codes for areas of St. Louis County open to hunting are:

*Unincorporated:* Hunting is allowed on areas of 1 or more acre. It is unlawful to discharge a firearm or bow from across any street, sidewalk, road, highway or park, or within range and in the direction of any person, vehicle or building. It is unlawful to discharge a firearm expelling a single projectile from any boat or water vessel or across or into any lake or reservoir, or the Missouri, Meramec, or Mississippi rivers. These county ordinances apply to all municipalities.

*Chesterfield:* Hunting is allowed on areas of 10 acres or more and on areas north of the agricultural levee north of Highway 40 and west of the Monarch Levee south of Highway 40, but not within 150 yards of any building, person, vehicle, or park.

*Clarkson Valley:* Hunting is allowed on lots of 1 or more acre with archery device (longbow or compound bow) only. Hunters and/or landowners must carry \$2 million liability insurance or indemnity bond, and hunters must complete a bowhunter safety course. Landowners must notify contiguous neighbors of hunting and file a Notification To Hunt at city hall. Hunting must be conducted more than 30 yards from any building (except with permission of owner); 200 yards from any school, church, or playground; 75 feet from any front-yard property line; and 50 feet from any street or public right of way. Hunters must be at least 18 years or older, and all hunting must be from a tree stand at least 10 feet high and 25 feet from any side or rear property line.

*Hazelwood:* Hunting is allowed but not within 300 feet of any road, building, person, vehicle, or park.

*Maryland Heights:* Bowhunting is allowed but not south or east of Creve Coeur Mill Road.

*Wildwood:* Hunting is allowed. Historic methods only (archery, crossbow, muzzleloader) allowed north and east of Highway 109. Firearms and archery allowed in all other areas.



## **Municipal “No Feeding” Ordinances**

Task Force reviewers: Susan Shea and Wendy Geckeler

### Summary of Findings

Feeding deer is a common practice in many areas of St. Louis County. Residents who put out food for deer often want to get a close up view or a sense of satisfaction by feeding the animals in their yard. However, feeding deer can cause some unintended consequences and certain biological and social considerations should be taken into account when deciding whether or not to allow residents to feed deer.

#### Biological considerations:

- Winter conditions in Missouri are not severe enough to warrant supplemental feeding of deer. Feeding probably has little impact on deer condition, survival, or reproduction.
- Dietary problems can occur if improper diets are provided when winter feeding. An improper diet can create deer health problems.
- Concentrating deer and increasing nose-to-nose contact around a food source can increase the rate of the spread of disease.

#### Social considerations

- Deer are browsers and will heavily graze areas surrounding feeding stations. A resident who feeds deer in an urban setting can cause increased landscape damage for neighbors and more deer travel through the area to reach the feeding site.
- Deer using feeding sites can become acclimated to humans and more likely to interact negatively with people. A fear of humans is healthy for both deer and urban residents.
- When placing feed on the ground for deer, residents cannot be selective about what animals they are feeding. Placing grains, apples, or deer chow on the ground can also attract unwanted pests such as mice and rats.
- Residents living near busy roadways need to be especially aware of the potential to cause more deer-vehicle collisions by providing supplemental food sources. Deer may travel across and into areas in search of the supplemental food crossing the roadways more frequently and in greater numbers.

If supplemental feeding of deer is causing increased social conflicts and property damage for residents, municipalities may choose to make supplemental feeding of deer illegal. Chesterfield and Clarkson Valley have “no feeding” ordinances for white-tail deer and Canada geese. The Chesterfield “no feeding” ordinance is as follows:

1. The feeding of Canada geese and white-tailed deer within the City limits, which feeding results in the deposit of refuse, debris, fecal matter or other offensive substance or in the attraction of deer and Canada geese, creating the prejudice or annoyance of any person, unless otherwise permitted by law, is prohibited.
2. No person shall deposit, place, distribute or leave any food, of any kind or nature, with the intent to feed Canada geese and/or white-tailed deer on public or private lands, within the City of Chesterfield.

3. The provisions of this Ordinance shall not apply to any resident or agent of the City authorized to implement a wildlife management program and who possesses the necessary permits from the Missouri Department of Conservation, nor shall it apply to any public officer or public employee in the performance of his or her duties. The provisions of this Ordinance shall not apply to the feeding of domestic animals.

4. Any person who shall violate or fail to comply with the provisions of this Ordinance may, upon conviction, be punished by a fine not to exceed Five Hundred Dollars (\$500) or confinement not to exceed ninety (90) days, or both. Each act in which a person violates this Ordinance shall be considered a separate incident and may be punished as a separate occurrence.

## Resident Attitude Survey

### Summary of Findings

The West St. Louis County Deer Task Force conducted a random survey of west county residents in January- March 2004 to examine attitudes toward the deer population and management alternatives. A random sample of 5,606 residents was purchased from a sampling company based on listed addresses and population by zipcode. A full report of survey results is available upon request. The survey questions were designed to accomplish several objectives:

- Evaluate attitudes toward the deer population and the extent of damage (landscape damage, deer-vehicle collisions) caused by deer in west county,
- Identify the relative importance of various deer management objectives, and
- Determine the acceptability and perceived consequences of four deer management alternatives.

After accounting for undeliverable addresses and recipients who did not live in St. Louis County, the overall response rate for the survey was 49%, or 2,671 respondents. This response rate is moderately high for a mail survey with no previous contact with recipients.

### *Attitudes toward deer population and extent of deer damage*

Individuals were asked in the survey to indicate their perspective on deer numbers and the extent of deer damage they have experienced. Results indicate:

- A large portion (44%) of overall respondents believe the number of deer in their area is “about right;” 31% believe there are “too many” deer, and only 8% believe there are “too few.”
- While 43% of respondents report never seeing deer on their property, 27% see deer “a few times a year,” 9% see deer “almost every month,” 12% see deer “almost every week,” and 9% see deer on their property “almost every day.”
- Approximately 16% of respondents report they or someone in their immediate family has been in a car that hit a deer in west county during the past 5 years.
- 17% of respondents report they have experienced landscape damage from deer “frequently” over the past year, while 16% report they have had such damage “once or twice,” and nearly 64% have not experienced landscape damage from deer in the past year.

### *Importance of deer management objectives*

Survey respondents rated various objectives of a deer management program, indicating whether they thought a given objective was “not important,” “somewhat important,” or “very important.” According to respondents, the most important objectives of a deer management program, should be to:

- reduce the number of car collisions with deer in the area,
- reduce the risk of diseases associated with deer, such as Lyme disease, and
- maintain a healthy deer herd.

### *Acceptability and perceived consequences of deer management alternatives*

Survey respondents also indicated their preference for four deer management alternatives. These alternatives included three lethal control measures (controlled hunting, sharpshooting, and trap and euthanasia) and one non-lethal measure (damage control, defined as the use of fencing, repellants, and scare tactics to deter deer). Respondents indicated that controlled hunting was the most acceptable method of deer management, followed by sharpshooting, damage control (non-lethal), and then trap and euthanasia:

- 63% of respondents found controlled hunting acceptable, while 27% found it unacceptable.
- 54% found sharpshooting acceptable, while 32% found it unacceptable.
- 49% found damage control (by residents' use of fencing, repellents, and scare tactics to deter deer) acceptable, while 32% found it unacceptable.
- 47% found trap and euthanasia acceptable, while 39% found it unacceptable.

Analyzing data on individuals' beliefs about the potential outcomes of deer management alternatives gives insight into why individuals find certain measures acceptable and others unacceptable. Overall, respondents believed that lethal control would...

