WHAT IS THE PROBLEM WE NEED TO SOLVE?

Is it "too many deer"? If so, the answer may be population control. But the DNR and wildlife biologists agree: Ann Arbor does not have an overpopulation of deer. Furthermore, despite years of annual aerial deer counts, no one can agree on how many deer there are—or more importantly, if any number would be acceptable.

If our problem is "deer in places we don't want them," a.k.a., the nonscientific term "overabundance of deer," site-specific mitigation techniques are effective solutions. It's important to know that unlike shooting deer (which may initially satiate those who are frustrated with deer), site-specific solutions aren't "quick fixes," and a may require a combination of measures. But they are *cost-effective, nonviolent and, when used consistently, successful*; unlike controversial and expensive culls which continue for years with no end in-sight.

CONTENTS

UNDERSTANDING DEER POPULATION

Carrying Capacity (Biological vs. Cultural)

In urbanized areas where the landscape is shaped by humans, food and resources are abundant and true biological carrying capacity is rarely, if ever approached. Social or cultural carrying capacity on the other hand often is:

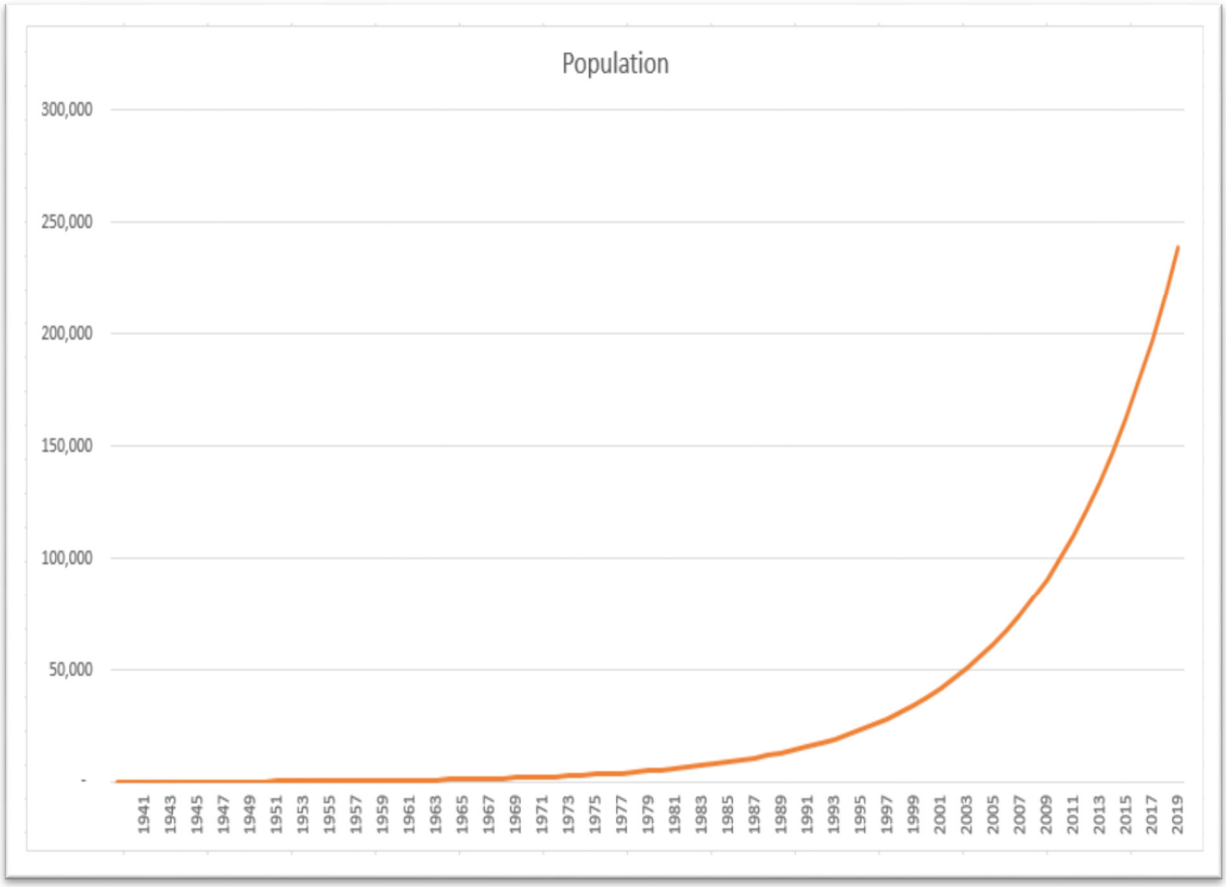
1. *Biological carrying capacity (BCC) is* the number of deer a given piece of land (or ecosystem) can support. If BCC is exceeded, that means there's not enough food for all and some deer will starve. Except in the most extreme and prolonged winters, adult deer rarely starve in suburbs; before deer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

