ADDRESSING THE URBAN DEER POPULATION IN KALAMAZOO

Neighborhood Association Ad Hoc Committee:
Comprehensive Deer Management Program - Report and Recommendations

February 1, 2022

Urban Deer Management Plan – Table of Contents

- Non-Lethal
- Lethal
- Experimental
- No Action

EXECUTIVE SUMMARY

Our committee, and this report, was initiated and developed in response to over three years of resident feedback and complaints to our many Neighborhood Associations (and the City) regarding an increase in quality of life, health, and safety challenges to both humans and deer. Our committee is solely made up of board members or officially designated representatives of our respective Neighborhood Associations.

We note that three Neighborhood Plans within "Imagine Kalamazoo 2025" include action items to pursue an approach to maintaining the deer population at a safe level for both the deer and residents.

Purpose of our Report

To provide the City of Kalamazoo's City Commission, along with city staff, strategic guidance through our committee's fact- and research-based information, data, and recommendations to:

1) Share with our city leaders the biology, ecology, and lifestyle of urban white-tailed deer, and
2) To understand how humans and deer can harmoniously and safely co-exist with each other

Goals of our Report

1) **Demonstrate there is a growing deer population in Kalamazoo** creating multiple issues that affect the health and safety of both residents and deer in many neighborhoods, not one or two
2) **Show that deer live within Kalamazoo in multiple herds** of varying sizes that impact each neighborhood differently; therefore they can and should be managed as such
3) **Identify and detail the many health and safety issues** brought forth by our neighborhoods that indicate the city's growing deer population is impacting both residents and the deer themselves
4) **Provide the initial, fundamental considerations** required to develop, implement, monitor, and maintain an effective short-, medium-, and long-term Deer Management Program for the City by:
    - Providing the initial data that illustrates many city residents have been impacted by deer, have concerns, and want action taken to ad dress the issue of our urban deer
    - Detailing ways to further evaluate community issues with white-tailed deer, and
    - Recommending "next steps" for city government to take that will address conflicts with deer by developing a comprehensive, practical, effective, science-based, humane, and community-supported deer management plan.

Our committee believes we have accomplished these goals – *and believes that the result of creating and implementing a deer management plan will create a community that is more knowledgeable and better equipped to co-exist with deer and other wildlife within our full urban ecosystem..*

Method of Data Gathering and Analysis

Our committee utilized *fact-based research and guidance* from known and trusted resources who have proven knowledge and experience in deer management techniques and planning. Sources included:

1) Michigan Department of Natural Resources (MDNR)
2) Over 20 State and city-based deer management plans
3) Seven Michigan city-based deer management/deer culling plans
4) Local research resources:
    - Kalamazoo Nature Center
    - Kalamazoo College
    - Kalamazoo Christian High School
5) Citywide resident survey (***1,616 responses received****;* see **Appendix D** for full survey results)
    - Developed via referencing surveys from seven professional deer management plans, a review by our full committee and senior city staff, and professional marketing help
    - One survey question stands out: *Generally, what are your thoughts about deer in Kalamazoo?*
        1. **"I enjoy the presence of deer, but I worry about problems (damage, disease, etc.) they may cause" - 48.4%**
        2. **"I do not enjoy the presence of deer and regard them as a nuisance" - 22.7%**

(Note: All survey data throughout this report is represented in bold and in brown)

Overview of Findings

A. Our committee examined all areas of multiple objective, fact-based, professional, and comprehensive urban deer management programs:

1) Understanding *urban* white-tailed deer (behaviors, range, diet, reproduction, etc.)
2) Examining the MNDR's mission, goals, and philosophy of managing urban deer:
   - The MDNR *"advises community leaders, assists in the development of deer management plans, participates on local task forces, speaks at public meetings, conducts disease testing, and provides permits for lethal harvest, but lacks a defined process that can be implemented consistently across the State...*
     - ***…Successful resolution of urban/suburban deer issues requires that community leaders and DNR staff work together with stakeholders to gain acceptance of proven methods and utilize them to successfully reduce human-deer conflicts".*** (MDNR, 2016, p.26)
3) Understanding the root causes of conflicts between deer and people in Kalamazoo:
   - We have identified nine safety issues that go well beyond "my hostas are being eaten", including increasing cases of deer/vehicle collisions (DVCs), Lyme Disease, and Chronic Wasting Disease (CWD)
4) Reasons for, and how to create and implement, a successful deer management program
5) Investigating many urban deer management options, tools, and techniques; both non-lethal and lethal

B. There are three types of deer "carrying capacity" (biological, ecological, and social) to consider when evaluating the management of an urban deer population. ***"An effective and appropriate management of deer populations must consider [all] carrying capacities".*** (MDNR, 2009, p.7)

C. *Deer management can be less about management of deer than about managing the issues created by deer–human interactions and differences in stakeholder tolerances regarding those interactions.* (MDNR, 2009, pp.9-12)

Recommendations

(Note: All committee notes and recommendations throughout this report are represented in red)

Based on our findings and research our committee is **recommending a two-phase approach** to managing Kalamazoo's urban deer population:

Phase 1

Develop and implement:

1) Ongoing public education program and resource website for residents regarding urban deer
2) Deer carcass removal program
3) Review and modify (if necessary) the fence ordinance to allow higher residential fencing
4) Effective way(s) the city can help support and report violations of the state's "no feeding" law

Phase 2

Work with the MDNR and other wildlife experts to:

1) Lead the research and budgeting (of funding and personnel) to gather deer population data
2) Develop and implement a comprehensive short-, medium-, and long-term deer management program for the health and safety of our city's ecosystem, deer, and human populations

NOTE: *Our research and recommendations reflect our desire to identify an appropriate balance among the biological needs of the species, the benefits deer provide to some segments of society, the costs they impose on others, and the acceptability and feasibility of the differing management methods.*

Our committee is not advocating for deer eradication or the elimination of wildlife watching opportunities, but rather to manage our urban deer safely and effectively for both residents and the deer themselves..

INTRODUCTION

Committee History, Formation, and Makeup

Our committee, and this report, was initiated and developed in response to over three years of resident feedback and complaints to our many Neighborhood Associations, as well as City staff, along with frequent neighborhood Facebook posts filled with concerns regarding an increase in safety, health, and quality of life challenges to both humans and deer. These included:

1) Deer damage to private property
2) Concerns regarding the increase and spreading of Lyme Disease among humans and Chronic Wasting Disease (CWD) among deer
3) Increase in deer/vehicle collisions
4) Lack of a governmental response (and taking responsibility for) helping residents safely and efficiently remove deer carcasses from their property
5) Damage to the natural ecosystems within Kalamazoo's parks and land preserves
6) Concern about the health and safety of Kalamazoo's deer population
7) Increase in dangerous deer/human and pet interactions

In response, **city staff encouraged a group of Neighborhood Association leaders along with other relevant association leaders** to form a citizen ad hoc committee to collaborate with them to research this issue and develop a roadmap to an acceptable and effective deer management plan to address these challenges.

NOTE: *ALL Kalamazoo Neighborhood Associations were contacted and invited to designate a representative to serve on this committee. One of our main goals was always to be as inclusive as possible, and to gather as many perspectives from as many viewpoints as possible. We also invited and included representatives from neighborhoods without formal Associations, such as Westnedge Hill, Hillcrest, Parkwyn Village, and Stewards of Kleinstuck*. (A list of participating neighborhoods can be found in **Appendix A).**

Some neighborhoods informed us that they did not want to participate, while others did not respond to our repeated attempts to contact and include them. Nevertheless, we continued to communicate and inform those neighborhoods of our progress, as well as invited them to reach out and keep their residents informed, and to join in on all feedback methods we employed, including our citizen survey.

NOTE: *Three Neighborhood Plans within the "Imagine Kalamazoo 2025" Master Plan include action items to pursue an approach to maintaining the deer population at a safe level for both deer and residents.*

A critical component of our recommendations was the solicitation and incorporation of as many Neighborhood Associations and citizen points of view as was possible, given our time, personnel, and budget constraints.

Committee Deer Research: Methodology

Our committee utilized *fact-based* research and guidance from known and trusted resources who have proven knowledge and experience in deer management techniques and planning; more than we could hope to amass as a citizen ad hoc committee. Sources included:

NOTE: *All applicable research sources are cited at the beginning of each section.*

1) **Michigan Department of Natural Resources (MDNR)**
   MDNR was a major resource which we relied on for discussions relating to education and advice; including our regional Wildlife Biologist, Don Poppe, and MDNR research; specifically, their 2009

Michigan Deer Management Plan, and their 2016 Review of Deer Management Report.

2) **Other Deer Management Plans - National**
Urban deer management is not a new issue in the United States. There are many cities across the US which have already completed their own research to develop their own comprehensive plan, of which much of their background information and research is universal to urban/suburban deer.
   - Our committee studied over 20 of these plans and have included relevant information and research from them in this report

3) **Other Deer Management Plans – Michigan Cities**
   - Our committee also researched deer management plans from seven Michigan cities that chose to institute a culling program. (A summary of their deer management programs, *along with their issues and concerns*, can be found in **Appendix B)**

4) **Supplemental Local Research**
Although not peer-reviewed scientific papers, two local school science classes provided us research that proved very helpful to our committee, in that they both presented strong anecdotal evidence that Kalamazoo has an over-abundance of deer in some areas
   - Kalamazoo Christian High School
     Their environmental science class, led by their Life Sciences teacher Steve Dyk, produced both a 2017 and 2020 Winchell/Asylum Lake Deer Survey

   - Kalamazoo College
     A 2020 Senior Individualized Research paper focused on Monitoring of White-tailed Deer Population using Citizen Scientists (by employing the "iNaturalist" citizen reporting app) in many Kalamazoo neighborhoods. A second, 2021 study by different Kalamazoo College students, is currently in progress

5) **Resident Survey** (1,616 responses; See **Appendix D** for full results)
   - During March and April 2021, our committee developed a citizen deer survey to supplement our other research with local data
   - We used as our guide surveys from seven professional deer management plans, professional marketing help, and a review by our full committee and senior city staff
   - With the help of Community Planning and Development, we distributed our survey online in mid-May via the city's website, as well as to all Neighborhood Associations, who promoted it and made it available through each of their own communication channels
   - We **closed the survey in mid-June 2021 and received 1,616 responses** from residents in 24 neighborhoods (as well as 70 non-residents who identified themselves as working in Kalamazoo). Selected survey results will be found throughout this report

NOTE: *Our committee fully understands that although our response rate was high, this survey was never intended to justify final deer management decisions. Rather, our goal for the survey was to* ***begin*** *to understand the observations, experiences, and attitudes of residents about our deer population to guide the "next steps" of developing a comprehensive deer management program for Kalamazoo.*

PURPOSE AND GOALS OF THIS REPORT

The purpose of this report is to provide the City of Kalamazoo's City Commission, along with city staff, strategic guidance through our committee's fact- and research-based information, data, and recommendations to:
1) Educate our city leaders on the biology, ecology, and lifestyle of urban white-tailed deer, and
2) To learn how we can harmoniously and safely co-exist with each other

The goals of this report are to:

1) **Demonstrate that there is a growing deer population in Kalamazoo**, creating multiple issues that affect many neighborhoods, not just one or two
2) **Identify and detail the health and safety issues** brought forth by our neighborhoods that indicate the growing city's deer population is impacting both residents and the deer themselves
3) **Show that deer within the city live within multiple herds** of varying sizes that impact each neighborhood differently; therefore can and should be managed as such
4) **Provide the initial, fundamental considerations** required to develop, implement, monitor, and maintain an effective short-, medium-, and long-term deer management program for the City of Kalamazoo by:
   - Providing initial data from our survey that illustrates that many of our city residents have concerns and have been impacted by deer and want action taken to address the issue of our urban deer population
   - Detailing ways to further evaluate community issues with white-tailed deer, and
   - Recommending "next steps" for city government to take that will address conflicts with deer by developing a comprehensive, practical, effective, science-based, humane, and community-supported Deer Management Plan.

NOTE: ***Our committee believes we have accomplished these goals*** *– and believes the result of putting a deer management plan in place will create a community that is more knowledgeable and better equipped to co-exist with deer and other wildlife.*

MICHIGAN DEPARTMENT OF NATURAL RESOURCES (MDNR): DEER MANAGEMENT

(Michigan Deer Management Plan, MDNR, 2016, pp.1, 11-33)

This report has closely followed the MDNR's mission, goals, and philosophy for deer management in guiding our committee's research and recommendations.