- decrease the number of deer-vehicle collisions in the area,
- decrease damage by deer to gardens, landscaping, and native plants,
- decrease the risk of disease associated with deer, such as Lyme disease, and
- decrease opportunities to see deer in west county.

Beliefs about the outcomes of non-lethal measures (damage control) also give insight into the acceptability of this alternative. Overall, respondents believed that non-lethal measures would...

- increase or lead to no change in the number of deer-vehicle collisions in the area,
- increase or lead to no change in the risk of diseases associated with deer, such as Lyme disease,
- decrease or lead to no change in the health of the deer herd,
- decrease the satisfaction of residents with deer management in west county, and
- increase or maintain opportunities to see deer in west county.

### *Conclusions*

Results indicate that, despite some variation in results by municipality, several conclusions can be drawn from the survey to help direct deer management decisions for west county:

- Most respondents support either controlled hunting or sharpshooting to control deer in their area.
- Respondents believe that lethal control measures to control deer numbers will accomplish the most important objectives of a management program, to decrease deer-vehicle collisions.
- Respondents believe non-lethal, or damage control, measures will not accomplish the most important objectives of a deer management program. Many believe employing this alternative will lead to an increase in deer-vehicle collisions and be detrimental to the health of the deer population.

## Deer Task Forces in Other Urban Areas

Task Force reviewer: Ben Knox

### Summary of Findings

The concept of a citizen task force to address deer population issues in suburban areas may be relatively new but it has been implemented by many communities throughout the country since the early 1990s. During the 1990s, New York state initiated task forces in numerous deer management units throughout the state, including several in suburban areas. The city of Irondequoit, a suburb of Rochester, and Amherst, located outside Buffalo, initiated task forces in the mid-1990s and now have recommendations for deer management which communities may implement if they experience problems related to deer. Montgomery County, Maryland formed a task force in 1993 which completed its final report in 18 months. The report included recommendations for population monitoring, damage control, and lethal management actions to reduce population size.

The Cuyahoga Valley Community Council in northeastern Ohio formed a deer management task force in 1993. For three years, the task force met to examine the deer population and associated problems in the neighborhoods surrounding Cuyahoga Valley National Park. This task force examined two kinds of carrying capacities: biodiversity and cultural. Based on a study of White-Flowered Trillium (*Trillium grandiflorum*), biodiversity carrying capacity was determined to be 20 deer/mi<sup>2</sup>. The cultural carrying capacity was estimated to be 50 deer/mi<sup>2</sup>. The task force completed a final report in 1996. Cleveland Metroparks then reduced the deer herd by sharpshooting, and communities are currently managing deer numbers. In Iowa City, IA, a deer management task force formed in 1997, produced a long-term management plan in 1998, and has continued meeting to evaluate the effectiveness of the plan and change it as necessary. All of these task force groups faced an opposition to hunting and lethal control in general. Education about the biodiversity carrying capacity and the affect of deer browse on forest health is essential to implementing any lethal control management.

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## **Deer Management in Other Urban Areas**

Task Force reviewer: Jennifer Schumacher<sup>1</sup>

### Summary of Findings

The dilemma of suburban deer management has been played out in many urban areas throughout the country. Various management approaches have been tried in different urban areas, however the general consensus is that hunting is the cheapest and most effective method of deer management. Lethal management actions are currently the only methods available to reduce the deer population. Non-lethal methods focus on damage abatement and do not function to reduce the number of deer.

The different deer management methods used in urban areas include open bowhunting, managed hunts, sharpshoot programs, trap and euthanasia, and fertility control. Bowhunting has allowed for some reduction of deer numbers in urban areas (e.g., Iowa City, IA; Superior, WI; Minneapolis, MN) and is considered the most feasible management for suburban areas. Managed hunts can be useful to reduce a population on large park areas (Minneapolis, MN; St. Louis, MO) but is limited in the large-scale affect on the population. Sharpshooting has proven to be an effective means of quickly reducing a population (Princeton, NJ; Cleveland, OH). Areas around Cleveland and Akron, OH initiated a trap and euthanasia program to control deer in 2004. Both trap and euthanasia as well as fertility control are discussed further in another section.

Missouri metropolitan areas of Kansas City and Columbia also face questions regarding deer management. In 2004, Kansas City initiated a managed hunt program where landowners of 5 or more acres could apply to host a managed archery hunt on their properties. On eight properties, hunters took 61 deer in the 2004-05 archery season. Columbia, MO is also reducing urban deer populations through hunting. In 2004-05 season, certain parks and properties owned by utilities were opened to archery hunting. In early 2005, Columbia passed an ordinance stating that newly annexed properties of 20 or more acres would be open to hunting by firearms (shotgun and muzzleloader only) and archery.

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<sup>1</sup> Jennifer Schumacher was a Task Force representative for MO Department of Natural Resources until May 2004.

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## **Managed Hunts in St. Louis County**

Task Force reviewer: Melissa Nordmann<sup>2</sup>

### Summary of Findings

Managed hunts can be a cost effective tool for controlling deer populations. They are not one-time solutions and require maintenance to be effective. Many of the safety issues that arise concerning managed hunts can be addressed by controlling factors of the hunts as well as public access to the hunting grounds during the hunt. Negative publicity can often be reduced by keeping the public well-informed of the benefits of population management and the low rate of hunting accidents.

Managed or controlled hunts may include special rules regarding the number of hunters, selection of hunters, hunting methods, timing and duration of the hunt, number and sex of deer killed, areas open to hunting, and marksmanship testing. A reduction phase, usually 2 to 3 years, involves intense hunting. The reduction phase should be followed by a maintenance phase, involving less intensive hunting for an indefinite number of years.

Managed hunts can be effective at reducing local deer densities and therefore improving the health of the herd. Removing antlerless deer is important to maximize the impact of a managed hunt. Hunting can also affect the deer behavior, reinforcing a fear of humans and altering movement patterns.

State and county owned properties in St. Louis County host several managed hunts each year. Hunts are by archery or muzzleloader and have varying harvest restrictions. For the 2004-05 season, managed hunts in St. Louis County will include archery hunts at Columbia Bottom Conservation Area, Forest 44 Conservation Area, Rockwoods Range, and St. Stanislaus Conservation Area, as well as muzzleloader hunts at Babler State Park, Columbia Bottom Conservation Area, Forest 44 Conservation Area, and Rockwoods Reservation. Because it is a more effective method, muzzleloader hunts generally have greater harvest number than archery hunts. Hunter and harvest numbers for the past three years of St. Louis County managed hunts are listed below (Tables 4-6).

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<sup>2</sup> Melissa Nordmann was a Task Force representative for Eureka until September 2004, and then replaced by Missy Rathmann.