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

Claims of Exponential Deer Population Growth

Some have claimed that without hunters and wolves, the deer population is growing exponentially. However, there haven't been hunters or wolves in Ann Arbor for many decades. But we do have coyote (some studies suggest coyotes have a greater impact on deer population than wolves), cars, natural causes of death, and limits to carrying capacity. Animals in nature usually find their own balance and populations will ebb and flow based on a variety of conditions.

The graph below is an example of exponential growth of the deer population (based on an average lifespan of 8 years and only half the does giving birth once a year to a single fawn). If we had exponential growth deer would far outnumber people in Ann Arbor. The 2015 pre-cull aerial count showed 168 deer.



A Growing Ann Arbor Human Population

Ann Arbor is a rapidly growing community. In 1950, there were 48,000 residents. In 2019, 122,000—plus 48,000 students and approximately 80,000 nonresident daily commuters. Areas that were formerly wildlife habitat are being bulldozed for expansion. Within and between these new developments are small carve-outs of natural space—the last vestiges of home for some wild animals.

Human encroachment combined with narrowing swaths of natural spaces increases deer visibility and proximity to homes, making some "feel" numbers have increased. But as mentioned in the previous section: Surveys show people assume wildlife numbers are as high as their personal conflict with them. That is, people's desires for more or fewer deer are dependent on whether they're experiencing conflicts, and the severity of those conflicts.

And there's our beautiful Huron River. It's the backdrop to some of Ann Arbor's most expensive (and unfenced) human real estate, and the ideal habitat for myriad wildlife.

This has set the stage for human/animal conflict, particularly with those trying to maintain pristine landscapes who may view deer as "pests." Killing deer who've been part of the world's natural environment forever is not about true conservation, but about getting rid of animals causing human inconvenience.

The real reason for the cull is not an "ecological imbalance," but rather we have exceeded our cultural carrying capacity in some areas of our community. This is defined not by numbers, but by the public's tolerance of deer. However, as shown by the City's own survey, the majority of residents are okay with or enjoy the deer. The majority are quite tolerant, actually.

The Futility of Culls – Population Rebound

While it is commonly assumed that hunting or culling will decrease the deer population, there are issues with this approach which is why communities who cull can't figure out how to stop:

1. *Increased reproduction:* Deer are very adaptable, and their productivity is keenly tied to their food resource. When there are fewer deer in an area and abundant food, they will maximize their reproduction – i.e., having twins and triplets the following spring instead of a single fawn. This can cause numbers to rebound quickly after any deer removal. Even if deer numbers can be lowered, they don't stay at that level.

2. *Immigration of new deer to area:* Ann Arbor isn't an island or a fenced-in nature preserve. Deer from the surrounding area may take advantage of any vacated niche. This, combined with a high reproductive rate, can lead to deer numbers bouncing back quickly after any depopulation effort.

The Futility of Culls - Deer Movement

When hunting or culling commences, deer will move into unhunted "safe" sanctuary areas within their habitat (or even make long distance movements) out of survival instinct. ***This is often why new complaints from different, previously content, areas of a community arise after culling has begun – adding to a false sense of a growing population.*** Once lethal control has ceased, deer may move back to their original territory.

The Futility of Culls - Increased Removal Effort & Cost

1. Even if deer numbers are lower after lethal removal efforts, it then requires more effort by hunters or sharpshooters to take out the same number of deer (since the deer will be scarcer and warier) in subsequent years and drives up the cost of culling.

2. Recurring challenge: Getting deer numbers to a low level, then keeping them at that level, can be extremely difficult and results in the need for perpetual annual hunts or expensive culling.

Natural Predators

Many claim that because urban deer have lost their natural predators, population growth is out of control and we are forced to shoot. While lack of wolves is often cited as the issue, not only are wolves just one of the animals who prey on deer, but they could never be part of the solution.