1) MDNR Deer Management - MISSION

The mission of the MDNR regarding deer throughout Michigan is to *maintain a healthy white-tailed deer population*: (MDNR, 2016, p.1)

- Using sound scientific management
- Maximizing recreational opportunities
- Minimizing negative impacts on ecosystems and other wildlife species
- Without creating undue hardship to private interests

2) MDNR Deer Management - GOALS

The MDNR has identified six principal goals relating to deer identified through their public input process: (MDNR, 2016, p.1)

NOTE: *Based on the results of our citizen deer survey, we have discovered numerous trends that indicate further action is needed for Kalamazoo to work with the MDNR (and other experts) to have our city fulfill all six goals of the MDNR, which reflect the public's desires to create the best and most appropriate management effort for deer herds and for the people of Michigan (and Kalamazoo).*

1. **Manage Deer Populations at Levels that do not Degrade the Vegetation Upon Which Deer and Other Wildlife Depend**
   The percentage of survey respondents who were "concerned to very concerned" about the following issues include:
   - **"Deer preventing the natural regrowth of native plants" - 65.7%**
   - **"Disruption of our city's ecosystem" – 64.2%**
   - **"Over-browsing of natural habitats (on public and/or private lands)" - 63.4%**

2. **Promote Deer Hunting to Provide Quality Recreational Opportunities, *as the Primary Tool to Achieve Population Goals*, and as an Important Social and Cultural Activity**

NOTE: *Although our survey showed that 81.9% are personally "not interested" in hunting deer as a sport* ***the MDNR considers hunting (i.e. – the killing of deer by humans) their primary tool to achieve deer population goals.*** *The MDNR states that the natural predators of deer in Michigan are effectively absent from the ecosystem, so humans must take over that role in some capacity to successfully manage deer population levels.*

3. **Manage Habitat to Provide for the Long-Term Viability of White-Tailed Deer in Michigan while Limiting Negative Impacts to the Habitats of Other Wildlife Species**
   The percentage of survey respondents who were "concerned to very concerned" about the following issues include:
   - **"Loss of deer habitat, leading to their increased population" – 73.1%**
   - **"Loss of plant or animal diversity in your neighborhood/city" – 64.2%**
   - **"Decreased bird populations due to deer-related habitat loss" – 60.3%**

4. **Reduce Conflict Between Humans and Deer**
   The percentage of survey respondents who were "concerned to very concerned" about the following issues include:
   - **"Injury to you or family members from a deer-vehicle collision" – 64.5%**
   - **"Deer threatening or harming people or pets" – 29.8%**

NOTE: *Many resident comments included accounts of their pets have been attacked or charged at by deer, mainly during "rutting" season (October – November).*

5. **Reduce the Threats and Impacts of Disease on the Wild Deer Population and on Michigan's Economy**

   The percentage of survey respondents who were "concerned to very concerned" about the following issues include:
   - **"Chronic Wasting Disease (CWD) spreading among local deer" – 71.0%**
   - **"You or those close to you getting a tick-borne disease (such as Lyme Disease)" – 70.0%**

6. **Enhance Public Engagement in, and Awareness of, Deer Management Issues and Knowledge of Deer Ecology and Management**

   The percentage of survey respondents who were:
   - **Not interested in feeding deer, or "concerned to very concerned about fellow neighbors feeding deer" – 82.8%**
   - **"Learning more about deer management actions" – 73.9%**

NOTE*: In addition to citizen responses that directly correlate to the MDNR's six primary goals, the following survey results and local data are also relevant to understanding the need to manage Kalamazoo's deer population in relation to the MDNR's Deer Management Philosophy:*

3) **MDNR Deer Management Philosophy**
The MDNR supports deer management in urban/suburban areas to help address the following five issues:

1. **Damage to Ecosystems**
   As stated above, 64.2% of survey respondents are "concerned or very concerned" about this issue, *a Strategic Vision Goal (Environmental Responsibility) of our Master Plan.*

2. **High Deer-Vehicle Crash (DVC) Incidence Rate**
   As the following data indicates, deer/vehicle crashes within Kalamazoo have been trending up since 2014 (data from Kalamazoo City Engineer and Michigan Traffic Crash Facts (MTCF)):

Year	# DVCs
2014	42
2015	53
2016	57
2017	58
2018	87
2019	72

Average # DVCs from 2014-19 = 61/year

In addition, 2019 deer-vehicle crash data from the Office of Highway Safety Planning (OHSP) shows that out of the 84 Michigan Counties, Kalamazoo ranked:

- 3rd in persons injured
- 7th in local street crashes
- 12th in total crashes

3. **Damage to Residential Landscaping and Gardens**

   The percentage of survey respondents who were "concerned to very concerned" about "Deer damage to trees, shrubs, plantings & gardens around [their] home"– 66.6%

   NOTE: *This was the second-highest concern among respondents, and generated the most comments among those who left comments*

4. **Public Act 451 of 1994**
   The Wildlife and their habitats of the state are valuable public natural resources held in trust by the state, and the state has a duty as trustee to *manage its wildlife and their habitats effectively for the use and enjoyment of present and future residents and for the protection of the environment*.

   Survey respondents indicate residents who:
   - **Have "seen an increase in deer" in the last three years:**
     - **At their home: 60.7%**
     - **In their neighborhood: 62.9%**
     - **In the city at-large: 49.1%**

   - **"Enjoy the presence of deer, but worry about problems (damage, disease, etc.) they may cause" – 48.4%**
     - **Believe the deer population should "decrease/decrease a lot"- 63.7%**
     - **Believe it is "important or very important" that the size of the deer population change – 56.7%**

NOTE: *As pointed out from survey data results, a vast majority of respondents are looking to Kalamazoo government to protect our city's ecosystem and manage the rising deer population*

5. **Natural Resources Commission Policy #2007**
   The Department's goal is to manage the deer herd using management practices based on scientific research to:

   - Maintain healthy animals and keep the deer population within limits dictated by the carrying capacity of the range

- Limit effects on native plant communities, agricultural, horticultural, and silvicultural crops, and public safety

Our resident survey also indicated that 63.4% respondents have "personally been affected" by problems #1 - 5 listed above.

Currently, the MDNR *"advises community leaders, assists in the development of deer management plans, participates on local task forces, speaks at public meetings, conducts disease testing, and provides permits for lethal harvest, but lacks a defined process that can be implemented consistently across the State.* ***Successful resolution of urban/suburban deer issues requires that community leaders and DNR staff work together with stakeholders to gain acceptance of proven methods and utilize them to successfully reduce human-deer conflict****".* (MDNR, 2016, p.26)

NOTE: *It is precisely for this reason that our committee recommends the City of Kalamazoo takes the initiative and lead in researching, developing, and implementing a comprehensive short-, medium-, and long-term deer management plan for the health and safety of its ecosystem and deer & human populations.*

To develop a deer management program based on scientific research, ***further study will need to be taken by Kalamazoo government*** *by means of engaging with the MDNR and other experts, and dedicating resources to the effort.*

UNDERSTANDING WHITE-TAILED DEER

(A Review of Deer Management in Michigan, MDNR, 2009, p.1,2 - 29,30)

NOTE: Our survey indicated that deer are important to the people of Kalamazoo*. The expectations, concerns, and values associated with deer by Kalamazoo residents are diverse and complex and will make successful management of this natural resource challenging, but necessary.*

Background

White-tailed deer (*Odocoileus virginianus*) are one of the most recognizable and charismatic species of wildlife, but they are the cause of a growing urban wildlife management problem not only in Kalamazoo but many metropolitan areas throughout the United States. Deer are generalist herbivores that exist in rural, suburban, and some urban areas throughout much of North America. White-tailed deer often shift from open canopy vegetation to forested cover seasonally and according to different food availability.

During early spring, open canopy vegetation provides herbaceous forage, during summer deer may browse in wetland areas, and in autumn deer often prefer hardwood forests if a mast crop is available (McCullough, 1984). ***For these reasons, the white-tailed deer is a species that often thrives in the transition between forest and open canopy vegetation, or edge habitat.*** (Alverson, 1988).

The forest/open canopy edge also occurs at the forest transition to ***areas such as landscaped suburban yards, parks, or playing fields*** where low intensity residential development is spreading into once rural farmed or forested areas. ***As land use shifts*** from forest, agricultural fields, and pasture to single family dwellings and recreational areas such as golf courses and playing fields, ***so too must our perception and management of deer habitat.***

Marked increases in forest fragmentation with only slight increases in human population density have had large effects on edge habitat This creates a suite of conditions that supports deer and ***often protects them from sources of mortality such as predation and hunting*** (Vogelman J., Assessment of forest fragmentation in southern New England using remote sensing and geographic information systems technology. 1995, p. 439-449).

As urban development increases, the natural habitat required by many wildlife species disappears, but white-tailed deer adapt to urban environments and human activity. ***White-tailed deer populations grow rapidly in urban areas due to:***

1) Lack of natural predators
2) Patchy habitats (scattered woodlots)
3) Abundant food resources
4) Increased offspring survival

*"**White-tailed deer thrive on disturbance and fragmented habitat**. It is possible to get very large deer populations in suburban areas, especially where there are tracts of trees between houses for cover".* (The Truth About Deer and Urbanization, Realtree.com, Dr. Joe Caudell, deer biologist, Indiana Department of Natural Resources, 2019).

Reproduction

(A Review of Deer Management in Michigan, MDNR, 2009, p.29, 30)

Deer productivity rates (fawns produced per doe) are generally highest in regions with an abundance of nutritious food. Deer living in areas with low annual snow accumulation tend to be more productive than those living in regions where snow covers available food for months at a time and inhibits deer movement to food sources. In southern Michigan, where winter conditions are relatively mild, a high percentage of fawns and almost all yearling and adult does breed each year.

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

In Michigan, the deer mating season typically occurs during late October through December. Peak mating activity is in November. Gestation is about 200 days, and the peak of fawn drop is mid-May to mid-June. For the first couple of weeks, does leave their fawns in a hiding place for several hours at a time, returning briefly to nurse them. This strategy reduces the likelihood of predators locating the newborn fawn. Fawns begin to follow their mother on her foraging trips at about 4 weeks of age. White-tailed deer fawns are nursed for 8 to 10 weeks before they are weaned.

In southern lower Michigan, where habitat for deer is excellent and winters are relatively mild, about 30 to 50 percent of females breed as fawns and produce a fawn themselves when 1-year old. **Pregnancy rates for does two years and older typically are very high, ranging from 80 to 95 percent.** Pregnant one-year old does usually produce a single fawn, whereas older does usually produce twins, with singles or triplets possible depending upon their age and nutritional status.

Food Habits

The diet of white-tailed deer changes with the seasons. Succulent herbaceous plants, such as hostas, sedums asters, and chard are preferred by deer during the summer months. *Favorite winter "browse" species in Michigan are white cedar, maple, birch, aspen, dogwood, and sumac, as well as many shrubs.*

Causes of Mortality

A deer's life expectancy in Michigan is influenced greatly by **hunting pressure and hunting regulations**. This obviously has an impact in rural areas but <u>not</u> in urban settings.

Deer-vehicle collisions (DVC's) are another major source of deer mortality in the state. According to State Farm Insurance research, Michigan ranks **5th in the nation** for DVC's; drivers have a 1-in-54 chance of a collision. (State Farm, 2020)

- On an annual basis, DVCs cost Michiganders upwards of $130 million in damage, a AAA news release said. In 2018, 14 people died in deer crashes in Michigan; nine of those were motorcycle-deer crashes, the release said. There was a total of 53,464 vehicle-deer crashes in the state that year, which was up from 50,949 in 2017. (MLive.com, October 31, 2019)

- **Crashes occurred most often in Michigan's southern, heavily populated counties**
  (Note – Kalamazoo County population ranks 8th of 84 counties)
  Vehicle-deer crashes occur during all months of the year, but they are especially prevalent during autumn (October-December) when roadways offer the last green forage of the season, corn fields are being harvested, the deer mating season ("rut") is in progress, and daily commute occurs around dawn and dusk, when deer are most active.