Table 4: St. Louis County Managed Hunts 2001-2002

| <b>Hunt location</b> | <b>Method</b> | <b>Date</b>     | <b>Number hunters</b> | <b>Doe harvest</b> | <b>Total harvest</b> |
|----------------------|---------------|-----------------|-----------------------|--------------------|----------------------|
| Columbia Bottom CA   | Archery       | Oct. 1- Nov. 14 | 29                    | 0                  | 3                    |
| Columbia Bottom CA   | Archery       | Dec.1- Jan. 15  | 39                    | 2                  | 7                    |
| Forest 44 CA         | Archery       | Oct. 1-14       | 68                    | 12                 | 17                   |
| Forest 44 CA         | Archery       | Dec.1- Jan. 15  | 76                    | 3                  | 6                    |
| Rockwoods Range      | Archery       | Nov. 1-30       | 69                    | 12                 | 12                   |
| Rockwoods Range      | Archery       | Dec. 1-30       | 58                    | 2                  | 4                    |
| Babler State Park    | Muzzleloader  | Dec. 8-9        | 87                    | 13                 | 21                   |
| Babler State Park    | Muzzleloader  | Jan. 5-6        | 89                    | 15                 | 25                   |
| Forest 44 CA         | Muzzleloader  | Nov. 12-13      | 29                    | 11                 | 15                   |
| Forest 44 CA         | Muzzleloader  | Nov. 19-20      | 25                    | 3                  | 9                    |
| <b>TOTAL</b>         |               |                 | <b>569</b>            | <b>73</b>          | <b>119</b>           |

Table 5: St. Louis County Managed Hunts 2002-2003

| <b>Hunt location</b>  | <b>Methods</b> | <b>Date</b> | <b>Number hunters</b> | <b>Doe harvest</b> | <b>Total harvest</b> |
|-----------------------|----------------|-------------|-----------------------|--------------------|----------------------|
| Forest 44 CA          | Archery        | Oct. 1-14   | 63                    | 6                  | 10                   |
| Forest 44 CA          | Archery        | Dec. 1-31   | 71                    | 5                  | 6                    |
| Rockwoods Range       | Archery        | Nov. 1-30   | 63                    | 5                  | 12                   |
| Rockwoods Range       | Archery        | Dec. 1-31   | 59                    | 0                  | 0                    |
| Forest 44 CA          | Muzzleloader   | Nov. 18-19  | 29                    | 7                  | 13                   |
| Forest 44 CA          | Muzzleloader   | Nov. 25-26  | 29                    | 4                  | 6                    |
| Rockwoods Reservation | Muzzleloader   | Nov. 18-19  | 24                    | 25                 | 33                   |
| <b>TOTAL</b>          |                |             | <b>338</b>            | <b>52</b>          | <b>80</b>            |

Table 6: St. Louis County Managed Hunts 2003-2004

| <b>Hunt location</b>  | <b>Methods</b> | <b>Date</b>         | <b>Number hunters</b> | <b>Doe harvest</b> | <b>Total harvest</b> |
|-----------------------|----------------|---------------------|-----------------------|--------------------|----------------------|
| Columbia Bottom CA    | Archery        | Oct. 15-<br>Nov. 15 | 38                    | 2                  | 13                   |
| Columbia Bottom CA    | Archery        | Nov. 18-<br>Dec. 14 | 32                    | 2                  | 5                    |
| Columbia Bottom CA    | Archery        | Dec. 18-<br>Jan. 15 | 45                    | 3                  | 5                    |
| Forest 44 CA          | Archery        | Oct. 1-14           | 71                    | 2                  | 8                    |
| Forest 44 CA          | Archery        | Dec. 1-31           | 62                    | 0                  | 2                    |
| Rockwoods Range       | Archery        | Nov. 1-30           | 68                    | 8                  | 14                   |
| Rockwoods Range       | Archery        | Dec. 1-31           | 51                    | 1                  | 3                    |
| St. Stanislaus CA     | Archery        | Oct. 1-<br>Nov. 18  | 23                    | 3                  | 4                    |
| St. Stanislaus CA     | Archery        | Nov. 22-<br>Dec. 31 | 19                    | 0                  | 0                    |
| Babler State Park     | Muzzleloader   | Dec. 13-14          | 94                    | 57                 | 77                   |
| Forest 44 CA          | Muzzleloader   | Nov. 17-18          | 20                    | 2                  | 7                    |
| Forest 44 CA          | Muzzleloader   | Nov. 24-25          | 31                    | 7                  | 9                    |
| Rockwoods Reservation | Muzzleloader   | Nov. 17-18          | 28                    | 16                 | 24                   |
| <b>TOTAL</b>          |                |                     | <b>582</b>            | <b>103</b>         | <b>171</b>           |

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## **Bowhunting as Suburban Deer Management**

Task Force reviewer: Susan Shea

### Summary of Findings

Bowhunting can be an effective and economical way to manage suburban deer, however it presents several complicating factors as well. Residents considering whether or not to allow bowhunting in neighborhoods or on their property voice three main concerns: safety, insurance, and wounding of deer.

Bowhunting in a suburban area should be done in tree stands, so all shots are taken toward the ground. Shots should be taken at 20 yards or less to minimize chances of wounding and eliminate the possibility of mistaking the target. Tree stands and close-range shots make bowhunting the safest form of hunting in a suburban area.

Insurance, covering the landowner in case of injury to hunter or some other accident, is a major concern of landowners when deciding to allow bowhunting on their property. Missouri has a "Recreational User Statute" that exempts a landowner from liability when allowing for recreational uses (including hunting) on his/her land, as long as the landowner does not charge a fee. However, this statute does not necessarily cover landowners whose properties are 1 acre or smaller, or whose properties lie within city or municipal boundaries, or whose properties are in residential areas. Landowners who are concerned about insurance should consult their insurance companies with questions regarding recreational uses of land.

Wounding of deer is also a major concern of landowners considering bowhunting on their property. Deer may not drop right away when hit with an arrow. Deer could run several hundred yards before dropping, and may cross into another person's property. Tracking and recovering a deer on another person's property requires permission of that landowner. Ideally, a bowhunter would have permission of surrounding landowners when hunting a property, but this is probably not always possible. Wounding but not killing and recovering a deer is not the norm in bowhunting. Studies show that 5-17% of deer shot by bowhunters are not recovered. Finding skilled and responsible bowhunters cannot be overemphasized.

In November 2004, Clarkson Valley began allowing bowhunting to reduce the deer population in the city. Landowners and hunters had to meet requirements set out by the city (see Municipal Ordinance section of this report for specific requirements) in order to hunt a property. Twenty-five properties participated in the hunt, and hunters took 81 deer during the remainder of archery season. Over 60 of these deer were does. Clarkson Valley City Hall and MDC offices received no complaints from residents once the hunting started.

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## **Firearms Hunting as Deer Management**

Task Force reviewer: Erin Shank

### Summary of Findings

Firearms hunting is the most widely used method of deer hunting. In suburban areas, however, it has drawbacks in addition to benefits as a deer management alternative.

The drawbacks of firearms hunting to control suburban deer numbers arise from safety concerns. Certain types of firearms may not be appropriate for most suburban environments. Another drawback to firearms hunting in suburban areas is noise. In St. Louis County, hunting with a firearm is allowed in unincorporated areas of larger than 1 acre, and in limited municipalities. In Wildwood, for example, any firearms hunting (including rifles) is allowed west of Hwy 109 on lots of at least 3 acres, and with shotgun or muzzleloader only east of 109.

Restricting the use of centerfire rifles is logical for many areas of St. Louis County. Allowing shotguns with slugs and muzzleloaders for deer hunting, however, could greatly enhance deer population control in suburban areas. Slugs are generally safer than centerfire rifles because they lack the power of a rifle, so the shot will not carry as far. Muzzleloaders are also less powerful than centerfire rifles, making them more appropriate for suburban use.

Crossbows are also considered firearms in Missouri. While crossbows do not use an explosive for firing, they have a mechanical device that pulls and holds the weight of the draw, allowing for an advantage to hunters over longbows and compound bows. Certain types of crossbows can be fitted with scopes, which can also give an advantage over more primitive type archery equipment. Crossbows are only legal for hunting deer during the firearms seasons in Missouri. Municipalities with “no firearms” ordinances also prohibit the use of crossbows. It is possible for cities to allow for crossbows but not other types of firearms through careful writing of the restrictive firearms ordinance.