It is true that native wolves once roamed our entire state and county along with millions of herd animals. Maligned by European settlers, the population was decimated barbarically.

According to the DNR, the last wolf was eliminated from Michigan's Lower Peninsula in 1935, and by the time the state had repealed its bounty on wolves in 1960, wolves had nearly vanished from the Upper Peninsula, too. In 1973, wolves received protections under the Endangered Species Act. Since then, they've made a very modest comeback in the UP.

While wolves are an essential part of a natural ecosystem, they do not play a significant role in reducing deer population. In fact, this myth is perpetuated by trophy hunters who want to shoot wolves in the name of "conservation" of the deer population (for the benefit of deer hunters).

Wolves live in family packs, are territorial and may roam hundreds of miles in search of a meal. Favorable habitat averages one wolf per 25 square miles; Ann Arbor is about 28 square miles.

According to average meat-eating habits, a wolf consumes enough meat to equal roughly 15-20 deer per year. This includes road-killed deer and deer scavenged, and is based on the highly unlikely scenario that they're eating only deer (wolves consume other ungulates and small mammals, such as beaver and snowshoe hare, and they supplement their diet with berries and even grasshoppers).

Like all of us, wolves prefer the easiest catch. As such, they also select the weakest of the herd—the young, old, sick and injured**—actually strengthening the herd.** A portion are those who would have died regardless.

Michigan whitetail deer are also native, and about 1.75 million strong in Michigan. They, too, were subject to overhunting in the early 1900s. After protections were put in place, they've bounced back, and the population is now maintained very carefully in more northern areas by the State of Michigan for the benefit of the hunting industry (which funds about 20% of the DNR).

(Natural Predators, Cont'd)

The Ann Arbor area has always had deer. But culling didn't start until 2015, almost a century after the last wolf disappeared from the Lower Peninsula. And far more deer are killed by cars—even after FIVE years of culling— than would be killed if the deer and wolves were cohabitating naturally.

In complete dissimilarity to wolf predation, the City shoots 100 or so deer within a few weeks' time, and makes no distinction between the strong and the weak. Or those who have learned to avoid crossing roads and can teach their young to do the same, and those who haven't.

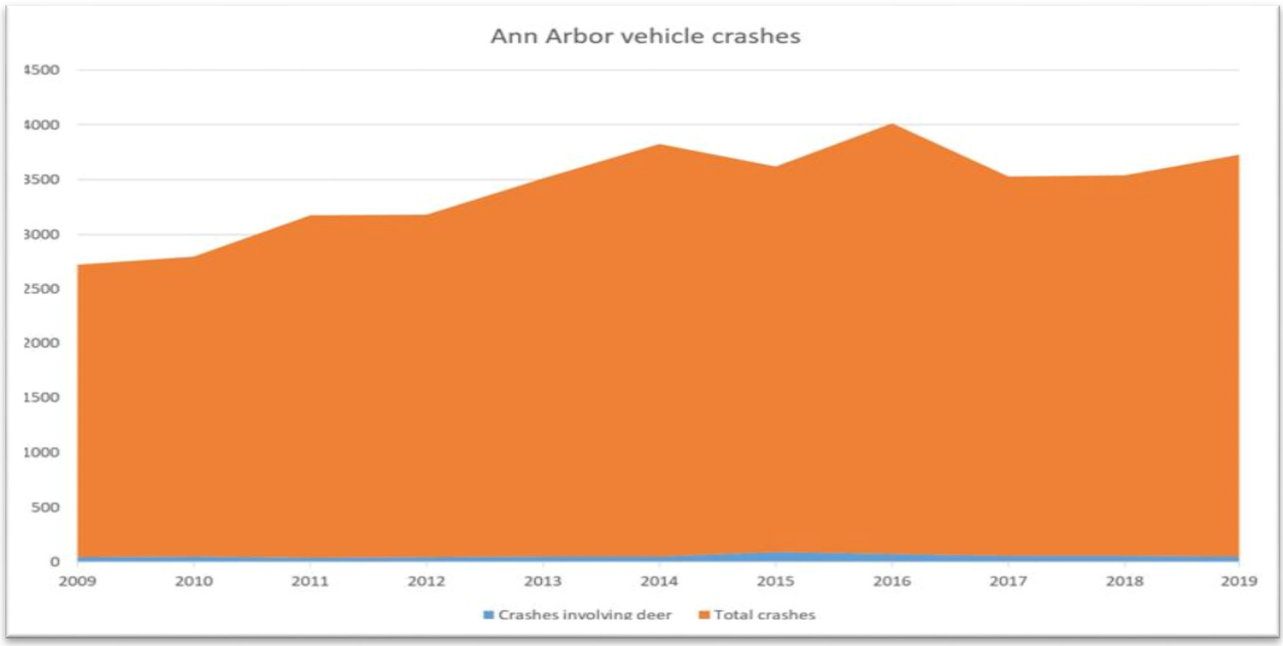
Ann Arbor's deer problem is about the number of people and their actions, not the number of deer or wolves.