Behavior

Deer ***leap as high as 10 feet*** in a single bound. Although they are great jumpers, ***fences that are 8 feet or higher typically deter them***. (Solving Problems with Deer, Humane Society of the United States (HSUS), p.3)

Current Population Status and Range in Michigan

(Michigan Deer Management Plan, MDNR, 2016, p.10)

In our southwestern lower peninsula, deer populations are highly productive, with many factors working together to produce a challenging management scenario. *The **abundance of food** in the form of available agricultural crops combined with the more than **adequate cover** of scattered woodlots and idle fields provide near perfect white-tailed deer habitat.*

In addition, relatively mild winter conditions, ***the near elimination of natural predators**, and **limited hunting access** on private land (including numerous parcels where no deer hunting occurs at all) contribute to the growth of these populations.*

Urban Deer Range

The size and shape of a deer's home range varies with deer density, sex, landscape conditions, habitat quality, and seasons. **Non-migratory deer in the southern lower peninsula have an estimated annual home range size of 0.2–2.9 square miles**. Males generally have larger home ranges than females. Research has shown yearling bucks in southern Michigan travel about 6 miles on average (Pusateri 2003). **Female resident deer have a home range of .48 to .83 square miles.**

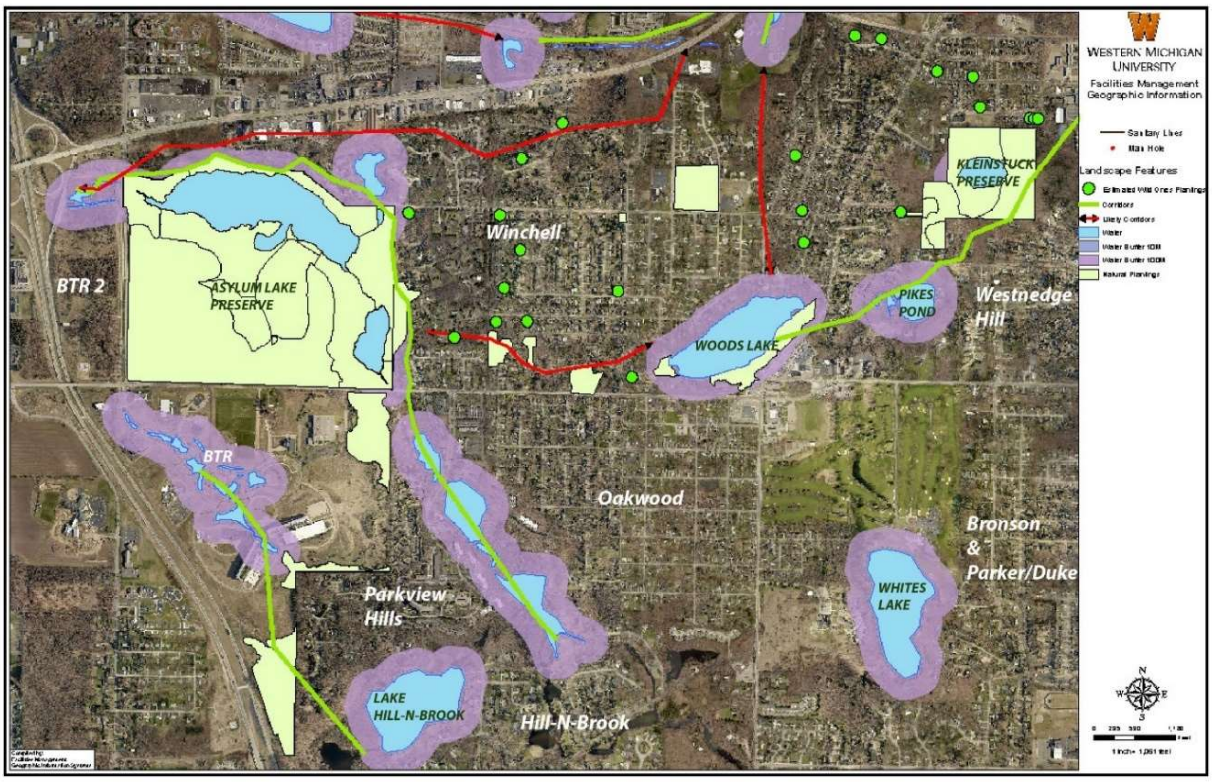
Influential landscape variables included distance to forest, roads, and urban development. *Deer occupying better habitats can fulfill all their necessary requirements (suitable food and cover) in smaller areas.* (Emerging Issues in White-tailed Deer Management and Conservation, Purdue University, 2009, p.20)

The relatively small annual home ranges of deer may be attributed to:

- Land ownership patterns (scattered woodlots)
- Quality of the habitat provided by stakeholders
- The positive values stakeholders have for deer

Following are three Kalamazoo studies that indicate the prevalence of deer throughout the city:

1) A **WMU-led study** map of deer travel corridors demonstrates this perfectly within the **Oakwood-Parkview Hills/Parkwyn Village/Oakland Drive-Winchell area**. Situated between two nature preserves, and home to wooded areas, streams, natural wildlife corridors, and abundant "transition" areas, this area is an ideal deer habitat and *the home to most Kalamazoo deer:*



2) A **2017 and 2020 Winchell-Asylum Lake Deer Survey** conducted by Kalamazoo Christian High School's 2017 and 2020 Environmental Science Classes. In both studies they observed the same Oakland Drive/Winchell Neighborhood boundary, a 1.34 mi^2 area, which as noted above, is an average range size for multiple, separate deer herds.

   Their results found:

   - In 2017 they observed **547 deer tracks which they interpreted to correlate to 266 deer - 199 deer/mi^2**
   - In 2020 they observed **1677 deer tracks which they interpreted to correlate to 108 deer - 81 deer/mi^2** (p.18)
   - One of their main conclusions in both studies was*, "The one piece of indisputable information is that the raw data illustrated pockets of high densities of deer among neighborhoods and in pockets of wooded areas".* (p.15)

Below is a map of the KCHS 2020 deer/deer track sightings:

NOTE: *Our committee understands the disparity between the 2017 and 2020 numbers and realizes that these students have done the best research they can with limited resources. But even accounting for their lowest estimates, it is clear this neighborhood has an abundance of deer that live and travel amongst it.*

3) **Monitoring of White-Tailed Deer Population using Citizen Scientists in Kalamazoo Neighborhoods**, a 2021 Senior Individualized Research paper by Kalamazoo College students (their research was supervised by the Kalamazoo Nature Center and the Kalamazoo College Department of Biology)
    - The group used "citizen science" via the free iNaturalist app to collect their data. iNaturalist uses a tracking system linked with Google Earth, and anyone who has a phone with a camera was eligible to submit photos and help with the deer's tracking. The application automatically detects what type of animal or plant is in the photo taken and pins the photo's location to a map of Kalamazoo using Google Earth, which tracks the photo's location and time studied (p.6)
    - The location of this project was in the City of Kalamazoo and recorded observations were made in 12 of the city's 21 named neighborhoods: Arcadia, Burke Acres, Colony Farm, Edison, Hill N' Brook, Oakland-Winchell, Oakwood, Parkview Hills, South Westnedge, Westnedge Hill, West Main Hill, and Westwood (p.6)
    - Their results indicated: (p.18)
        - There was **a total of 14 different herds** throughout Kalamazoo's neighborhoods
        - **The majority of the sightings came from the Oakland-Winchell neighborhood**, with 40 different sightings

        - This neighborhood was one of the largest sustainable living areas for deer in Kalamazoo (p.25)
    - Of the 14 herds, four came from the Oakland-Winchell neighborhood
    - A direct correlation between the abundance of deer to plentiful water sources and forest/woodlands areas. Again, Oakland-Winchell has more of these types of natural areas than any other neighborhood

NOTE: *Again, our committee understands the inexact science here, and the limitations imposed by voluntary data collectors, the need to use the iNaturalist application on a smart phone, and the incomplete public awareness of the study.* ***But direct observation and data shows us that deer are prevalent within the city and specifically, their counts vary drastically depending on the neighborhood****.*

These cited studies within the city, along with our resident survey, indicate that residents also observe many deer on a regular basis in these other neighborhoods:

- **Arcadia** - has the most readily available parks (Kalamazoo College Study, 2021, p.24)
- **Bronson/Parker-Duke** - Woods Lake to Whites Lake through the Kalamazoo Country Club
- **Burke Acres** - has one of the most extended stretches of woodland area and water sources of all the neighborhoods (Kalamazoo College Study, 2021, p.24)
- **Parkview Hills** – Adjacent to Asylum Lake Preserve and includes numerous streams, mill ponds, and Lake Hill-n-Brook
- **Westnedge Hill** - Crane Park to Bryant Pond/Portage Creek areas

NOTE: *This researched data and the student-led studies premised our committee to work from the basic assumption that* ***Kalamazoo has multiple herds*** *of does and fawns, so* ***some neighborhoods will be more severely affected by our deer population than others****, depending on which neighborhoods have an environment that are more ecologically likely (those that transition between forest and open canopy vegetation, or edge habitat) to support deer.* ***A Kalamazoo deer management program needs to take this into account.***

DEER MANAGEMENT WITHIN URBAN AREAS

(Michigan Deer Management Plan, MDNR, 2016, p.1), (HSUS, p.4)
(Deer Management Within Suburban Areas, Creacy, 2006, pp.1,2)

Root Causes of Conflict Between Deer and People

NOTE: *Our committee agrees with and supports the premise that the goal of deer control measures is* ***not*** *deer eradication or the elimination of wildlife watching opportunities, but rather to manage our urban deer safely and effectively for the health and safety of both our residents and the deer.*

Eight root causes of conflicts between deer and people in urban and suburban areas have been identified, which create obstacles for effectively managing their population levels:

1) **Conflicting Social Attitudes and Perceptions: Human Values Placed on Deer**
   The public may view high deer numbers differently depending on a variety of factors. Some considerations include:
   - Health and safety risks
   - Fear of disease transmissions
   - Concerns about animal health
   - Economic costs

   "Controlling deer populations within residential areas involves numerous stakeholders. These stakeholders often present disparate views and opinions regarding control measures". (HSUS, p.4)

2) **Suburban Development**
Conversion of farmland and forest to suburbs brings people and deer together in an environment where both species thrive, inviting conflict. Golf courses, parks, grassy lawns and tree-lined or hedge borders, and the flowers, ornamentals, bird feeders and vegetable gardens in suburban backyards *provide more food for deer in suburbia* than mature woods, where most vegetation is out of reach in the forest canopy.

For the deer, this leads to good nutrition, which means excellent physical condition and a high reproductive rate. ***This highly fragmented landscape is the preferred habitat structure of white-tailed deer.***

Residential developments also possess a variety of planted trees and shrubs, creating a large quantity of food. *This enhanced landscape* ***provides year-around stable living conditions for deer****, as opposed to fluctuations in forage availability on natural ranges.*

3) **Aesthetics**
Many people enjoy wildlife watching within their neighborhoods. Although white-tailed deer are often viewed as an aesthetically pleasing addition to many homeowners in urban communities, ***they can cause ecological, social, and economic problems when they become overabundant and unmanaged.***

4) **Wildlife feeding**
Safe from harassment and hunting, suburban and urban deer can quickly lose their fear of people and pets and make themselves at home in backyards and on playing fields. ***Intentional backyard feeding emboldens them even more, concentrating deer and worsening conflicts.***

NOTE: *The State of Michigan has banned feeding or baiting deer anywhere in the lower peninsula.*

5) **Lack of Natural Predators**
Another factor leading to suburban deer overabundance is *the scarcity of predators within these habitats*. Modern deer populations on natural ranges are maintained at suitable levels largely by fawn predation. The reduction of predators within less natural, suburban habitats contributes to unusually high fawn survival rates.

Additionally, recreational hunting is not allowed within most residential areas. In rural areas across the United States where deer predators have been eliminated, recreational hunting has served to create a balance between deer populations and their available habitats.

6) **Safety and Liability Concerns**
Harvesting or capturing animals within populated areas may create safety concerns for residents. While many safety concerns are only perceived, rather than real, special safety precautions must be addressed before deer control measures are initiated.

7) **Hunting and/or Firearm Restrictions**
Local ordinances and/or policies regarding hunting and the discharge of firearms may be obstacles to implementing deer control measures.

NOTE: **Kalamazoo Ordinance § 7-9; Hunting and trapping** states: *"No person shall hunt or trap wildlife at any time within the City limits, except with the approval of the City Manager or Chief of Public Safety, nor shall any person carrying a firearm or hunting weapon trespass upon the land of another in the City without the landowner's consent".*

8) **Public Relations Concerns**
Appointed decision makers within city governments, community associations, or development organizations are often hesitant to make controversial or divisive decisions.

Suburban deer overabundance presents unique challenges and circumstances. While the biological constraints of deer herds are commonly considered when managing rural deer populations, ***suburban deer overabundance is usually solely a reflection of human values. When deer numbers approach or exceed human tolerance levels, they may be considered overabundant.*** (Creacy, 2006, p.1)

The percentage of survey respondents who have "seen more deer now than 3 years ago" – 58.0%

Carrying Capacity: Biological, Cultural/Social, Ecological

(A Review of Deer Management in Michigan, MDNR, 2009, pp.9-12)
(Deer Management, Whitetails Unlimited, 2018, pp.5-6)

There are three types of deer population "carrying capacities" to take into account when considering management of a wildlife population. ***"An effective and appropriate management of deer populations must consider ALL carrying capacities".*** (MDNR, 2009)

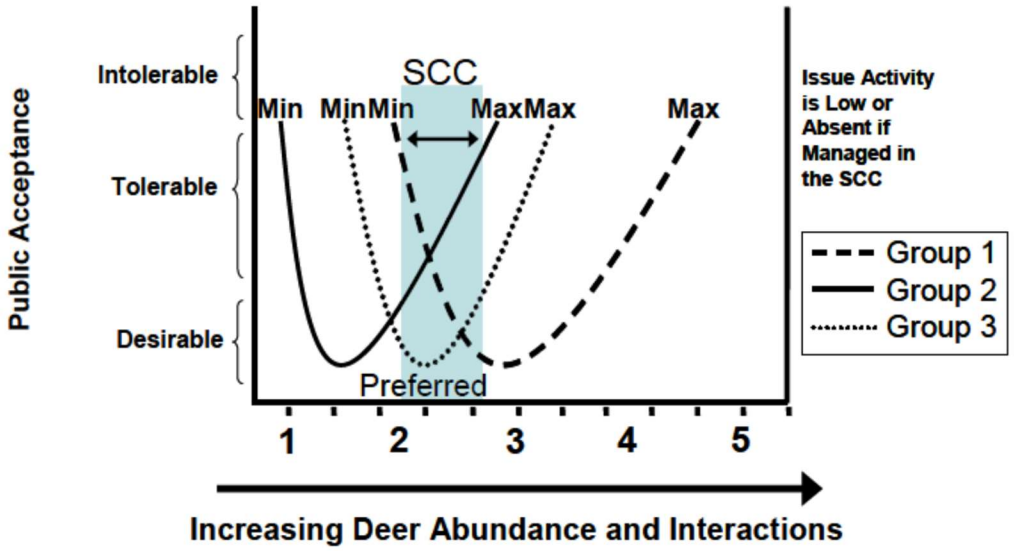
1) **Biological Carrying Capacity (BCC)**
This is referred to as the number of animals that a given area can support in good condition over an extended period. *BCC is determined by the quality and quantity of food, water, and cover in an area. When the environment cannot meet the needs of the herd, mortality from starvation, disease, parasites, or reproductive failure is imminent or is occurring* and there is a dramatic population decline, and surviving animals are in poor health. ***Biological carrying capacity for deer is a moving target in that it changes yearly and seasonally****. Zones containing a large percentage of public land and minimal human conflict are generally managed based on BCC, not the typical definition of an urban area.* ***Therefore, BCC is often not relevant in an urban setting.***

2) **Cultural/Social Carrying Capacity (CCC or SCC)**
This is the maximum number of deer that *can coexist compatibly* with local human populations (Ellingwood and Spignesi, 1986). This level is dependent on human tolerance, land use, availability of natural foods, local values, and other factors, and can vary from area to area. The SCC/CCC is the point where conflicts between deer and human populations become a problem. **The cultural carrying capacity can be exceeded without exceeding the biological carrying capacity over a geographic area**, because different communities have different tolerance levels of deer numbers, and it and is not easily correlated with specific deer densities.