The benefit of firearms hunting over archery is efficiency. Firearms hunters are able to harvest more deer than bowhunters. Shots from firearms will usually kill a deer more quickly and can be taken from farther away than shots with archery equipment. Firearms hunting can more effectively reduce the number of deer in an area than archery, and choosing the appropriate type of firearms can help to address safety concerns. Noise remains a drawback to firearms hunting in suburban areas that does not exist with archery hunting. Finally, firearms may be appropriate for a sharpshoot program, which is addressed in another section of this summary.



## **Trap and Euthanasia as Suburban Deer Management**

Task Force reviewer: Joe Williamson

### Summary of Findings

In areas where deer management is restricted by “no projectile” ordinances, residents who wish to lethally control deer are limited to trap and euthanasia as deer management. Trapping and euthanizing deer requires a special permit from Missouri Department of Conservation. To receive the permit, the landowner must show considerable damage caused by deer and prove they have tried other ways to deter damage (scare tactics, repellants, fencing).

Although the permit from MDC costs nothing, the landowner is responsible for all other costs, and these can be substantial. Deer are trapped in a collapsible clover trap (a netted, box-shaped trap), which costs approximately \$700. Trapped deer are humanely euthanized by a captive bolt device, the same method used in slaughterhouses. The captive bolt device costs approximately \$400. All euthanized deer must be donated through a Share the Harvest food processor, and the cost of processing one deer is approximately \$50-100. To successfully set up and run a trap and euthanasia program on one’s property requires a considerable amount of time, dedication, and money.

Other types of traps exist that may be used in a larger-scale trap and euthanasia program for deer. Rocket nets or drop nets may be used to trap larger numbers of deer. Both methods involve baiting deer into an area and nearby staff waiting in blinds to trigger the net traps. Rocket nets use charges to fire nets over the deer, trapping them underneath. Special permission would be needed from most municipalities to use rocket charges, as most city codes have ordinances against explosives. Drop nets are hung above the baited area and are literally dropped onto the deer below. Using either of these methods would involve extensive staff time, and would require enough staff to handle the number of deer could be potentially caught in the nets.

In areas where deer densities are high (60-90 deer/mi<sup>2</sup>), it is apparent that euthanizing 10-15 deer per year on one’s property is not going to lower the overall deer density. However, after years of operating a trap and euthanasia program on their property, landowners may see a local population decrease as well as behavioral changes in local deer, or deer using neighboring properties more and avoiding the area near the trap. These behavioral changes may help to reduce damage on one property.

## **Sharpshooting as Suburban Deer Management**

Task Force reviewer: Harry Mauchenheimer, Joe Wingbermuehle<sup>3</sup>

### Summary of Findings

Among the methods of reducing deer population numbers is sharpshooting. Sharpshooters can provide a key role in urban deer management. If the goal of a deer management plan is to decrease deer numbers quickly, sharpshooting is the best method to use. Sharpshooting requires a special permit from Missouri Department of Conservation and involves the use of firearms to shoot deer over bait piles.

However, sharpshooting can be cost-prohibitive. The cost of programs in other urban areas using professional sharpshooters has varied, ranging from \$91 to \$260 per deer removed. Additionally, processing of deer may add another \$50-100 per animal. Unlike a managed hunt system, which relies heavily on logistical support from MDC, sharpshooters require a state permit and the cooperation of the surrounding community.

Problems associated with sharpshooting include a learning curve exhibited by deer near or around bait piles, making them more difficult to harvest as the program progresses. Excessive noise from gunfire, the possibility of an errant shot, and negative public perception may add to opposition as well. Thoughtful placement of bait piles, identification of safe shooting zones, and communication with local government and police will alleviate most of these concerns.

Sharpshooting as a population control method has been used with success in a wide variety of instances. In urban environments, such as Cleveland and Akron, OH, Minneapolis, MN, Iowa City, IA and Princeton, NJ, sharpshooters have been utilized for years. Restrictive firearms laws may need to be relaxed or revised in order to permit sharpshooting in certain municipalities. Locally, sharpshooting has been used in rural environments with great success.

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<sup>3</sup> Joe Wingbermuehle is the Beaumont Ranger and provided information for this summary.

## **Town & Country Trap and Relocation Project**

Task Force reviewer: Mike White & Skip Mange

### Summary of Findings

Starting in the winter of 1999, the City of Town & County, in cooperation with the Missouri Department of Conservation (MDC), started the first deer relocation project from an urban area in the State of Missouri. The project continued for three years.

Between January 11, 1999, and February 16, 1999, 80 deer (51 does and 29 bucks) were trapped, radio collared, and relocated onto state property in rural Missouri at a cost of \$356 per deer (\$28,480 total). MDC chose the release site and monitored deer survival for 10 months until December, 1999. It was found that 16 (20%) of the relocated deer died in the first 30 days from capture-stress myopathy. It is estimated that 28 fawns were born to the 64 deer that survived the initial 30 day period, which brought the total reduction of deer in Town & Country to 108 deer. During the ten month study period, 18 deer were killed legally by hunters, 7 by poaching, 6 by unknown causes, 5 by road kill, and 3 by wounding. 25 (31%) deer survived the entire study period.

During January and February of 2000, 57 deer (44 does and 13 bucks) were removed at a cost of \$369 per deer (\$21,033 total). Although not monitored, deer survival rates were probably similar to the previous year, as only the absence of collars on these deer was different. It was estimated that with fawning the actual reduction in deer in the city was a total of 83 deer.

During January and February of 2001, 96 deer (50 does and 46 bucks) were relocated. 65 deer were captured with large nets, 7 were captured in small drop nets, and 24 were caught in box traps. The cost per deer was similar to previous years. It is estimated that with fawning the actual reduction in deer in the city was a total of 126 deer.

Over the course of the three year project, a total of 233 deer (145 does and 88 bucks) were trapped in Town and Country and relocated. With fawning, the total number of deer effectively removed from the city was approximately 317. The project was a success in the minds of some Town & Country residents in that effectively 317 fewer deer remained in the City. However, in the minds of others the program was very expensive to the City of Town & Country and not completely non-lethal.

In December of 2001, MDC eliminated relocation as an option from the state's Urban Deer Guidelines. The decision was based on the new concern about chronic wasting disease. Currently, trap and relocation is not an option for deer management in Missouri.

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## Fertility Control as Suburban Deer Management

Task Force reviewer: Erin Shank

### Summary of Findings

#### *Fertility Control Methods*

Fertility control is not a new idea in wildlife management. In general, fertility control is often seen as more humane than lethal deer control because it acts by reducing birth rates rather than increasing mortality. From the perspective of population dynamics, some methods of fertility control in wildlife may be suitable for management of short-lived, rapidly reproducing wildlife populations such as rodents & small birds. Fertility control refers to three basic methods of inhibiting reproduction: contraception (prevention of fertilization or pregnancy), sterilization (to make an individual animal physically infertile), and contragestation (to prevent gestation, or the development of an embryo, usually through spontaneous abortion).