MANAGING DEER-HUMAN CONFLICTS

DECREASING DEER VEHICLE COLLISIONS (DVCS)

The likelihood of a crash in Ann Arbor including a deer has actually decreased in the past decade:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Crashes involving Deer	1.64%	1.97%	1.34%	1.43%	1.44%	1.35%	2.55%	1.85%	1.61%	1.58%	1.36%
# Crashes with Deer	44	54	42	45	50	51	90	73	56	55	50
Total All Crashes	2682	2742	3133	3137	3464	3776	3530	3939	3471	3486	3676



State-wide, the percentage of deer-vehicle collisions has declined, too; in 2010, 19.8% of all Michigan crashes were deer-related; in 2019, 17.7%.

Data shows Ann Arbor drivers should be more afraid of bicycles, as there are more crashes with bicyclists than deer. And you're much more likely to suffer a crash in Ann Arbor with someone who is intoxicated. Unlike those types of crashes, there have been no fatal collisions with deer in Ann Arbor.

(DECREASING DEER VEHICLE COLLISIONS CONT'D)

Despite the facts and statistics, though, emotions rise when discussing deer-vehicle collisions. And most can agree: we'd like to decrease DVCs as much as possible.

What can we do?

The most proven, cost-effective way to reduce DVCs is strategic fencing.

- The Federal Highway Administration's Report to Congress focused on the reduction of wildlife-vehicle collisions concludes by recommending **public education**, and wildlife **fencing**.

- A summary study by the University of Nebraska on Deer-Vehicle Collision (DVC) prevention techniques says, "multiple studies have shown properly installed and maintained fences combined with wildlife crossings to be the most effective method of reducing DVCs."

- A paper by Wildlife Control at Cornell analyzing wildlife crash prevention methods and their effectiveness says, "Fencing, combined with underpasses and overpasses as appropriate, is the only broadly accepted method that is theoretically sound and proven to be effective."

- The Deer-Vehicle Crash Information Clearinghouse (DVCIC) states, "Only studies of properly installed/maintained exclusionary fencing and wildlife crossing installations have consistently shown DVC reductions**.** The DVC reduction capabilities of the other 14 countermeasures [including herd reduction] appear to still be in question."

All wildlife populations will ebb and flow naturally based on a variety of conditions including weather, but deer tend to cross the same roads, in the same areas, year-after-year – patterns which can be seen by overlaying Ann Arbor's annual maps of deer-vehicle collisions.

The City may want to consider **speed studies** in these areas as well as assess current **signage**. Research shows that other inexpensive solutions (e.g., placing a plastic bag over a sign which scare deer) have been effective, too.

Studies suggest **public education** can help reduce DVC's, too – e.g., including reminders about safe driving/deer education with utility bills.

CONTROLLING LYME DISEASE

While “deer tick” is an unfortunate name, deer aren’t responsible for Lyme disease; ticks are.

In a Harvard study conducted in Massachusetts, they reduced their deer from around 400 in 1983 to just over 100 in 1991, yet Lyme disease kept growing. Why? As the researcher says, "The deer do not carry the bacteria. They [or another host] are needed to continue the life cycle of the tick, but they are not infected. So as you killed deer, you would simply have more ticks per deer because the surface area of each is enough to support many ticks. Just killing deer won’t do the job."

When deer are reduced, ticks find other hosts including mice and songbirds.

The American Lyme Disease Foundation does not advocate for deer culls. Nor does the Lyme Disease Association. Nor does the CDC. Because it’s not an effective way of controlling Lyme Disease; it’s a scare tactic used by those whose goal is to cull deer.