Deer in urban and suburban areas do not exhibit the typical flight behavior seen in rural areas. Urban deer accustomed to human presence essentially have lost fear of humans and no longer view them as a threat, which *increases the probability that a negative human-deer interaction will occur.*

Deer management can be less about management of deer than about managing the issues created by deer–human interactions and differences in stakeholder tolerances regarding those interactions. *"A SCC for deer is defined by the level of abundance and interactions acceptable to enough stakeholders such that there is a low level of deer-related issues".* (MDNR, 2009, pp.9-12)

There is no question that there is a tremendous amount of variation in determining the "right" SCC. *It is a subjective figure which can vary widely depending on which interest group(s) are surveyed.* The overlap of the example of the three interest groups on the next page defines a CCC; that is, it suggests a level of deer abundance and interactions that would be acceptable to most members of the three hypothetical stakeholder groups. (MDNR, 2009, p.12



3) **Ecological Carrying Capacity (ECC)**
This is when the ecosystem starts to become damaged because the herd is eating faster than the plants can regenerate. **Deer remain healthy, but as the habitat degrades, the deer may move on.** Reducing the number of deer can restore overall ecological health.

As the MDNR states, ***"Rather than a discussion regarding overall deer numbers or densities, a focus on impacts related to the local deer population should be emphasized and monitored****. This can include constituent surveys sent out every couple of years to measure changing attitudes regarding deer numbers, monitoring deer-vehicle collisions, or conducting simple regeneration surveys in natural areas".* (MDNR, 2016, p.1)

The choices all depend on the overall goals of a deer management program. Focusing on a set number of deer for a management plan may not resolve some of the concerns that were intended to be reversed or stabilized by initiating deer management.

For example: ~20 deer/square mile has generally been cited as an appropriate level to ensure healthy regeneration/bird communities, etc. pertaining to forest management. However, if a forest has been severely over-browsed for years, yielding little to no regeneration, a population under 20 deer/sq mile could still hypothetically have an impact on regeneration as their numbers are still high enough to suppress a vegetative response in a denuded landscape. (East Lansing, City Council Questions re: Deer Management, 2015)

NOTE: *Our committee believes that the various Carrying Capacities make up a complex and variable concept; they are very specific to each area within the city where deer live.* ***Further study is warranted*** *to:*

1. ***Determine accurate deer counts*** *(and number of herds) within Kalamazoo at-large, beginning the focus of study on the individual neighborhoods that report more deer sightings and issues than others*
2. ***Measure and track*** *citizen conflicts and impacts, deer-vehicle crashes, and vegetation regeneration (or lack of) by each affected area*
3. ***Survey*** *citizen tolerance and attitudes*

REASONS TO DEVELOP A KALAMAZOO DEER MANAGEMENT PROGRAM

Introduction

(A Review of Deer Management in Michigan, MDNR, 2009, p.29-30)

As white-tailed deer have expanded in number and adjusted to living in and around urban areas, they have taken up permanent or semi-permanent residence in many Michigan communities. ***With adequate cover and food available*** deer successfully navigate sidewalks, traffic, and backyard fences, and ***appear quite comfortable with daily interactions involving humans, barking dogs and vehicles***. Management of urban/suburban deer populations can be difficult. As deer populations increase and conflicts with deer arise, different expectations, concerns, and values make addressing these conflicts problematic.

Similarly, as deer populations increase and conflicts with deer arise, different expectations, concerns, and values make addressing these conflicts problematic. As stated previously, ***deer management can be less about management of deer than about managing the issues created by deer–human interactions and differences in stakeholder tolerances regarding those interactions.***

NOTE: *Our committee understands that many stakeholder groups and individuals often have differing views and needs regarding deer management.* ***A deer management plan should take all views into consideration but still "follow the science"*** *to insure the best course of action for the health, safety, and quality of life of both the deer herds and residents.*

Our research and recommendations reflect efforts to ***identify an appropriate balance*** *among the biological needs of the species, the benefits deer provide to some segments of society, the costs they impose on others, and the acceptability and feasibility of the differing management methods.*

Identified Issues in Kalamazoo

Based on public statistics and data, our citizen survey, and multiple neighborhood's resident feedback over the last several years, **the main, identified issues associated with Kalamazoo's urban deer population include:**

The percentage of our survey respondents "personally affected by the problems [below]" – 63.4%

1) **Deer-Vehicle Collisions (DVCs)**
   - The data indicates that DVCs within Kalamazoo have been trending up since 2014 (*data from City Engineer and MTCF*):

Year	# DVCs
2014	42
2015	53
2016	57
2017	58
2018	87
2019	72

Average # DVCs from 2014-19 = 61/year

   - **Michigan DVC Statistics:**
     (A Review of Deer Management in Michigan, MDNR, 2009, p.34)
     - As deer populations increase and development encroaches upon rural environments, **DVCs have become more prevalent**. As many as half of all DVCs go unreported (Marchoux, 2005). During 2008, there were 61,010 reported DVCs in Michigan (MTCF, 2008).

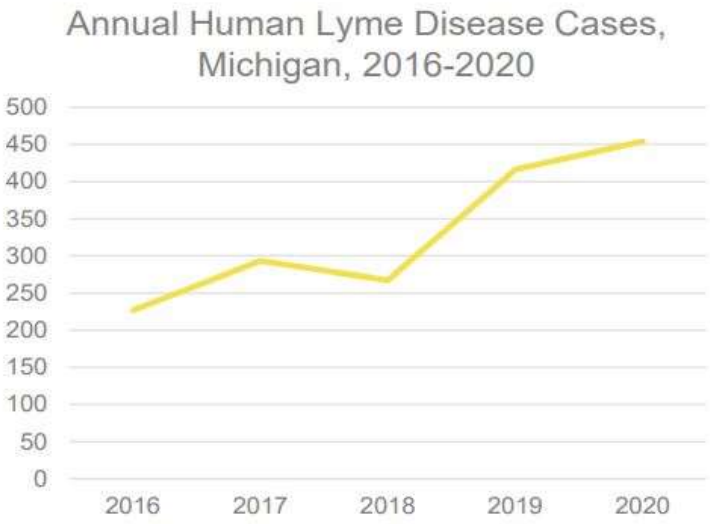
- While Michigan's two million deer are most active in spring and fall, vehicle-deer crashes are a year-round problem. Each year, there are nearly 50,000 reported vehicle-deer crashes in Michigan. (Michigan.gov/MSP [Michigan State Police], 2021)
- The average repair bill when a person hits a deer is about $2,100 (MSU Extension, 2012)
- On an annual basis, deer crashes cost Michiganders upwards of $130 million in damage, per a AAA news release
- In 2018, 14 people died in deer crashes in Michigan; nine of those were motorcycle-deer crashes, the release said. *There was a total of 53,464 vehicle-deer crashes in the state that year, which was up from 50,949 in 2017.* (MLive.com, 2019)

2) **Lyme Disease**
(Ticks and Your Health, MDHSS, MDNR, MSU, 2019)

Lyme disease is an illness caused by the spirochete bacterium *Borrelia burgdorferi.* In the midwestern and eastern US, this disease is transmitted to people and animals by the bite of an infected blacklegged tick (*Ixodes)*.

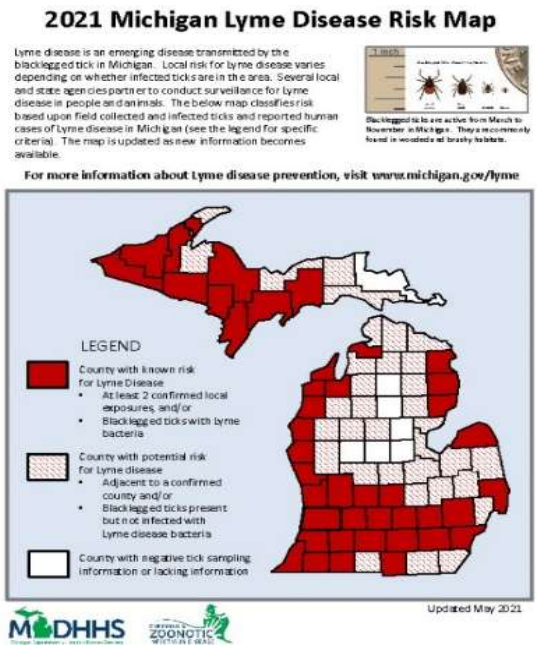
The percentage of our survey respondents who were "concerned to very concerned" about "You or those close to you getting a tick-borne disease (such as Lyme Disease)" – 70.0%; *the #1 concern among respondents*

- *Lyme disease is the most common vector-borne disease in Michigan*
- In Michigan, the first official reported human case of Lyme disease was in 1985
  Cases have now been reported in both the upper and lower peninsula and in most of Michigan's 83 counties and is rapidly trending up
- *It is anticipated that the number of cases reported will continue to increase:*



Source: MI Dept. Health & Human Services, 2020

White-tailed deer are the primary hosts for adult black-legged ticks, or deer ticks (Ixodes). These ticks are responsible for transmitting the causative agent of Lyme disease to humans. *Research has shown increased tick abundance and more human disease occurrences in areas with high deer densities, and that **tick populations decline by controlling the deer population*** (Deer Reduction Is a Cornerstone of Integrated Deer Tick Management, Sam R Telford, III, Journal of Integrated Pest Management, Volume 8, Issue 1, January 2017, p. 25)



NOTE: *In a July 30, 2020 news release the Kalamazoo County Health & Community Services Department made residents and healthcare providers aware of an increasing number of confirmed and probable Lyme disease cases in Kalamazoo County. They also noted that* ***Lyme disease cases were five times higher than they were in 2015.***

3) **Other Tick-borne Diseases Spread in Michigan**
(*Ticks and Your Health*, MDHSS, MDNR, MSU, 2019)

Ticks may transmit numerous other diseases to people and pets and although they are less common than Lyme disease, it is just as important to protect yourself from:

- Powassan Encephalitis (Deer Tick virus)
- Rocky Mountain spotted fever
- Anaplasmosis
- Ehrlichoisis
- Babesiosis
- Tularemia

4) **Landscape and Garden Damage**
The percentage of our survey respondents who were "concerned to very concerned" about "Deer damage to trees, shrubs, plantings & gardens around [their] home" – 66.6%

NOTE: *This was the second-highest concern among respondents*

Many trees, shrubs, vines, and herbs planted within residential landscapes are highly preferred by white-tailed deer. Of course, severity of landscape damage is directly proportional to deer population density. It has been estimated that residential landscape damage in the US may exceed $250 million per year (Conover 2002).

5) **Ecosystem Damage - Private and Public Lands; Over-Browsing & Habitat Degradation**
(A Review of Deer Management in Michigan, MDNR, 2009)

The percentage of our survey respondents who were "concerned to very concerned" about the following issues include:

- **"Deer preventing the natural regrowth of native plants" - 65.7%**
- **"Disruption of our city's ecosystem" – 64.2%**
- **"Loss of plant or animal diversity in your neighborhood/city" – 64.2%**
- **"Over-browsing of natural habitats (on public and/or private lands)" - 63.4%**
- **"Decreased bird populations due to deer-related habitat loss" – 60.3%**

Excessive deer densities are known to cause long-term damage to wildlife habitats. Parks and land preserves must serve as protected areas for all plant and animal species. Impacts on native plant communities have cascading effects on associated wildlife species.

Overabundant deer herds can:

- Eradicate preferred and native plant species
- Alter or eliminate habitat ecosystems of other animals
- Disrupt the natural succession of plant communities

Deer may also facilitate the introduction and spread of invasive species through preferential foraging on certain plant species and serving as dispersal conduits along the trails they use.