The following table provides a summary of fertility control methods that have been researched in white-tailed deer. None of the methods described are approved by the FDA for use in free ranging white-tail populations.

| Method                            | Type                  | Description  | Pros  | Cons   |
|-----------------------------------|-----------------------|--|---|--|
| <b>Surgical Sterilization</b>     | Ovariectomy           | Surgical removal of the ovaries.   | Permanent   | Expensive. High stress to animal. Field surgeries pose high risk of infection. Removal of ovaries would alter doe behavior by removing hormone source.         |
|                                   | Oviduct ligation      | Surgical ligation of oviducts  | Permanent.  | Expensive. High stress to animal. Field surgeries pose high risk of infection. Does would repeatedly cycle for up to 7 estrous cycles, altering buck behavior. |
| <b>Synthetic Steroid Hormones</b> | Oral delivery         | Progesterone given daily inhibits ovulation in does.                             |   | Must be given daily, which is difficult to determine. Non-target wildlife is a concern.  |
|                                   | Subcutaneous delivery | Progesterone and estrogen implanted in does inhibits ovulation.                  | Can provide 1-2 years effective treatment.  | Expensive. Does must be captured. Is not effective on pregnant does. Individuals must be re-treated after 2 years.   |
|                                   |                       | Levonorgestrel progestin implanted in does can prevent conception                |   | Not effective.   |
|                                   |                       | Norgestomet progestin delivered via "bio bullets" can prevent conception         | Successful in preventing pregnancies for 1 year. Can be delivered remotely                                  | Annual treatment required. Municipal firearms and projectile ordinance would prohibit delivery via "bio bullets"   |
| <b>Contragestation</b>            | Prostaglandin         | Prostaglandins delivered remotely via "bio bullets" terminate pregnancy in does. | Deer can be easily drawn to bait sites in winter for treatment. Can be treated remotely using "bio bullets" | 50% effective at terminating pregnancies. Pregnant does must be treated annually in winter. Abortion of fawn-like fetuses may be unacceptable to community.    |
| <b>Immunocontraception</b>        | PZP vaccine           | See below for more information   |   |  |

### *Immunocontraception using SpayVac*

Decades of experiments and research into developing new drugs to control reproduction of white-tailed deer has brought one potentially useful technique into wildlife management: immunocontraception using a porcine zona pellucida vaccine. The vaccine is still in experimental stages, and not available for free-ranging populations. Additionally, there are major technical, biological, economic, and legal considerations in using immunocontraception for free-ranging whitetails.

A non-cellular membrane, called the zona pellucida surrounds all mammalian eggs. The zona pellucida consists of several glycoproteins (proteins with a carbohydrate attached). One of these proteins, Zona Pellucida 3 (ZP3), is thought to be the sperm receptor, allowing for a sperm to fertilize an egg. The PZP vaccine is derived from pig eggs, and utilizes the porcine zona pellucida (PZP) to inoculate other mammal species. Like other vaccines, when PZP is injected into the muscle of the target female animal, it stimulates her immune system to produce antibodies against the vaccine. These antibodies attach to ZP3 (the sperm receptors) on the zona pellucida of that female's own eggs. This antibody attachment thereby blocks fertilization.

In delivering the PZP vaccine, the proteins are mixed with an adjuvant to increase their immunogenicity, or immune response. The only PZP vaccine with successful results uses Freund's Complete Adjuvant (FCA), which is a mixture of mineral oil (an indigestible compound that further promotes the antigen response by slowing the degradation of the vaccine), water, and heat-killed bacterial proteins (including *Mycobacterium tuberculosis*). Use of FCA in the vaccine can result in a false positive test for tuberculosis, is potentially carcinogenic to humans if consumed, and may cause granulomatous lesions at the injection site. It is therefore not approved by the FDA for routine use in management of deer populations.

Fertility can resume after exposure to the antigen ceases and the antibody titers decrease, or when the antibody concentration falls below some effective/contraceptive level. PZP vaccines require boosters, severely complicating the vaccine's feasibility for free-ranging populations. A recent study (Fraker et al, 2002) of the PZP vaccine SpayVac in fallow deer on an island population encapsulated the PZP protein in liposomes formed from soybean, specifically L- $\alpha$ -lecithin and cholesterol. It seems that this vaccine may be effective in maintaining contraception for 3 years without boosters.

Even with a vaccine that does not require boosters, using the PZP vaccine in free-ranging deer populations has a wide range of effects that are not completely understood. Female deer treated with the PZP vaccine display recurrent estrous cycles. McShea et al (1997) noted that females continued to display estrus as late as March; Fraker et al (2002) noted this as late as April. The breeding season for white-tails, or the rut, peaks in mid-November in Missouri. Prolonging the breeding season in this manner disrupts normal intersexual behavior. In short, it causes bucks to continue mating attempts with females that are repeating estrous cycles. At this point, it's unknown to what extent a prolonged breeding season would affect the deer herd, both socially (animal behavior) and physically (could possibly tax the health of bucks, as the rut requires large amounts of energy). Also, extending the rut has the potential to lead to increased deer-vehicle collisions, as bucks travel more and are more aggressive during this time.

The recent study published on a longer-lasting, single dose PZP vaccine, SpayVac, saw successful results for 3 years following treatment of fallow deer. The study took place on the 1.4mi<sup>2</sup> James Island,

off southern British Columbia. The island had a population of 1400, which gives a density of 1010 deer/mi<sup>2</sup>. The most significant difference in this particular PZP vaccine and ones used in the past is that the PZP was encapsulated within liposomes and suspended in FCA and saline. The encapsulation of the proteins delays their breakdown and enhances the delivery of the vaccine.

Over the course of 9 months, researchers captured and inoculated 41 fallow does prior to the rut. Following the rut for 3 years, they recaptured some does to examine for pregnancy and shot others to examine for pregnancy and assess overall condition. They also examined 152 culled, untreated does to compare overall pregnancy rates and physical condition. Of the 41 treated does, 19 were examined after one year, 10 after 2 years, and 5 after 3 years. None was pregnant. Researchers felt it was safe to assume that the deer examined 2 or 3 years post-treatment and found not pregnant were not pregnant during the preceding years as well. Eight fawns that were treated were found to have nulliparous uteri 2 to 3 years post treatment, indicating that none had been pregnant. Through observation, researchers also noted that does go through repeated estrous cycles.

The mean anti-PZP titer of sera taken from does after 3 years was 78%(+/- 25) of the reference serum. Prior research has shown that titer that remain at or above 50% of the reference serum throughout the breeding season indicate successful contraception.

There is also the issue of biological efficiency: even if successful immunocontraception were feasible for free-ranging deer, would this effectively reduce the population? Reproductive control in general is much less efficient than lethal control in managing populations for larger species that do not reproduce until 2+ years of age and produce fewer young per year than most rodents or small birds. Population simulations demonstrate that, in these cases, lethal control is much more efficient than reproductive control to reduce population levels. The amount of time a community is willing to maintain contraceptive efforts is also a major factor to consider.

Merrill, Cooch, & Curtis (2003) modeled the efficiency of contraception in white-tailed deer. Their model is useful for very conservative estimates of the necessary annual rates of contracepted females and the amount of time to reach a goal reduced population. The model made the following assumptions:

1. Sterilization was permanent for treated females.
2. Density independence (deer density does not feedback to survival or fertility. In other words, resources are not limiting the deer density. Given the health and growth rate of suburban deer herds, this assumption is valid.)
3. Closed population. No immigration or emigration. (Females show high site fidelity.)
4. Population not male-limited (true)
5. Age-class homogeneity (every individual in a given age class [fawn, yearling, & adult for both male and female] has an equal chance of dying, giving birth, or being captured for sterilization.)
6. Mortality and sterilization are independent (if a fertile female dies after sterilization, she would have died regardless of the procedure.)
7. No compensatory behavior (as fertility is reduced, recruitment and survival stays the same. If there is compensatory behavior, the efficiency of sterilization decreases.)

Numerical analysis showed the effects of permanent sterilization on population abundance under numerous conditions. The time needed to reach a population reduction goal was also calculated under varying sterilization rates.

Results of the model showed that survival has twice the impact on projected population growth as the birth rate. Increasing survival rates in the model dramatically increased management effort (the sterilization rate). Without any lethal control/hunting pressure, initially reducing population size requires greater sterilization rates and time to achieve the goal reduction. In other words, survival made a much larger proportional contribution to projected population growth than did fertility; thus, management actions affecting survival rates have a relatively large impact on population growth while interventions affecting birth rates have a more moderate influence.