What can we do?

If Lyme Disease is a community concern, the most effective way to control it is a community education program. The CDC provides a wealth of information on prevention and early detection of Lyme.

ADDRESSING ENVIRONMENTAL CONCERNS

While it's simple and popular to say that deer negatively affect ecosystems, as with all ecological issues, the truth is much more complex, and the science is rapidly evolving.

Deer are easy scapegoats for a variety of systemic issues causing forest growth concerns. These include pollutants, insecticides and herbicides, acid rain, lawn fertilizers, noise and light pollution, land development and fragmentation and, of course, climate change. We also need to consider other natural dynamics like disease, competing plant species, and parasitic organisms.

But we also must recognize that deer are not just another problem; they are also an important and beneficial part of the ecosystem. Some of these benefits we know about, such as increasing biodiversity and new plant growth; deer help spread seeds and fertilize the soil through their feces and eating brush helps sunlight reach small plants. Other benefits are yet to be fully understood.

New England's Highstead Foundation has had a long-term (17+ year) ecological study on deer impact, monitoring the vegetation, diversity of plants, tree regeneration, plant abundance and more. *They report findings without bias for or against deer.* "[Deer and the forest have a] complex and not very straightforward relationship," says Highstead ecologist Ed Faison. "Some exotic species benefit from deer browsing and some do not."

Deer also appear to have a positive impact on the continued growth of mature trees, which ecologists say is important in the long-term health of forests.

A 41-year-long study of national parks in Ireland published in the Journal of Forest Ecology and Management found that ***grazing deer are good for diversity, and that if deer are shot in annual culls, the forest becomes significantly less diverse. Deer prevent some plants from taking over the valuable ecosystem.***

> *"Our results certainly have implications for the management of these woodlands as future policy should focus on managing deer - rather than simply excluding them - as part of the overall biodiversity objective," said researcher Dr. Miles Newman.*

It's also important to note that deer, like many other species, are responsible for dispersing endangered plant seeds like trillium.

(ADDRESSING ENVIRONMENTAL CONCERNS CONT'D)

In an Ohio study which excluded deer from one plot, and included deer on another, they found more salamanders, snakes, and gastropods as well as more species or "invertebrate richness" higher in the plots where deer were allowed. Researchers say, "Our findings suggest that ***management actions taken to regulate deer densities could have the unintended effect of reducing local animal diversity."***

> *"By just reducing the number of deer in the forest, we're actually indirectly impacting forest ecosystems without even knowing the possible effects,"* said Katherine Greenwald, wildlife management researcher.

Like spraying "Round-up" on weeds, culling may feel like a quick fix to our environmental woes, but has lasting and undesirable effects.

In 2006, the USDA culled massive numbers of gulls around Kennedy Airport. Yet bird strikes continued. What happened? Geese moved in. The habitat was perfect for them — an unintended consequence of culling. They were back to square one.

More and more communities that have done culls on various species are recognizing culls are ineffective. Canada says culls are not effective for dealing with coyote populations. The UK has concluded badger culls were ineffective.

In a 28-year longitudinal study in southwestern Ontario, Canada, researchers monitored changes in a large forest. From 1981-1996, deer density reached a peak of 55 deer per square kilometer; they reduced it from 1996-2009 to 7 deer per square kilometer. ***Despite this reduction in deer density and browsing, and even after allowing what they deemed sufficient time, the trees that were expected to regenerate did not.***

Of course, Ann Arbor is not a forest, and we have a low deer density, but this study points out that if we're concerned about trees, we need to look at something bigger than just deer.

Manipulating nature to favor one species has historically caused the endangerment or extinction of another species. Nature manages itself through habitat size, availability of water and food, natural predators, and weather conditions. Of course, humans play a role in nature as well. ***According to the Federal Endangered Species Act, the two major causes of extinction are hunting and habitat destruction.***

(ADDRESSING ENVIRONMENTAL CONCERNS CONT'D)

If we're still interested in a single-species solution, perhaps we should look at the species that scientists agree has done the greatest harm to ecosystems: humans.

What can we do?

It's important to note that deer are a species native to Michigan, and thrive on edges—i.e., they like to eat in the intersection of different habitat types (e.g., between developed and undeveloped land). So when we develop areas, we need to be conscientious as to how it will affect the animals within it and nearby.