There is already evidence of damage to Kalamazoo's parks and land preserves ecosystems by deer over-browsing, as noted by local biologists and naturalists:

- Our parks and land preserves support ecosystem services, protect water quality, and provide wildlife habitats
- Preferred native forage plants (oak, cedar, trillium, bloodroot, and trout lily) can require *up to 10 years to regenerate*

6) **Declining Deer Herd Health: Chronic Wasting Disease (CWD) and Other Diseases**
(Michigan.gov/DNR [Deer Management], 2021)

The percentage of our survey respondents who were "concerned to very concerned" about "Chronic Wasting Disease (CWD) spreading among local deer" – 71.0%

- ***CWD is a highly contagious and lethal neurological disease*** that affects deer, elk, and moose. It causes a degeneration of the brain resulting in emaciation, abnormal behavior, loss of bodily functions and death. **CWD is fatal; once an animal is infected there is no recovery or cure.** To date, there is no evidence that CWD can be naturally transmitted to humans or to other animals.

  It is caused by a normal protein, called a prion, that folds incorrectly and can infect other deer. It is transmitted through direct animal to animal contact or by contact with saliva, urine, feces, blood, carcass parts of an infected animal or infected soil. Prions are extremely resistant in the environment and can stay infectious for years.

  Since May 2015 when the first CWD deer was found in Michigan, CWD has been confirmed in several Lower Peninsula counties. CWD was found in October 2018 in Dickinson County, in August 2018 at a Kent County deer farm facility, and in January 2017 in two captive deer from a deer farm facility in Mecosta County. (Michigan.gov/DNR [Deer Management], 2021)

- **Other diseases deer can contract:**
  (East Lansing, City Council Questions re: Deer Management, 2015)
  - Epizootic hemorrhage disease (EHD)
    - The SLP has had sporadic outbreaks of EHD at varying intensities *that have impacted deer populations for several years.* EHD is an acute, infectious, often fatal viral disease of some wild ruminants. (MDNR, 2016, p.5)
  - Bovine tuberculosis
  - Blue tongue virus – lethal among deer
  - Deer warts - can be lethal to deer; affected areas should not be consumed
  - Parasitic worms & Arterial worms & Nasal bots
  - Brain abscess – meat not edible
  - Mange – contagious to other deer

7) **Loss of Deer Habitat Leads to an Unhealthy and Unsafe Ecosystem for Deer**
As deer populations overutilize available resources, herd health inevitably declines. Increased parasite loads and declines in body weight, antler production, and fawn recruitment are **often followed by large-scale deer "die-offs".**

The percentage of our survey respondents who were "concerned to very concerned" about the loss of deer habitat leading to an increased deer population" – 58.8%

8) **Other Public Health Concerns (not including Lyme's Disease)**
(MDNR, September 2020; Michigan Emerging Disease Issues, 2021)

- **SARS-Co-2 (COVID-19)**
(aphis.usda.gov/aphis/, July 28, 2021;
https://www.nytimes.com/2022/02/07/health/coronavirus-deer-animals.html)

  In July 2021, the US Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) released the news that a survey of wild deer populations has found that large numbers of the animals seem to have been exposed to SARS-CoV-2, the virus that causes COVID-19. ***67% of the deer tested in Michigan have been exposed to it.***

  APHIS is working closely with federal and state partners, including the Department of the Interior, the CDC, and the Association of Fish and Wildlife Agencies, to determine next steps. Results from this surveillance effort are currently being prepared for publication in a peer-review journal.

- **Deer Droppings (scat)**
(Nicholas Martin, entomologist; Entomology and Nematology Department, University of Florida, Institute of Food and Agricultural Sciences, Feb. 2021)
  - Zoonotic diseases associated with deer feces, urine, or other biological fluids include E. coli, Leptospirosis, Listeria, Cryptosporidium, Q fever (Coxiella burnetti), and tuberculosis
  - E. coli can be easily transmitted between species through fecal to oral contact. In 2011, 15 people in Oregon became ill and one died from E. coli 0157:H7 contaminated strawberries grown on a field with deer scat. E. coli poses a threat to dogs as well as people. Dogs with E. coli can then transmit it to their owners
  - Scientists have not ruled out fecal to oral transmission of CWD from deer to humans, although no cases of this type of transmission have been reported
  - There is no evidence at this time that the CWD pathogen is transmissible to people from consuming deer or elk meat, but both the CDC and the Game Commission state that if a harvested animal tests positive for CWD, you should not eat it

The percentage of our survey respondents who have "seen deer pellets (poop)" – 66.3%

NOTE: *Many of our survey respondents commented on the nuisance, sanitary concerns, and health hazards of regularly finding abundant amounts of deer scat in their yards, in parks, and in school playgrounds.*

9) **Public Safety**
The percentage of our survey respondents who were "concerned to very concerned" about the following issues include:
- **"Injury to you or family members from a deer-vehicle collision" – 64.5%**
- **"Loss of [natural] deer habitats, leading to their increased population [within suburban areas]" – 58.8%**
- **"Deer threatening or harming people or pets" – 29.8%**

NOTE: *Many resident comments included accounts of their pets being attacked or charged at by deer (and themselves being threatened), mainly during mating/"rutting" season (October – November)*

Many suburban communities, including Kalamazoo, are experiencing overabundant deer populations, urban sprawl, and limited natural resources. These scenarios lead to an unhealthy environment for humans and deer to coexist in. ***Consequently, some form of deer management becomes a requirement, not an option****.*

DEVELOPING AND CREATING A SUCCESSFUL DEER MANAGEMENT PROGRAM

Planning Considerations

NOTE: *Our committee recognizes that many other cities throughout the US, as well as cities in Michigan, have faced, and will continue to face, this complex issue. The good news, however, is that many cities who have addressed this issue head on have developed and created strategies and tools (and successes) to lead the way for Kalamazoo's efforts.*

1) **MDNR Publications**
   - Managing Deer Within Suburban Communities – First Steps, 2020
   - Urban Deer Management: First Steps and Options for Communities, 2020

2) **Local Resources**
   - Kalamazoo Nature Center: Deer culling program; 2001-present (phone conversation with Ryan Koziatek, KNC Stewardship Director, February 2020)
   - Summary of other Michigan cities deer management/culling programs (2015-20) (Can be found in **Appendix B**)

3) **Other Resources**
   - Community-based deer management (CBDM): Cornell University
     - https://deeradvisor.dnr.cornell.edu/cbdm-process
   - Solving Problems with Deer, HSUS, 2018

Comprehensive Deer Management Strategy

(A Review of Deer Management in Michigan, MDNR, 2009, p.33)

1) ***Choosing which actions to implement*** is the most difficult and time-consuming part of the planning process for many communities.
   - MDNR staff can help by providing information on deer biology and management options

2) ***Bringing in a trained facilitator*** *to guide discussions* may also be useful and even necessary.
   - Deer management can become a contentious and controversial issue, as community members may have widely varying perspectives on deer and be passionate about their opinions and priorities

3) It's important to ***thoroughly publicize planning*** efforts to ensure that all members of the community have an opportunity to participate and voice their perspectives.
   - Insufficient outreach increases the likelihood of negative backlash from groups or individuals who disagree with a plan that was formulated without their participation

4) ***An inclusive process*** provides valuable information to community leaders on deer impacts and stakeholder opinions, allows stakeholders to increase mutual understanding by educating each other on their differing perspectives, and establishes a strong foundation for defending deer management decisions and actions in the event of a subsequent challenge.
   - *A high level of communication and transparency should be maintained throughout program implementation to keep community members informed and engaged*

5) **Because deer management is a long-term undertaking, periodic evaluation of the program is an important component.**
    - Evaluations should incorporate as much diversity of stakeholder participation as did the initial planning process
    - Progress toward the program goals should be assessed and a determination made on whether modifications to the program are needed. Such modifications may be stimulated by lessons learned during program implementation, data gathered through monitoring, technological advancements, shifts in community priorities, or other causes
    - In most cases, programs run more smoothly after the first year or two as residents become accustomed to the management activities and begin to see results. However, controversy can still resurface, and ***if periodic evaluations and modifications are not conducted, over time the program may become out of sync with the community's needs and desires***

6) Because a deer management program should outlast the tenure of the people making decisions when the program is initiated, ***it is valuable to have a written management plan***. Such a plan provides an opportunity for the community to document their decision-making process and reasoning and establish guidance for future decisions

URBAN DEER MANAGEMENT OPTIONS, TECHNIQUES, AND TOOLS

(Solving Problems with Deer, HSUS, 2018)

Deer Management Options

(Deer Management Handbook for Communities in New York, 2018, p.12)

Options communities have to reduce deer-related impacts fall into ***two broad approaches***:

1) Reduce resident's vulnerability to the negative effects of deer
2) Reduce deer populations

NOTE: *Our committee believes full consideration of both of the above approaches will maximize the likelihood of success and will engage all residents in the impact reduction effort.*

Deer Management Techniques

(Deer Management Within Suburban Areas, Creacy, 2006, p.3)

1) When addressing suburban deer problems, the advantages and disadvantages of **all available deer management tools must be evaluated**. Differing circumstances among suburban communities will result in varied approaches to solving the problem
2) Furthermore, it is likely that a **combination of management tools** will be necessary to achieve desired results
3) Deer control measures require **community input**, as well as considerable long-term planning and commitment
4) The costs of suburban deer management should always be compared to potential benefits such as reduced deer/vehicle accidents, improved human safety, and decreased landscape/garden damage.
5) It is important for communities to **develop measurable long-term goals and objectives** as part of a comprehensive deer management plan before implementing deer control measures:
    - Objectives based on deer abundance can be evaluated with standard deer survey techniques such as:
        - Survey transects or time/area counts
        - Indicators such as frequency of deer/vehicle collisions
        - Number of reported deer complaints
        - Predetermined reductions in landscape damage

Stakeholders should understand that the total elimination of the problem (or the deer herd) is neither practical nor achievable. Rather, ***the goal should be related to the reduction of deer-human conflicts to an acceptable level.***

Deer Management Tools

NOTE: *Our committee has carefully researched and listed every option we could identify and reviewed each and every one for the City's evaluation and consideration.*

1) **Education Programs for Citizens**
(A Review of Deer Management in Michigan, MDNR, 2009;
Howard County, MD Dept. of Recreation and Parks, Deer Management Plan, 2002, p.6-7)

Public information is an important part of the management of deer-human conflicts. A lack of understanding of deer biology and ecology can be compounded by a lack of knowledge, misinformation, and misconception regarding available management options.

Educational activities can range from formal presentations for large groups to ad hoc, one-on-one conversations. Content includes educating the public, deer committee members, and city officials about the aspects of urban deer management.

NOTE: *Our committee recommends that the following specific educational tools be developed and implemented by the City as soon as possible:*

- Deer management educational and informational-based website, to**:**
  - Disseminate deer-related (biology, habits, etc.) information
  - **Inform** about:
    - The latest management activities and policies
    - Other resources and information regarding deer-related issues
  - Be a **resource** for:
    - Deer resistant plants
    - Non-lethal deterrents
    - Hazing and scare tools
  - Comments and inquiries from residents should also be received
  - *Create effective tools to report and manage:*
    - *Deer-feeding violations*
    - *Deer carcasses for city removal*
- Educational programs and informational brochures covering deer biology, carrying capacities, diseases, etc.
- Media plan to provide timely and relevant information to residents
- Informational brochures
- Hold regular informational meetings
- Annual update on deer management activities
- Partner with public health agencies to increase awareness about Lyme Disease, CWD, and other public health safety issues

2) **Non-Lethal Deer Management Techniques**
(A Review of Deer Management in Michigan, MDNR, 2009, p.30-33; Deer Management Within Suburban Areas, Creacy, 2006, p.3; Deer Management Handbook for Communities in New York, 2018, p.20; Urban Deer Technical Guide, Indiana Division of Fish & Wildlife, 2013, pp.11-14)

Non-lethal management techniques are generally well accepted by the public. However, ***limited effectiveness and high cost*** may prevent success when used exclusively to resolve human-deer conflicts; they are best used to ***supplement, not replace***, deer population management.

NOTE: *Our committee has identified the following non-lethal methods of urban deer management for the City's research, review, and consideration. We recommend the City also be an educational resource for this information.*

1. **Ban on Deer Feeding**
   Many people enjoy feeding deer in urban/suburban areas to increase viewing opportunities. This may attract deer to unwanted areas, especially during winter months. *Feeding deer can also lead to crowding and increased potential for disease transmission*, and also induce deer to cross roadways, increasing the potential of vehicle accidents**. *Strong, consistent enforcement is a must for this to be effective.***

NOTE: *The State of Michigan has banned the feeding of deer in the lower peninsula, therefore, our committee strongly recommends the following measures:*

1) *The City establishes an anonymous method for residents to report deer feeding*
2) *The City works with MDNR to establish an effective way of enforcing the deer-feeding ban*

2. **Unpalatable Landscape Plants**
   While deer feed readily on a variety of plants, some varieties are less palatable than others, and a wide variety of native and cultivated plants are available. Careful plant selection for home and business landscapes, combined with the selective use of repellents may minimize damage due to deer browsing and make areas less attractive to deer. However, as deer densities increase, preferred foods become less available, resulting in less desirable plants also being browsed to a greater extent.