The time to reach a specified reduction level varied nonlinearly with sterilization rates. An increase in the fraction of sterilized females produced a diminishing marginal gain in time to a desired reduction. For instance, with a 3-year time frame, an increase from zero reduction to a 30% population reduction required sterilization of 0.3 to 0.45. However, an increase from 30% to 60% reduction required the proportion sterilized to be increased from 0.45 to 0.75.

Assuming medium birth and survival rates in all age classes and a six-year time frame, for a 30-45% reduction (or to reduce a density from 60 deer/mi<sup>2</sup> to 42-33 deer/mi<sup>2</sup>), one would need an annual sterilization rate of 35-40% of fertile does in the population. Additionally, as time passes and more females are sterilized, the probability of recapture increases, and the net efficiency of capture and sterilization decreases. Finally, once a goal reduction has been met, it must be maintained through a base level of continued treatment.

The logistics are further complicated by the fact that even the most advanced available technology, SpayVac, is not permanent, and would need periodic boosters, potentially every 3 years, to remain effective.

Given the time and effort necessary to successfully reduce a deer population through contraception, a community must be prepared to commit approximately 10 years to efforts. This would probably require hiring full time (maybe full time, seasonal) staff for capture, vaccination, and tagging.

Because SpayVac is not in commercial production, a price for the vaccine is not set. In the future, PZP may be produced on a large scale, but the recombinant DNA technology is not yet developed. Currently the PZP proteins are removed from pig ovaries that are collected for this purpose at slaughterhouses.

Based on areas that have experimented with the treatment, it is expensive. In a field studies of the vaccine in New York state, and suburban Ohio, the average cost was \$1,100 and 11.2 hours labor per treated doe. Communities considering the use of immunocontraception for deer management must provide their own funding.

The largest portion of the cost is in the capture efforts, which can take an extraordinary amount of time and effort. These costs vary with the difficulty of treating deer. As the proportion of treated does in a herd increases, the time needed to find untreated does in the herd also increases. Thus, labor costs will



be higher as more does in the herd are treated. Labor costs are higher, still, for SpayVac and other FCA vaccines because the deer must be live trapped and marked, as well as treated. A community that decides to pursue immunocontraception to control deer numbers must realize it requires a long-term commitment of funding and personnel and careful planning to ensure the fiscal and human resources are available to support the work over the long term. It is critical to be open and honest about these factors when communicating with the public about immunocontraception as management.

Because the FDA will not approve FCA for wide-scale application in free-ranging wildlife, administration requires a site-specific Investigational New Animal Drug authorization. Again, FCA may cause false-positive tests for tuberculosis, is potentially carcinogenic to humans if consumed, and may cause injection-site abscesses. Based on the latter two concerns, the FDA has required that food animals, such as deer, that are treated with FCA be marked with a tag prohibiting human consumption (both ears tagged with markers reading “Experimental Animal: Not Safe For Human Consumption”). Usually, to obtain this authorization, a community needs to justify efforts as an experiment and prove the research value of the immunocontraceptive treatments. Finally, to experiment on deer using the vaccine, special permission is needed from Missouri Department of Conservation.

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## Frequently Asked Questions

### *How were Task Force representatives appointed?*

Each municipal representative to the Task Force was directly or indirectly appointed by the mayor of that municipality. When forming the Task Force, mayors could choose anyone from that city to attend. The Task Force has citizens, aldermen, parks directors, and city administrator staff as representatives.

### *Why do we need a Task Force... can't Missouri Department of Conservation (MDC) take care of problems caused by deer?*

MDC is the state agency responsible for the management of Missouri's fish, forest, and wildlife. While MDC sets deer management regulations, county and municipal governments have the authority to restrict the use of firearms or projectiles (archery equipment). MDC's recommendations for deer management do not supercede local restrictive ordinances. In order for deer management to occur in many areas of St. Louis County, local ordinances will need to be revised to allow for hunting and/or sharpshooting of deer. A cooperative effort between municipalities and MDC is necessary to address concerns related to urban deer management.

The role of MDC in urban deer management is to serve as a technical advisor to communities where urban deer populations require management. MDC guides deer population assessment and goal setting, informs individuals and communities on methods of minimizing conflict between deer and humans, advises regarding statutory language that is compatible with deer management goals, cultivates public awareness of deer population impacts, and authorizes management efforts.

### *What will happen with the Task Force recommendations once they're made?*

The Task Force recommendations will be published in a final report and placed in the hands of municipal governments. Because the Task Force itself does not have authority to revise ordinances, it is ultimately up to municipalities to implement the Task Force recommendations.

### *How were residents chosen to participate in the mail survey about deer management?*

Residents who participated in the mail survey about deer management were chosen randomly by listed phone numbers. The Task Force purchased a random sample of 5,606 residents in West County from Survey Sampling, Inc. The number of residents varied by zipcode, depending on the overall population (obtained from the 2000 U.S. Census data). Therefore, every resident of West County with a listed phone number had an equal chance of being selected for the sample.

### *What are the legal options for deer control in Missouri?*

MDC offers several options for deer control in Missouri. These options are generally divided into two categories: non-lethal and lethal. Non-lethal methods aim to reduce damage caused by deer by the use of fencing, repellants, scare tactics, and habitat modification. Lethal methods aim to reduce or control the deer population. Legal methods of lethal deer control are: hunting, sharpshooting, and trap and euthanasia. Currently, reproductive technologies are not feasible for free-ranging deer populations. Trap and relocation is no longer a legal option for deer control in Missouri due to the potential to spread disease.

*Can't we just let nature take it's course and eventually the deer population will decrease?*

Taking no action to control the deer population is an option for communities. Based on the concept of biological carrying capacity, eventually a deer population will reach it's maximum size, when the environment can no longer support it. In a nutshell, the deer will eat themselves out of house and home. However, in a suburban area with watered and fertilized landscaping and residents who occasionally feed deer, this carrying capacity may not be reached for quite some time. The more relevant and pressing questions are: what size deer population will a community tolerate and what size deer population is responsible? Deer are browsing animals and high deer densities can do considerable damage to native plants, woodlands, and landscaping. The threat of disease also increases as deer come in frequent contact with each other and individual health suffers from limited resources. Although taking no action is an option for communities, it is questionable whether this is a responsible decision regarding deer management and overall environmental health.

*Does the Task Force want to have no deer in west St. Louis County?*

The Task Force in no way aims to eliminate deer from west St. Louis County. Besides the fact that eliminating deer from the area would be near impossible, it is also not desirable. Deer are a valuable natural resource, appreciated for their beauty, important for their function in the ecosystem, and respected as a part of Missouri's heritage. The goal of deer management is to maintain a reasonable number of deer in the area, ideally between 15-20 deer/mi<sup>2</sup>. In some areas of west St. Louis County, deer populations are currently as large as 60-85 deer/mi<sup>2</sup>.

*What have other urban areas done to control deer?*

The problem of urban deer management is not unique to St. Louis. Many other urban areas throughout the United States have faced similar problems. Other urban areas, such as Cleveland, OH; Iowa City, IA; and Irondequoit, NY have also formed citizen task forces to address the complicated issues involved. Other urban areas have used hunting with firearms and archery, sharpshooting, trap and relocation, trap and euthanasia, damage control, and managed hunts to control the deer population. Best results in deer population reduction are generally seen when a variety of control tactics are used.