Though some Ann Arbor parks are designated "wildlife sanctuaries," none are designated plant sanctuaries. Of course, if there are areas in our parks and natural areas we don't want deer browsing, inexpensive exclusions have been shown to be very effective.

Before investing more in this area, Ann Arbor may want to poll residents. Anecdotal information suggests environmental concerns of clean water, wetland/habitat protection, pollinator population, and pesticide reduction are more important to (the health of) Ann Arbor residents than deer browsing.

Very little in today's world remains untouched and "wild." In fact, globally, we've lost 60% of wildlife since 1970 partly due to habitat destruction. Wanting to "get back to the way things were," when deer were abundant, but rarely seen, is impossible. We cannot turn back the clock, we can only move forward, and we need to think of wildlife issues in modern times.

Traditionally, we have discussed individual species and their benefits or detriments to us. However, this species-specific approach is short-sighted and ignores the broader issue. The UK has issues with badgers, Australia has issues with kangaroos, and we have issues with deer. In some areas of the US, there are issues with wild boars, steers, raccoons, and more... Instead of approaching these issues species-by-species (as we're bound to run into more as we continue to expand the human species), we would be best served by developing a horizontal, cross-cutting approach reflecting all the various human and wildlife interests at hand and a better model for wildlife stewardship and coexistence.

(What can we do to address environmental concerns, Cont'd)

> *"Whether it is the badger cull, controlling deer overpopulation, maintaining feral cats, or the much wider task of wildlife law reform, effectively addressing the issues requires less focus on whether specific animal species are "good" or "bad," and more attention broader question of how to properly address human relationships and interactions with all forms of wildlife. Getting that balance right and addressing each of the various perspectives is the challenge for wildlife management, reform, and legislation for the coming century."* - The Journal of Animal & Natural Resource Law

If we're concerned about the environment, we must look at all decisions holistically. For instance, at the same City Council Meeting in which the deer cull was approved, there were numerous discussions of new development in the City—and some on green spaces and wetlands. Constituents expressed concern only not only the additional traffic this would create, but also at what would happen with the wildlife who reside in that space. Where will they go and what will they do? It was given no consideration. **Nor were there any recommendations on educating new or nearby residents on how to avoid conflicts with the displaced animals that once called that undeveloped land home – setting the stage for further conflicts and resident complaints.**

Natural area stewards concerned about browsing damage on particular plants can use similar strategies as gardeners:

- Exclusion, through the use of fencing
- Deterrents, using tools that scare deer away
- Repellents, that repel by spell or taste
- Alternative plantings/habitat modification

MITIGATING LANDSCAPING/GARDENING COMPLAINTS

The push to cull began with folks who were frustrated that deer were eating their expensive landscaping and beautiful gardens. And while over 70% of Ann Arbor survey respondents said they hadn't done anything to try to deter deer, some say they've tried repellants and "they don't work."

What can we do?

1. Understand deer characteristics and behavior

Deer have poor eyesight, a very powerful sense of smell and are afraid of anything new. However, once they become accustomed to something, they'll accept it as safe. This explains why one technique to deter them (e.g., Ivory soap) may work one week, but not the next. Therefore, you can change the technique (e.g., a different smelling soap like Irish Spring) every 10-14 days so that they do not become accustomed to it.

2. Select appropriate plants

There are many deer resistant plants; deer tend to avoid plants with aromatic foliage, tough leathery and/or hairy or prickly leaves or plants with milky latex or sap. They also tend to not like yellow flowers! The Lady Bird Johnson Wildflower Center has a list of over 350 plants that are deer-resistant, and you can sort it by growing season. MSU also has an excellent list of deer-resistant plantings, sorted by those rarely damaged, those rarely severely damaged, occasionally damaged and frequently damaged.

It's important to understand that deer are individuals, and what one doesn't like another may like. Before planting a bunch of expensive plants, try one or two to be sure the deer in your area avoid it.

3. Use repellents and deterrents as directed on the container

Some repellents recommended by master gardeners are Deer Out, Ropel, and Deer Busters. There are also repellents that can be created from hot pepper, garlic or rotten eggs.

(What can we do to mitigate landscaping/gardening complaints, Cont'd)

Deterrents work by startling deer, either visually or auditorily. For instance, the Smart Scarecrow has received rave reviews by gardeners.