3. **Repellants**
   Repellants are commonly used to reduce a plant's attractiveness and palatability to browsing deer.
   - Use of repellants is often expensive, labor intensive, and its effects temporary due to being diluted or washed off by rain and acclimation by deer
   - Repellants work best in small orchards, gardens and on ornamental plants when an alternative food source is readily available
   - Repellents are more effective on less palatable plant species than for those that are highly preferred

   Repellents also work by reducing the attractiveness and palatability of treated plants to a level lower than that for other available forage. ***Repellents don't reduce or control deer numbers but do have the potential to increase human tolerance to deer.***

4. **Fencing**
   "Deer-proof" fencing (8 to 10-foot-high woven wire) is effective at excluding deer from specific locations to prevent or reduce deer access. (Solving Problems with Deer, HSUS, 2018, p.3)

   - Fencing does not directly reduce deer numbers. Rather, it can prevent damage, which in turn has the potential to some extent to increase tolerance to deer by those directly impacted.
   - Locations where landscape or horticultural damage is an issue are good candidates for fencing as are airports and along roads where deer-vehicle collisions are common
   - The initial cost for fencing materials and installation can be substantial but will provide years of protection if properly maintained

The percentage of our survey respondents who found it "acceptable to very acceptable" for the City to "allow "deer" fences to keep them away from yards, gardens, etc." – 66.2%

NOTE: *Our committee recommends that the City review and modify, if needed, its current fencing ordinance (§ 6.3 Screening and Fences) to allow for approved "deer-proof" fencing* ***up to 10 feet high*** *to allow residents to keep deer out of their yards. § 6.3 currently limits fence height to 4 feet in front yards and 7 feet for side and rear yards. We also recommend the City consider allowing the use of electric fencing / tape in certain locations as an option to control deer damage.*

5. **Deterrents**
   - Hazing and frightening techniques
     - Hazing or frightening deer using ***motion-activated devices*** that use sound, light or spraying water can be an effective method for keeping deer out of specific areas. *However, deer can quickly become accustomed to these repetitive sounds or sights over time unless a variety of methods are used and changed often.*
   - Approaches for minimizing DVCs include:
     - Roadside reflectors
     - Warning (Deer Crossing) signs
     - Wildlife warning whistles
     - Vegetation management
     - Reduced speed limits
     - Efforts to raise public awareness
     - Construction of barrier fencing, or wildlife overpasses/underpasses may be effective for addressing specific problem areas but can be expensive to construct. *This is not a practical option in Kalamazoo.*

     These have all been used to attempt to decrease the incidence of deer-vehicle collisions without much documented success.

6. **Dogs**
   Use of dogs, located within invisible fencing systems has been *used effectively to deter deer from damaging crops*. Success varies with the size of the area and the number and aggressiveness of the dogs. Dogs with restricted movement, such as on a chain, are not effective.

7. **Trap (live capture) and Relocate**
   (A Review of Deer Management in Michigan, MDNR, 2009, pp.31-32)

   Capturing and moving deer from one area to another is often requested by people opposed to lethal techniques. However, ***it is not a reasonable option, and has been demonstrated to be:***
   - Impractical (there are few places available to release excess deer)
   - The procedure of capture and release is very expensive
   - Relocating deer results in significant levels of stress, injury, and mortality to them
   - *Presents risk of spreading diseases*

NOTE: *Due to these disease concerns, MDNR will not issue a permit to translocate deer.*

3) **Lethal Deer Management Techniques**
   (Deer Management Within Suburban Areas, Creacy, 2006, p.3) & (Anthony J. DeNicola, *Managing white-tailed deer in suburban environments*. A technical guide, January 2000)

NOTE: *Based on our resident survey results, our committee fully understands and appreciates that employing lethal methods as part of a Kalamazoo urban deer management program is a controversial approach, as many residents have very strong feelings both for and against the culling of deer.*

However, to dismiss any/all lethal methods without fully researching the local situation *to see if lethal methods are warranted and necessary as one part of a comprehensive approach to managing the*

deer population in Kalamazoo is not looking at the full picture to support the long-term health and safety of both our residents and our deer.

*Therefore, **our committee strongly recommends that the City "follow the science"** and wildlife experts to determine the most effective methods (both non-lethal and lethal) to manage our urban deer population, and to employ methods recommended by the professional deer managers.*

Lethal tools are more effective than others but may be unacceptable if social or safety concerns are an issue. ***Applying a combination of several techniques specifically tailored for each situation should prove to be more successful than utilizing a single tool.***

Lethal techniques face several challenges in many urban/suburban areas, including:

- Real or perceived safety concerns
- Conflicting social attitudes and perceptions about wildlife
- Hunting and firearm discharge restrictions
- Liability or public relations concerns

Lethal deer population management techniques are not always well accepted by some portions of the public. However, *when successfully implemented*, they can be safe, relatively inexpensive, and highly effective at reducing deer populations.

As the MDNR states in their 2016 Michigan Deer Management Plan (p.26):
"Perhaps the most challenging aspect in all of white-tailed deer management is the issue of how to best manage deer in these urban/suburban areas where use of lethal control as a management tool is frequently unavailable and community members often have highly polarized views and values regarding deer management.

***Successful resolution of urban/suburban deer issues requires** that community leaders and MDNR staff work together with stakeholders to gain acceptance of proven methods and utilize them to successfully reduce human-deer conflicts".*

"Currently, the DNR:

- *advises community leaders*
- *assists in the development of deer management plans*
- *participates on local task forces*
- *speaks at public meetings*
- *conducts disease testing, and*
- *provides permits for lethal harvest but*
- ***lacks a defined process that can be implemented consistently across the State".***

***NOTE:** Our committee recommends that if it is determined by professional deer managers and experts that lethal method(s) should be employed to manage a demonstrated overabundant deer population in Kalamazoo, it should be accomplished in two phases:*

- **Initial Reduction Phase**
  Used to remove large numbers of deer from an overabundant herd during a short period of time to achieve desired deer densities.

- **Maintenance Phase**
  This includes long-term efforts to maintain deer densities at target levels.

***NOTE:** Most importantly, our committee believes and recommends that Kalamazoo have a long-term deer management plan in place before initiating any deer herd reduction operations.*

See **Appendix B** for a table identifying other Michigan cities that, after careful research and consideration, have employed lethal methods as a part of their deer management programs.

NOTE: *The Kalamazoo Nature Center, although rural in nature, has held numerous deer culls since 2001. Their research and shared experiences to our committee have been invaluable in understanding this method first-hand. Our committee recommends, if a cull is warranted, that the City works with them to gain further insight.*

(A Review of Deer Management in Michigan, MDNR, 2009 p.30-33);
(Deer Management Handbook for Communities in New York, 2018, p.20);
(Urban Deer Technical Guide, Indiana Division of Fish & Wildlife, 2013, pp.9-14)

1. **Regulated Hunting**
   Controlled hunting is the application of legal, regulated deer hunting methods in combination with more stringent controls or restrictions as dictated by landowners or government officials. Regulated hunting has proven to be an ecologically sound, socially beneficial, and fiscally responsible method of managing *rural* deer populations. However, hunting has limited application in some urban/suburban areas because of safety considerations, competing land-use priorities, legal constraints, or social values.

   This method, when used in a safe manner, is often the most cost-effective method for managing urban-suburban deer populations. The primary hunting methods used to safely harvest deer during regulated hunting in urban environments typically includes archery and crossbows. The low cost of regulated hunting is one of the more attractive features of this solution to deer conflicts.

NOTE: *Due to the lack of strict management control over licensed hunters at-large, especially in our urban setting, our committee does not recommend this method be employed by the City.*

2. **Controlled/Managed Hunting**
   These are *specialized hunts that incorporate the benefits of regulated hunting but add restrictions* designed to meet the needs and objectives of landowners experiencing conflicts with deer.

   Restrictions typically are imposed by the municipality during controlled hunts and specifically are *designed to improve safety precautions* or accelerate the reduction of present and future deer numbers, and include limiting hunter numbers, restricting days or times to hunt, requiring shooting proficiency tests, strategically disbursing hunters on property experiencing deer conflicts, etc.

NOTE: *Again, due to the lack of strict management control over licensed hunters at-large, even with additional regulations placed on them, especially in our urban setting, our committee does not recommend this method be employed by the City.*

3. **Sharpshooting (either with firearms and/or archery)**
   Lethal harvest of deer by sharpshooting through the employment of highly trained, experienced professional sharpshooters, ***generally employed by municipalities through the U.S. Department of Agriculture's Wildlife Services (USDA)***, ***can be a very effective technique***. A variety of techniques (shooters using night vision goggles, suppressed weapons, limited locations and times, etc.) can be used in sharpshooting programs to maximize safety, humaneness, discretion, and efficiency.

   This technique, while effective in reducing deer population, is *generally more expensive than controlled hunting* based upon several factors (size and scope of the project, approachability

of deer, seasonal or timing restrictions, level of involvement of professionals in processing of culled deer, etc.) as well as requiring the service of trained professionals (through the USDA), which increases the cost significantly over regular hunting options. *However, costs are much lower ($600-700/deer) than methods such as capture and* sterilize; see 4) 1.below. Further, like virtually all forms of deer management options, sharpshooting **requires year-to-year repetition to be successful**. (Deer cull by sharpshooters approved in Muskegon despite some citizen opposition - mlive.com, January 14, 2020)

NOTE: *If a lethal method is determined by experts to be an effective piece of successfully managing the deer population (for the benefit of humans and overall deer herd health and safety), our committee recommends that only this lethal method be employed by the City.*

- **Venison Donation Programs**
  An obvious by-product of any deer reduction program is the availability of venison (deer meat). Venison is a lean meat that is low in fat and high in protein, comparing favorably with the nutritional qualities in chicken breasts. Such meat is in desperate need by many. Additionally, an increasing number of people are looking to organically produced, free-range sources of meat, such as from free-ranging game species (including deer) as an alternative to supporting practices typically associated with existing livestock husbandry and processing.

NOTE: *Our committee further recommends that any deer reduction effort by the City encourages, promotes, and employs a* ***Venison Donation Program*** *as a valuable public service. Our committee has identified local and regional processors who have previously offered their services for processing and venison donation distribution at no, or reduced, cost to those in need.* ***Local food banks identified include Loaves & Fishes, Gospel Mission, Ministry with Community, as well as several Neighborhood Association food banks.***

4. **Trap and Euthanasia**
   This method is seldom used but is an option in areas where lethal techniques have been approved but hunting or sharpshooting are not possible due to safety concerns. *It is a labor-intensive, inefficient, and expensive method* as it is difficult to trap deer. The deer are euthanized by gunshot, penetrative captive bolt, or by pharmacological agent. The effects of capture stress are key in assessing the humaneness of this option. The longer a deer is trapped, the greater its stress level and the less humane the management option. This also poses danger to the people involved with the process.

NOTE: *Due to the understood costs, difficulties, and unnecessary trauma inflicted on deer using this process our committee does not recommend this method be employed by the City, unless recommended by experts as being both humane for the deer and cost-effective for the City.*

4) Experimental Deer Management Techniques

(A Review of Deer Management in Michigan, MDNR, 2009 p.30-33),
(HSUS, 2018, p.17, Appendix H),
(Urban Deer Technical Guide, Indiana Division of Fish & Wildlife, 2013, pp.11-14)

1. **Deer Fertility Control**
   There has been a significant amount of research focusing on alternative, non-lethal population control techniques. Specifically, researchers have sought an effective, affordable immune-contraceptive that would be useful in areas where traditional hunting methods are not a safe or socially acceptable option.

NOTE: *Most of these tools are still in experimental phases, and thus are not currently available for general use.*

- **Immunocontraception** (a vaccine to block reproduction)
  Most immunocontraception options have had limited use due to the substantial costs, labor, and special requirements needed to successfully implement such programs:
  - Most must be administered via a hand injection, project costs are typically high due to the need for traps, restraint equipment, specialized personnel, and possibly immobilization drugs.
  - It is believed that 70 to 90 percent of the females in a specific area need to be treated to effectively limit the population growth
  - A 2021 New York study conducted on suburban, free-ranging deer estimated that the minimal annual time commitment per deer for reproductive control was approximately **20 person-hours and a cost of $700 to $1,550 per deer**
  - In general (depending on the specific vaccine used) this method can be 80-100% effective for 2-5 years, then re-treatment is necessary

- **Surgical Sterilization**
  Involves surgically removing female reproductive organs or interrupting the fertilization pathway. (DeerFriendly.com, 2018)

  - Spaying can be expensive; $1,200 per deer because of high labor costs. Sterilization is typically 97 to 100 percent effective and only needs to be done once, but *may result in the death or injury of some deer*
    - This field surgery requires more supplies and equipment than contraception so easier access to deer also becomes an issue
  - **In 2018 Ann Arbor attempted this with much controversy and concern**: (https://www.bridgemi.com/michigan-environment-watch/no-joke-ann-arbor-removing-deer-ovaries-lawmakers-arent-laughing)
  - This technology *does not overcome the intensive effort involved with treating a substantial proportion of deer to prevent population growth* and assessing deer movements in and out of the area in which management is being applied

Unfortunately, the lack of public education regarding the availability and practicality of fertility control has caused unnecessary delays in the implementation of effective management programs because fertility control has been perceived as the ideal solution.