*I've heard that hunting actually increases the deer population. Is this true?*

This statement is not true for St. Louis County deer. It is a good example of data being oversimplified and taken out of context. When a deer population has used all available resources in a landscape, it can support no more deer in good physical condition, or the deer have reached biological carrying capacity. Fawns born under these circumstances will have a poor chance of survival because of scarce resources. In this situation, hunting would reduce the number of deer, allowing the fawns a better chance of survival; it would increase the reproductive success of the population. However, this is not the situation in St. Louis County. According to recent research, the deer in St. Louis County are in good physical condition, indicating that they have not yet reached the maximum number the landscape can support before starvation or disease sets in. Hunting, and especially hunting of does, would reduce the population of deer without increasing the reproductive success of the population.

## APPENDIX 1:

### **Missouri Department of Conservation Guidelines for White-tailed Deer Management on Urban Lands in Missouri (Revised July 2001)**

#### *The Urban Deer Management Program of the Department of Conservation:*

Encourages urban development that conserves green space and native wildlife populations using science-based management to maintain wildlife populations at levels compatible with urban and suburban lifestyles.

#### *The role of the Department of Conservation in this Program is to:*

Serve as a technical advisor to communities where urban deer populations require management. MDC guides deer population assessment and goal setting, informs individuals and communities on methods of minimizing conflict between deer and humans, advises regarding statutory language that is compatible with deer management goals, cultivates public awareness of deer population impacts, and authorizes management efforts.

#### *The Goal of the MDC Urban Deer Management Program is to:*

Provide individuals and communities with information about deer management and control and assist as requested in the management of white-tailed deer by providing management expertise, deer management plans, and population control options that provide residents and communities effective ways to manage deer in accordance with MDC Urban Deer Management Guidelines and all state, county, and municipal laws.

#### **MDC Responsibilities and Strategies:**

As trustee for the fish, forest, and wildlife resources of Missouri, the Department of Conservation (MDC) is mandated to provide management programs governed by sound ecological principles for the conservation of these resources. The Department strives to maintain statewide deer populations at densities compatible with habitat types and that provide for public utilization while minimizing deer-human conflicts.

Although MDC is responsible for statewide deer management, the Department does not implement deer management programs on non-MDC lands without consent and cooperation of landowners. MDC serves in an extension role to evaluate deer populations, advise on appropriate management strategies, and establish geographic and regulatory boundaries through which feasible management alternatives can be developed. Successful implementation of management alternatives can only be accomplished with landowner consent and approval. Therefore, extensive effort to inform and educate landowners is essential.

On MDC managed properties, hunting is utilized to control deer populations whenever practical. On most public areas in urban settings, deer hunting access must be controlled due to high public use and close proximity to human development. Hunting in or near urban areas may initiate controversy among hunting and anti-hunting groups, especially where hunting has not occurred in the recent past. Such responses should be anticipated so that appropriate Department educational and public relations efforts can be incorporated in hunt management strategies.

Urban deer management falls into two broad categories: management on public lands and management on private lands. Expansion of deer hunting opportunities and programs on public lands in urban areas will continue. MDC will continue to implement managed deer hunts on Department lands in urban areas where necessary to control expanding deer populations. Such programs should be maintained at levels consistent with appropriate and acceptable deer densities. MDC will work cooperatively with public landowners, such as local governments and other state and federal agencies, to increase the opportunities for managed hunts in urban areas where practical. Specific urban areas will continue to be designated as urban deer management zones, with special regulations developed as necessary for hunting programs designed to control expanding deer populations. Wherever feasible, MDC will work closely with private landowners to encourage deer hunting opportunities on their lands.

**Department Guidelines for Urban Deer Management Programs:**

Regulations enacted each year by MDC establish deer harvest levels within the framework of the statewide deer management program. MDC, however, lacks direct control over access to private and much public land, including urban sites. The following guidelines apply to deer population control and human-deer conflict on non-MDC public and private land in predominantly urban areas of Missouri.

- 1) Successful deer management on non-MDC lands within the MDC regulations framework requires cooperation of private citizen and local government landowners.
  - a) MDC personnel will provide expertise in evaluating the problem and advise on appropriate management strategies.
  - b) Implementation of a deer management plan is the landowners responsibility, with MDC acting in an advisory and support capacity.
- 2) Deer herd control concerns and human-deer conflicts in the 5 major metropolitan areas of the state (Kansas City, St. Louis, Springfield - Joplin, Columbia - Jefferson City, and St. Joseph) will be directed to the Urban Wildlife Biologist. Deer control problems in smaller urban areas of the state should be directed to the local Conservation Agent and/or Wildlife Damage Biologist.
  - a) In the major metropolitan areas, the Urban Wildlife Biologist, with Wildlife Research support and assistance, will have primary responsibility for resolution and coordination of human-deer conflicts and urban deer control programs.
    - i) The Wildlife Research Biologist will provide expertise in deer population assessment, management planning, and evaluation of herd reduction and removal methods.
    - ii) The Urban Wildlife Biologist will direct conflict resolution, team building, removal proposals, permit application, and associated administrative requisites.
  - b) In complex urban situations, statewide, where potential controversy exists, the Urban Wildlife Biologist, Wildlife Damage Biologist and/or Conservation Agent may assist with the organization of a local committee that includes local government officials, involved landowners, concerned citizens, and Department of Conservation representatives to assess the problem and evaluate and recommend management options.
  - c) In urban areas without an Urban Wildlife Biologist, the Conservation Agent and/or Wildlife Damage Biologist will assess the problem and make specific control recommendations or consult with the Wildlife Research Biologist on potential management programs.
- 3) Urban deer control measures include the following, some of which require a legal permit(s):
  - a) Non-lethal:
    - i) No action
    - ii) Habitat modification

- iii) Repellants (chemical, noise, etc.)
  - iv) Fencing
  - v) Reproductive control (permit required)
- b) Lethal:
  - i) Statewide regulated or managed hunting (permit required)
  - ii) Sharpshooting (permit required)
  - iii) Trapping and euthanasia (permit required)
- 4) A standing subcommittee of the Regulations Committee known as the Urban Deer Management Working Group and composed of the Urban Wildlife Biologist, Wildlife Research Biologist, Wildlife Programs Supervisor, Protection Division representative, and Policy Coordination facilitator will review all situations and requests for deer control, including those made outside of these guidelines and procedures. The working group will recommend appropriate control action and removal protocol, and be responsible for updates and revisions to the Guidelines as necessary and/or mandated.
- 5) An MDC and/or landowner(s) evaluation of initial control effectiveness may be required. Control activities may be modified to maintain long term effectiveness.
- 6) In those situations where managed deer hunting is the most viable control option, a hunt specific regulatory mechanism, such as longer seasons, additional seasons, higher per hunter harvest, sex-specific harvest, and others, will be developed as needed to control deer population densities.
- 7) Wildlife Division, in conjunction with all Department divisions and local communities, will compile and maintain an information system on urban deer populations that includes number and severity of deer-human conflicts, number of deer-vehicle accidents, public complaints of deer damage, and other related information as appropriate. This information will aid in the identification of, planning for, and response to urban deer conflicts, and will be directed by the Urban Wildlife Biologist or “urban” Wildlife Management Biologist.
- 8) Wildlife Research Section will assess deer population status and make recommendations for optimum deer densities for a specific area based on deer habitat availability, management goals, and landowner objectives.
  - a) Wildlife Research Section will assess efficacy of control methods and their potential for application in Missouri, and make appropriate recommendations.

**Operational Procedures for Site-Specific Urban Deer Management Programs on Lands Not Managed by MDC:**

The following management protocol is recommended for administration and implementation of urban deer management plans and programs. However, landowners choosing not to follow established MDC deer management protocol can make management decisions within the MDC legal framework.