NOTE:

1) ***MI Public Act 390 of 2018 currently prohibits until April 1, 2022, the MDNR from issuing any permits to authorize the sterilizing of deer***
2) *A December 20, 2020 MDNR Preliminary Report on Sterilization of Game in Michigan found that the MDNR is* ***not yet able to evaluate*** *how much of deer decline may be attributable to the combined sharpshooting and sterilization efforts, or attributable to other factors. The final MDNR report is due March 31, 2022*

Due to the described concerns with these methods (effectiveness, cost, stress/injury/death to deer), as well as their status as experimental (and sterilization currently prohibited under Michigan law), our committee does not recommend any of these fertility methods be employed by the City.

2. **Reintroduction of Predators**
   (Deer Management Handbook for Communities in New York, 2018, p.20)
   This is not ecologically or socially feasible in areas with high human density and no large blocks of natural habitat.

NOTE: *Due to the highly urban nature of Kalamazoo, and for the safety of our citizens (and pets), our committee does not recommend this method be employed by the City.*

3. **NO ACTION**
   Per the MDNR's Review of Deer Management in Michigan, 2009, pp.32-33:
   "Implementing urban/suburban deer management is a difficult, costly, and time-consuming undertaking. Communities may be tempted to ignore human-deer conflicts until the problem has escalated and become severe in nature. ***The eventual cost for taking no action will likely be much greater than if the problem had been addressed when conflicts first surfaced****. Deer populations, as well as frustration levels of residents, will likely grow to the point where finding a successful solution becomes very difficult".*

The percentage of our survey respondents who found it "not acceptable to not acceptable at all" for the City to "let nature take its course without human interference" – 92.1%

When asked their "general thoughts about deer in Kalamazoo"

- **"I enjoy the presence of deer, but I worry about problems (damage, disease, etc.) they may cause" - 48.4%**
- **"I do not enjoy the presence of deer and regard them as a nuisance" – 22.7%**
- **"I enjoy the presence of deer, and I do not worry about problems they may cause" – 26.8%**

NOTE: *Based on our resident survey results, as well as the many comments, complaints, and concerns voiced to many of our Neighborhood Associations over the years (especially in the last 2-4 years), as well as our report's demonstrated deer population issues our committee is* ***strongly against the City taking a "no action" approach to our urban deer population****.*

CONCLUSIONS AND RECOMMENDATIONS

Our committee's deer management recommendations are based on the best biological science available to us; however, all decisions must also be considered within a social context where stakeholder values and priorities must be addressed. *The integration of social considerations into scientific examination is necessary* to move wildlife management recommendations and actions forward.

NOTE: *Our committee understands that proper research and implementing effective and acceptable solutions will take time. Due to the complexity of the issue, as well as the additional research needed to make scientifically based decisions, our committee recommends this issue be addressed in TWO PHASES, employing the following tools:*

A) PHASE 1 - *Develop and Implement*:

1) Public Education Program and Resident Resource Website

- Public information is an important part of the management of deer-human conflicts. A lack of understanding of deer biology and ecology can be compounded by a lack of knowledge, misinformation, and misconception regarding available management options.

Our committee recommends the City develops and maintains an up-to-date, comprehensive deer education program to include educational programs, literature, dedicated website, in-person educational events, public informational displays, ***and hold regularly scheduled meetings with residents and neighborhoods to keep them informed and educated on responsible deer management techniques***

2) Deer Carcass Removal Program

- Although not asked in our survey, ***many neighborhood associations and residents have indicated over the years their frustration and disappointment that no local***

governmental body will take responsibility for removing deer carcasses. The only "solutions" offered to-date include either "drag it into the woods" or "dump it in a trash bin". Both are completely unacceptable

Our committee strongly recommends the city develops an efficient and safe program for residents to have deer carcasses removed from their property, as well as from parks and roadways.

3) Modified Fence Ordinance and/or Allow Higher Fencing

- It has been demonstrated that "deer-proof" fencing (8-10-foot-high woven wire) is effective at excluding deer from specific locations to prevent or reduce deer access. Additionally, electric tape in some locations should be considered
- Although fencing does not directly reduce deer numbers it can prevent damage, which in turn has the potential to some extent to increase the tolerance to deer by those directly impacted.

4) Support Enforcement of Michigan's "No Feeding" Law

- Address illegal deer feeding by:
  - Educating residents of the state's current "no feeding" law
  - Creating an effective and efficient process for residents to report illegal feeding
  - **Implementing an effective way to enforce this ban via education and/or penalties to violators**

B) PHASE 2 - *Develop and Implement:*

1) Further City-led Research

As stated earlier, the MDNR **advises** community leaders, **assists** in the development of deer management plans, **participates** on local task forces, speaks at public meetings, **conducts** disease testing, and **provides** permits for lethal harvest*, but lacks a defined process that can be implemented consistently across the State*. (MDNR, 2009, p.26)

It is precisely for this reason our committee recommends the City of Kalamazoo takes the initiative and lead in researching, developing, and implementing a comprehensive short-, medium-, and long-term deer management program for Kalamazoo for the health and safety of its ecosystem and the deer and human populations.

- Our data and resident survey indicate that Kalamazoo has multiple herds of does and fawns, the deer population seems to be increasing, and some neighborhoods are more severely affected by our deer population than others
  - Our committee *strongly recommends* that the deer management program takes this into account, and looks at this issue from each affected neighborhood, based on their geography and topography

- Carrying Capacity is a complex and variable concept; very specific to each area/range/herd where deer live. Our committee *recommends* further study to:
  - Determine accurate deer counts within Kalamazoo
  - Begin the focus of study on those individual neighborhoods that have reported more deer sightings and issues than others
  - Measure citizen tolerance, deer-vehicle crashes, and vegetation regeneration by each affected area

2) City-led Deer Management Plan

*Our committee recommends the City **develop and authorize a budget now**, as well as **adequate staff resources now**, to:*

1) Comprehensively research the issues brought forth in this report, working with experts from MDNR, as well as regional and local environmental, biological, and health experts

2) Include Western Michigan University (WMU) in the discussions and research process. As the landowner of two of the largest natural open spaces in Kalamazoo that house our urban deer (Asylum Lake Preserve and Kleinstuck Preserve) WMU's input and cooperation will be crucial in successfully planning and implementing any deer management plan
3) Utilize that research to develop a comprehensive short-, medium-, and long-term deer management program for Kalamazoo that is ongoing in nature

4) Let the research, science, and evidence dictate the best course of action(s) that works to protect the health and safety of both our residents and the deer herd

C)

Suggested Implementation Timeline

APPENDIX A: COMMITTEE ROSTER

Neighborhood Association Ad Hoc Deer Management Committee

Association	Name	Title
Arcadia NA	Jeff Carroll	Past President
Bronson Neighborhood	Mary Balkema	Representative
Edison NA	Tammy Taylor	Executive Director
Hillcrest Neighborhood	Vicky Kettner	FB Administrator
Milwood NA	John Hillard	President
Oakland Dr./Winchell NA	Peter Kushner (Chair)	President
Oakwood NA	David Nesius	Board Representative
Parker/Duke NA	Bill Hughes	President
Parkview Hills NA	Rick Schmitt	Board Representative
Parkwyn Village	Les Tung	President
Vine NA	Steve Walsh	Executive Director
Westnedge Hill	Natalie Patchell	Representative
Stewards of Kleinstuck	Heather Ratliff	Treasurer
Environmental Concerns Committee	Jim Melluish	Member
Environmental Concerns Committee	Gail Walter	Member
Advisors		
Kalamazoo Nature Center	Jen Meilinger	Community Science Director
MDNR	Don Poppe	Wildlife Biologist
City of Kalamazoo	Rebekah Kik	Director, CPED

APPENDIX B: MICHIGAN CITIES THAT HAVE IMPLEMENTED DEER CULLING PROGRAMS

1) **Summary: Deer Cull/Management Programs – Issues and Concerns**

MI Cities Holding Culls:

Ann Arbor	2015-2020
East Lansing	2020
Lansing	2017
Jackson	2008-2017
Muskegon	2019
Tecumseh	2018-2019
Manistee	2019
Meridian Twp.	2010-present
Kal. Nature Center	2001-present

2) **Reasons Municipalities Decided to Control their Deer Population**

Ann Arbor:

Began its deer cull program in 2016 for three primary reasons:

1) Residents stated herds of deer were eating virtually all landscaping as soon as it was planted.
2) Multiple nature areas and parks in the city were being depleted of flowers and tree seedlings, resulting in reduced biodiversity, and depriving wooded areas of young trees.
3) Car collisions with deer were increasing.

East Lansing:

1) *"This [isn't] about whether gardens are being destroyed. It [is] about proper wildlife management".*
3) Survey of under 200 residents: about 60% of residents supported a professional deer cull; 39% opposed it
4) Another survey indicated that about 54% of respondents "strongly supported" a lethal deer cull:
   - *"We're not here to eliminate deer in East Lansing. This is about managing the population*"
   - *"Overpopulation is an issue and, at least from what I've been hearing, residents want something to be done".*

Lansing:

1) Over-population
   - A MDNR-funded culling effort removed 113 deer over seven nights in 2017. As a result, more than 3,300 lbs. of venison was donated to Volunteers of America

Meridian Township:

1) Have been culling since 2010. A 2020 survey indicated 81% of residents approved
2) 2020: 350 deer culled, and 7,000 pounds of venison was donated to a five-county area.

Jackson:

1) MDNR study said the deer population in the area was very high
2) A high number of car crashes due to deer

Muskegon:

1) Nuisance
2) Worried about the spread of deer ticks and tick-borne illnesses, such as Lyme disease. (There were no signs that Lyme disease was spreading in Muskegon County at that time (2019))

Tecumseh:

1) Destruction to their gardens from browsing deer
2) Car-deer collisions
3) Spread of diseases such as Lyme Disease in the city

Manistee:

1) "Overrun with deer"

Kalamazoo Nature Center (rural environment):

1) Malnutrition / chronic wasting / tick-borne illnesses

APPENDIX C: TECHNICAL CONSULTANTS AND OTHER EXPERT SUPPORT

1) Michigan Department of Natural Resources (MDNR): Don Poppe; Wildlife Biologist
2) Kalamazoo Nature Center: Jen Meilinger, Community Science Director and Ryan Koziatek, Stewardship Director
3) Kalamazoo Christian High School: Life Sciences Class
4) Kalamazoo College: Department of Biology

APPENDIX D: AD HOC COMMITTEE CITIZEN SURVEY RESULTS

Neighborhood Association Ad Hoc Committee:
Citizen Survey - May 2021

Total number of responses: 1,616

What evidence have you seen of deer in the city the past 3 years? (Check all that apply.)	
Saw deer	97.2%
Saw deer pellets (poop)	66.3%
Saw deer feeding	74.5%
Saw evidence of where deer had been feeding	66.8%

In your opinion over the past 3 years, what trend have you seen in the number of deer around your house/neighborhood/city?	
More deer now than 3 years ago	58.0%
Fewer deer now than 3 years ago	4.1%
About the same number of deer now as 3 years ago	29.1%
No deer seen at all	1.3%
Don't Know	7.2%

The following is a list of interests that people may have regarding deer. Please indicate how interested you are in doing each of the following.	
Watching or photographing deer near your home? - Not interested-1	35.3%
Watching or photographing deer near your home? - 2	10.2%
Watching or photographing deer near your home? - 3	18.4%
Watching or photographing deer near your home? - 4	12.0%
Watching or photographing deer near your home? - Very interested - 5	23.0%
Feeding deer near your home? - Not interested - 1	78.9%
Feeding deer near your home? - 2	3.9%
Feeding deer near your home? - 3	6.9%
Feeding deer near your home? - 4	2.8%
Feeding deer near your home? - Very interested - 5	5.6%
Learning more about deer management actions? - Not interested - 1	17.3%
Learning more about deer management actions? - 2	7.5%
Learning more about deer management actions? - 3	19.7%
Learning more about deer management actions? - 4	17.2%
Learning more about deer management actions? - Very interested - 5	37.1%
Hunting deer? - Not interested - 1	79.0%
Hunting deer? - 2	3.0%
Hunting deer? - 3	5.3%
Hunting deer? - 4	2.4%
Hunting deer? - Very interested -5	8.5%

The following is a list of possible problems that people may have regarding deer. Please indicate how concerned you are about each in Kalamazoo

Injury to you or family members from a deer-vehicle collision - Not concerned -1	20.3%
Injury to you or family members from a deer-vehicle collision - 2	14.0%
Injury to you or family members from a deer-vehicle collision - 3	17.2%
Injury to you or family members from a deer-vehicle collision - 4	16.8%
Injury to you or family members from a deer-vehicle collision - Very concerned - 5	30.4%
Deer threatening or harming people or pets - Not concerned -1	57.4%
Deer threatening or harming people or pets - 2	7.3%
Deer threatening or harming people or pets - 3	10.6%
Deer threatening or harming people or pets - 4	7.3%
Deer threatening or harming people or pets - Very concerned -5	11.9%
Deer damage to trees, shrubs, plantings & gardens around your home - Not concerned - 1	21.6%
Deer damage to trees, shrubs, plantings & gardens around your home - 2	9.7%
Deer damage to trees, shrubs, plantings & gardens around your home - 3	10.4%
Deer damage to trees, shrubs, plantings & gardens around your home - 4	12.3%
Deer damage to trees, shrubs, plantings & gardens around your home - Very concerned -5	43.9%
Over-browsing of natural habitats (on public and/or private lands) - Not concerned - 1	22.6%
Over-browsing of natural habitats (on public and/or private lands) - 2	7.8%
Over-browsing of natural habitats (on public and/or private lands) - 3	12.4%
Over-browsing of natural habitats (on public and/or private lands) - 4	14.3%
Over-browsing of natural habitats (on public and/or private lands) - Very concerned -5	36.8%
Deer preventing the natural regrowth of native plants - Not concerned - 1	19.9%
Deer preventing the natural regrowth of native plants - 2	9.8%
Deer preventing the natural regrowth of native plants - 3	13.1%
Deer preventing the natural regrowth of native plants - 4	16.0%
Deer preventing the natural regrowth of native plants - Very concerned -5	36.6%
Loss of plant or animal diversity in neighborhood/city - Not concerned - 1	21.5%
Loss of plant or animal diversity in neighborhood/city - 2	8.3%
Loss of plant or animal diversity in neighborhood/city - 3	16.5%
Loss of plant or animal diversity in neighborhood/city - 4	15.0%
Loss of plant or animal diversity in neighborhood/city - Very concerned - 5	32.7%
You or those close to you getting a tick-borne disease (such as Lyme) - Not concerned -1	18.5%

You or those close to you getting a tick-borne disease (such as Lyme) - 2	8.5%
You or those close to you getting a tick-borne disease (such as Lyme) - 3	11.8%
You or those close to you getting a tick-borne disease (such as Lyme) - 4	15.7%
You or those close to you getting a tick-borne disease (such as Lyme) - Very concerned - 5	42.5%
Disruption of our city's ecosystem - Not concerned -1	20.5%
Disruption of our city's ecosystem - 2	9.4%
Disruption of our city's ecosystem - 3	17.7%
Disruption of our city's ecosystem - 4	15.8%
Disruption of our city's ecosystem - Very concerned -5	30.6%
Decreased bird populations due to deer-related habitat loss - Not concerned -1	20.5%
Decreased bird populations due to deer-related habitat loss - 2	10.3%
Decreased bird populations due to deer-related habitat loss - 3	17.2%
Decreased bird populations due to deer-related habitat loss - 4	15.9%
Decreased bird populations due to deer-related habitat loss - Very concerned - 5	27.2%
Chronic Wasting Disease (CWD) spreading among local deer - Not concerned - 1	14.5%
Chronic Wasting Disease (CWD) spreading among local deer - 2	7.4%
Chronic Wasting Disease (CWD) spreading among local deer - 3	14.3%
Chronic Wasting Disease (CWD) spreading among local deer - 4	18.1%
Chronic Wasting Disease (CWD) spreading among local deer - Very concerned - 5	36.8%
Loss of deer habitat, leading to their increased population - Not concerned -1	11.0%
Loss of deer habitat, leading to their increased population - 2	6.1%
Loss of deer habitat, leading to their increased population - 3	14.4%
Loss of deer habitat, leading to their increased population - 4	18.6%
Loss of deer habitat, leading to their increased population - Very concerned - 5	40.2%

Have you personally been affected by any of the problems listed previously?

Yes	63.4%
No	36.0%

Generally, what are your thoughts about deer in Kalamazoo?

I enjoy the presence of deer, and I do not worry about problems they may cause.	26.8%
I enjoy the presence of deer, but I worry about problems (damage, disease, etc.) they may cause.	48.4%
I do not enjoy the presence of deer and regard them as a nuisance.	22.7%
I have no specific feelings about deer in Kalamazoo	1.4%

Please indicate the extent to which you believe the following events have increased, decreased, or stayed the same in your local area over the last 3 years.

Number of deer you see around your home - Decreased a lot -1	2.5%
Number of deer you see around your home - 2	2.3%
Number of deer you see around your home - No change -3	29.8%
Number of deer you see around your home - 4	19.6%
Number of deer you see around your home - Increased a lot -5	41.2%
Number of deer you see in your neighborhood - Decreased a lot- 1	2.3%
Number of deer you see in your neighborhood - 2	2.4%
Number of deer you see in your neighborhood - No change - 3	27.8%
Number of deer you see in your neighborhood - 4	20.2%
Number of deer you see in your neighborhood - Increased a lot - 5	42.6%
Number of deer you see city-wide - Decreased a lot- 1	2.0%
Number of deer you see city-wide - 2	1.7%
Number of deer you see city-wide - No change - 3	29.8%
Number of deer you see city-wide - 4	23.3%
Number of deer you see city-wide - Increased a lot- 5	25.9%
Amount of deer damage to plants around your home - Decreased a lot - 1	2.9%
Amount of deer damage to plants around your home - 2	1.7%
Amount of deer damage to plants around your home - No change-3	32.2%
Amount of deer damage to plants around your home - 4	17.1%
Amount of deer damage to plants around your home - Increased a lot- 5	39.5%
Amount of deer damage to natural plants and forests in parks, undeveloped land, etc. - Decreased a lot - 1	2.5%
Amount of deer damage to natural plants and forests in parks, undeveloped land, etc. - 2	1.4%
Amount of deer damage to natural plants and forests in parks, undeveloped land, etc. - No change - 3	28.5%
Amount of deer damage to natural plants and forests in parks, undeveloped land, etc. - 4	12.9%
Amount of deer damage to natural plants and forests in parks, undeveloped land, etc. - Increased a lot- 5	19.6%
Number of deer-vehicle collisions (roadside carcasses) - Decreased a lot - 1	2.7%
Number of deer-vehicle collisions (roadside carcasses) - 2	1.9%
Number of deer-vehicle collisions (roadside carcasses) - No change - 3	29.2%
Number of deer-vehicle collisions (roadside carcasses) - 4	20.7%
Number of deer-vehicle collisions (roadside carcasses) - Increased a lot- 5	18.7%

How do you believe the size of the deer population should change?

Decrease a lot - 1	36.2%
2	27.5%
Stay the same - 3	23.6%
4	1.9%
Increase a lot - 5	2.2%

Based on your previous answer, How important is it to you that the size of the deer population change?

Not important - 1	15.8%
2	6.1%
3	14.4%
4	18.4%
Very important - 5	38.2%

Listed below are actions that have been used for managing deer in other communities. Some are actions individuals might take on their own property; others require collective community action. How acceptable to you personally is each action for managing deer in Kalamazoo?

Ongoing deer surveying (drone, trail cameras, etc.) - Not acceptable at all - 1	6.6%
Ongoing deer surveying (drone, trail cameras, etc.) - 2	4.3%
Ongoing deer surveying (drone, trail cameras, etc.) - 3	10.5%
Ongoing deer surveying (drone, trail cameras, etc.) - 4	14.3%
Ongoing deer surveying (drone, trail cameras, etc.) - Very acceptable - 5	58.0%
Allow "deer" fences to keep them away from yards, gardens, etc. - Not acceptable at all - 1	8.0%
Allow "deer" fences to keep them away from yards, gardens, etc. - 2	6.9%
Allow "deer" fences to keep them away from yards, gardens, etc. - 3	11.9%
Allow "deer" fences to keep them away from yards, gardens, etc. - 4	15.5%
Allow "deer" fences to keep them away from yards, gardens, etc. - Very acceptable - 5	50.7%
Sterilization (live trap, sterilize, release) - Not acceptable at all - 1	17.6%
Sterilization (live trap, sterilize, release) - 2	7.8%
Sterilization (live trap, sterilize, release) - 3	10.8%
Sterilization (live trap, sterilize, release) - 4	12.6%
Sterilization (live trap, sterilize, release) - Very acceptable - 5	43.2%
Contraception (birth control) – effective for up to 3 years - Not acceptable at all - 1	15.3%
Contraception (birth control) – effective for up to 3 years - 2	6.6%
Contraception (birth control) – effective for up to 3 years - 3	10.5%
Contraception (birth control) – effective for up to 3 years - 4	12.8%
Contraception (birth control) – effective for up to 3 years - Very acceptable - 5	47.1%

Use firearms - regulated sharpshooters to kill deer and donate the deer meat to food banks. - Not acceptable at all - 1	35.7%
Use firearms - regulated sharpshooters to kill deer and donate the deer meat to food banks. - 2	8.3%
Use firearms - regulated sharpshooters to kill deer and donate the deer meat to food banks. - 3	10.3%
Use firearms - regulated sharpshooters to kill deer and donate the deer meat to food banks. - 4	9.7%
Use firearms - regulated sharpshooters to kill deer and donate the deer meat to food banks. - Very acceptable - 5	9.7%
Use archery - regulated sharpshooters to kill deer and donate the deer meat to food banks - Not acceptable at all - 1	31.6%
Use archery - regulated sharpshooters to kill deer and donate the deer meat to food banks - 2	30.8%
Use archery - regulated sharpshooters to kill deer and donate the deer meat to food banks - 3	7.7%
Use archery - regulated sharpshooters to kill deer and donate the deer meat to food banks - 4	10.0%
Use archery - regulated sharpshooters to kill deer and donate the deer meat to food banks - Very acceptable - 5	9.8%
Allow licensed archery hunting by licensed hunters (vs. sharpshooters) to control the deer population. - Not acceptable at all - 1	37.6%
Allow licensed archery hunting by licensed hunters (vs. sharpshooters) to control the deer population. - 2	44.0%
Allow licensed archery hunting by licensed hunters (vs. sharpshooters) to control the deer population. - 3	10.5%
Allow licensed archery hunting by licensed hunters (vs. sharpshooters) to control the deer population. - 4	8.0%
Allow licensed archery hunting by licensed hunters (vs. sharpshooters) to control the deer population. - Very acceptable - 5	7.0%
Allow licensed firearms hunting by licensed hunters (vs. sharpshooters) to control the deer population. - Not acceptable at all - 1	25.6%
Allow licensed firearms hunting by licensed hunters (vs. sharpshooters) to control the deer population. - 2	54.3%
Allow licensed firearms hunting by licensed hunters (vs. sharpshooters) to control the deer population. - 3	11.4%
Allow licensed firearms hunting by licensed hunters (vs. sharpshooters) to control the deer population. - 4	6.4%
Allow licensed firearms hunting by licensed hunters (vs. sharpshooters) to control the deer population. - Very acceptable - 5	4.8%
Stricter enforcement of current "no deer feeding" ordinance - Not acceptable at all - 1	18.1%
Stricter enforcement of current "no deer feeding" ordinance - 2	8.4%
Stricter enforcement of current "no deer feeding" ordinance - 3	6.7%
Stricter enforcement of current "no deer feeding" ordinance - 4	11.5%
Stricter enforcement of current "no deer feeding" ordinance - Very acceptable - 5	10.9%
Educate people about how to co-exist with deer - Not acceptable at all - 1	55.4%
Educate people about how to co-exist with deer - 2	8.2%
Educate people about how to co-exist with deer - 3	6.2%
Educate people about how to co-exist with deer - 4	12.3%
Educate people about how to co-exist with deer - Very acceptable - 5	11.4%

Let nature take its course without human interference - Not acceptable at all - 1	57.0%
Let nature take its course without human interference - 2	35.1%
Let nature take its course without human interference - 3	15.5%
Let nature take its course without human interference - 4	15.8%
Let nature take its course without human interference - Very acceptable - 5	7.7%
Use chemical repellents to keep deer away from plants. - Not acceptable at all - 1	19.4%
Use chemical repellents to keep deer away from plants. - 2	30.6%
Use chemical repellents to keep deer away from plants. - 3	15.5%
Use chemical repellents to keep deer away from plants. - 4	15.3%
Use chemical repellents to keep deer away from plants. - Very acceptable - 5	10.5%
Capture and kill deer by lethal injection. - Not acceptable at all - 1	54.6%
Capture and kill deer by lethal injection. - 2	9.3%
Capture and kill deer by lethal injection. - 3	7.0%
Capture and kill deer by lethal injection. - 4	4.0%
Capture and kill deer by lethal injection. - Very acceptable - 5	16.2%
A combination of any of the above approaches - Not acceptable at all - 1	17.0%
A combination of any of the above approaches - 2	7.0%
A combination of any of the above approaches - 3	17.2%
A combination of any of the above approaches - 4	12.4%
A combination of any of the above approaches - Very acceptable - 5	27.5%

Generally, when you think about all aspects of living with deer, how would you weigh the benefits and disadvantages of having deer in your area?

The benefits of deer in my local area exceed the disadvantages	28.3%
The disadvantages of deer in my local area exceed the benefits	43.6%
The disadvantages and benefits of deer in my local area are about an even tradeoff	26.4%

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