- 1) In order to implement deer management programs within urban areas, a cooperative relationship with landowners must be developed. MDC will provide technical advice and information on advantages and disadvantages of various management strategies and afford opportunity for management through its regulatory authority.
- 2) The Urban Wildlife Biologist will be the initial contact for urban deer control concerns in the major metropolitan areas of the state. In other areas of the state, the local Conservation Agent and/or Wildlife Biologist will be notified.
- 3) In case of single ownership and small deer numbers, non-lethal or lethal methods can be implemented in accordance with the Wildlife Conflicts Handbook.

- 4) Where multiple ownerships occur or the property is controlled by city, county, state, or federal government, formation of a community task force consisting of representative MDC staff and community leadership is recommended to address the issues, develop alternatives, and recommend appropriate action.
- 5) In situations involving multiple landowners, a standard citizen opinion survey designed by MDC may be administered to all landowners if required or requested. Administration and analysis of the survey must be approved by MDC.
- 6) MDC and/or MDC approved assignee may conduct deer population surveys to determine current deer densities and recommend population goals, when necessary and/or requested.
- 7) In the absence of a landowner and/or deer population survey, on site evaluation will be used to determine the need for and conditions of a deer removal permit.
- 8) Following monitoring and assessment, the community task force should develop a deer management plan that establishes deer population goals and defines management alternatives. MDC will assist with plan development by providing necessary expertise and information on population assessment and management, control alternatives, and regulatory guidelines requiring compliance. The plan will facilitate data collection on the problem, pull diverse groups together in a concerted effort, and encourage constructive solutions to the problem. The plan should include the following information:
  - a) Title - course of action and the name of the agency/organization requesting MDC assistance in deer population control.
  - b) Introduction - Brief description of the area, its location or address and size. Definitive statement on the problem(s) caused by deer.
  - c) Goal - long term purpose of the management program
  - d) Objective - specific description of management tasks to be accomplished at this time
  - e) Site Description - detailed description of the area, estimated deer numbers, and history of deer management problems
  - f) Documentation of deer related damage or potential safety hazard - quantitative and cost estimates of damage, potential or actual safety hazards to the public.
  - g) Proposed methods and procedures - the number of animals to be removed and the recommended techniques to accomplish the short and long term goals. Names and telephone numbers of the contractors/volunteers that will perform the work, urban officials to be contacted by members of the media and the general public concerning the project. For many management methods this section may also need to include information on how to deal with protests, set up check stations, organize public meetings, and similar public relations specifics
  - h) Evaluation - a description of the criteria used to determine the progress of the management program
  - i) Schedule - establish a timetable for implementation of the program
  - j) Support Documents - additional support documents as necessary
- 9) An MDC permit will be issued for removal of deer by any method other than statewide hunting or managed hunt regulations. This permit will specify all removal criteria based on protocols submitted by the landowner(s) or community task force and approved by MDC.
- 10) Initiation of first-time managed deer hunts on MDC lands in urban areas will follow Operational Guidelines for Urban Deer Management. In these instances, MDC will be the primary advocate. However, appropriate citizens, citizen groups, and other government agencies having an interest in population management of deer on the proposed lands should be involved in the planning process,

and relevant public relations and educational strategies should be implemented as part of the proposed hunt.

### **Urban Deer Population Control Alternatives**

Where control of deer numbers is required, only the following techniques (each summarized with a summary of realistic expectations) are recognized by MDC as potential management options:

- 1) *Legal hunting* may occur under statewide deer hunting regulations or during a special managed hunt outside the normal season framework. Managed hunts must receive Commission approval.
  - a) Firearms hunting is the most efficient way to reduce deer populations but may not be practical in all urban areas
  - b) Archery hunting can be effective and safe when constraints are placed on the age/sex and number of deer that can be taken.
  - c) Special disabled accessible and youth-only hunts may be considered for urban settings. Disabled hunters could be assisted by Department staff or approved civic groups. Such hunts could serve as both resource management strategies and urban management promotional strategies.
  - d) It is recommended that mandatory hunter orientation sessions be held prior to these special hunts.
- 2) *Sharpshooting* by trained marksmen can be an effective deer removal technique where location renders legal firearms hunting unsafe and archery hunting is not a feasible control mechanism. Small caliber centerfire rifles are most effective and are safe when used under controlled situations. Deer taken by sharpshooters will be processed by approved facilities and donated for use. MDC will not be responsible for compensating contracted sharpshooters or for meat processing.
- 3) *Live Trapping and Euthanasia* should be considered only in special circumstances and should be conducted in a humane, socially acceptable manner under the supervision of a licensed veterinarian. Landowners will be responsible for all trapping and euthanasia monitoring and associated costs.
- 4) *Reproductive control* can be implemented only with Federal authority and when proven to be an effective population control method. Landowners will be responsible for all trapping, administration of reproductive control, contracting necessary expertise, and associated costs. Landowners may be required to monitor and record trapping and reproductive control efforts.
  - a) *Live trapping and sterilization* is presently not an efficient or cost effective population control technique requiring animal capture, administration of drugs or surgery, high stress to animals, and produces little if any reduction in deer density.
  - b) *Contraception* procedures are presently under strict Federal authority and not legal in most situations. Presently, they are neither cost-effective nor biologically feasible population management techniques, but may hold promise for future urban deer population management and will be considered if they prove safe and effective in controlling numbers and area biologically feasible to implement.



## APPENDIX 2: Summary of comments from 2005 Deer Task Force public forums

### WEST ST. LOUIS COUNTY DEER TASK FORCE PUBLIC FORUMS SUMMARY OF COMMENTS

We heard from 74 individuals as a result of the forums, and many more attended but did not submit comments. Of the 74 individuals who commented:

56 individuals spoke or submitted comments in writing at the forums  
18 individuals submitted written comments by mail  
(some folks did both, but were only counted once)

Of the 74 people:

|                         |                          |
|-------------------------|--------------------------|
| 2 from Ballwin          | 16 from Chesterfield     |
| 3 from Clarkson Valley  | 9 from Creve Coeur       |
| 0 from Eureka           | 1 from Kirkwood          |
| 2 from Maryland Heights | 14 from Town and Country |
| 0 from Valley Park      | 7 from Wildwood          |
| 2 from Illinois         | 6 from St. Louis City    |
| 12 from other           |                          |

**Comment topics** (many comments fit more than one topic):

|                           |                      |                    |
|---------------------------|----------------------|--------------------|
| Lethal control in general | 20 -allow it         | 19 -don't allow it |
| Bow hunting:              | 22 -allow it         | 8 -don't allow it  |
| Sharpshooting:            | 3 -allow it          | 2 -don't allow it  |
| Trap & euthanasia:        | 2 -allow it          | 0 -don't allow it  |
| Hunting in County Parks   | 2 -allow it          | 0 -don't allow it  |
| Damage control            | 15 -want to see more | 2 -doesn't work    |
| Fertility control         | 6 -want to see it    | 1 -don't want it   |
| Trap & relocate           | 3 -want to see it    | 1 -don't want it   |
| Do nothing                | 2 -as best option    | 6 -not an option   |
| Deer-vehicle collisions   | 16 -a concern        | 4 -not a concern   |
| Landscape damage          | 15 -a concern        | 2 -not a concern   |
| Native plant damage       | 6 -a concern         | 0 -not a concern   |

**Other comments:**

Do something/anything - 3  
Damage to pool by deer - 1  
Don't hire a for-profit company for wildlife management - 1  
Support non-profit bow hunting organizations -3  
Make feeding deer illegal -5  
Don't approve of Task Force representatives -6