4. Use fencing wisely

Deer can jump up or across-- but not both-- that is, they cannot physically make a high and broad jump-- only one or the other. They also won't jump over a fence if they don't believe they'll land on a safe surface. And they also won't jump over something if it spooks them -- check out this video on cheap, easy and sightly fencing and this one that a Michigan blueberry farmer swears by!

5. Make a strategic plan based on your needs and the specific area

UNDERSTANDING DEER AND URBAN WILDLIFE

Ann Arbor isn't alone; urban wildlife are everywhere. No matter if you love animals or hate them, as humans develop more land and are building upon what was formerly animals' habitat, we're living closer to wild animals. Cities are dealing with this in myriad ways.

After experiencing years of deer culls, our Canadian neighbors did an analysis, concluding urban deer culls are expensive and futile. ***Culls are about killing deer, not resolving conflicts***. **Let's solve problems. Let's resolve conflicts.**

The most progressive of urban areas (like New York, for instance) have educational campaigns designed for conflict resolution and increasing the social tolerance and understanding of urban wildlife.

What can we do?

Educate on deer behavior

- Provide formal and informal education to residents. Include information on basic deer behavior.
- Deer are prey animals who cannot see well. They can be acclimated to humans, but it's best for both of us that they stay afraid of us. Noises and moving things can scare them off.
- Deer breeding season (September – December) gets them crossing roads frequently, especially at dawn and dusk. When you see one deer, you'll often see more—important information for drivers.
- Deer are individual; one deterrent may work for one deer and not another. Often, multiple approaches are needed to exclude deer from eating your plants.
- Deer protect their young. It is best to keep yourselves, children dogs and other pets away from fawns. If you should come across a fawn and you are concerned for their well-being, reach out to the Humane Society of Huron Valley for help.

(What can we do, Cont'd)

Stop feeding deer

- The City recently enacted "Don't Feed Deer" ordinance, but it's not well known and difficult to enforce.
- Folks may be inadvertently feeding them (with low hanging bird feeders or delicious tulips, for example) and/or not know the negative consequences of feeding urban deer.
- Efforts may need to be made to educate people why we shouldn't feed deer, and why they shouldn't plant items that attract deer (or, if you must plant "deer candy," use exclusions like fencing and repellants and deterrents (like dogs!) to keep them out)
- In the wild, deer have large home ranges, but studies show suburban deer have small home ranges—and often visit the same gardens and backyards repeatedly, which is why some people with unprotected gardens may get very frustrated.

Help individuals

Some communities have "hotlines" to help people with their wildlife conflicts. They'll send out individuals to consult with you about plantings, deterrents and exclusions. Animal control officers can also play a role in educating the public on human behavior that leads to wildlife nuisance complaints.

Many gardening centers, including Downtown Home and Garden, and extension offices offer tips on deer resistant planting.

For concerns about sick or injured deer, or abandoned fawns, HSHV maintains a free 24/7/365 service to help community wildlife in need. Go to HSHV Emergency Rescue Help or call (734) 661-3512. Information on living peacefully with our wild neighbors can be found at https://www.hshv.org/get-help/wildlife/.

COMPASSIONATE CONSERVATION AND ANN ARBOR VALUES

While Ann Arbor's deer cull is about management (reducing animals to reduce human frustration) versus true conservation, City leaders could consider embracing the principles of Compassionate Conservation.

Compassionate Conservation is a growing movement by biologist and animal experts who recognize animals as sentient beings with intrinsic value, and challenge the continuous bloodletting and individual suffering created by the traditional conservation industry. It counters the long-embraced notion of the necessity of killing and cruelty in pursuit of a larger goal, and first aims to "do no harm" by valuing the lives of individual animals and the pursuit of peaceful co-existence.

Compassionate Conservation seeks to shift the paradigm in morally-challenged centuries-old conservation practices by inserting principles of ethics and empathy for our genetic cousins who, like us, have been scientifically proven to have complex emotions, family bonds, unique cognitive abilities, and a drive to live. It goes beyond population numbers and taxonomies and points out that eco-systems are living entities constantly in a state of flux, and narrowly-focused wildlife management practices usually make more problems than they fix and lack an end-game.

Compassionate Conservation refutes the notion of killing one species in favor of another or the "tail-chasing" practice of culling one bothersome species after another. It notes the environmental disasters created by the growing number of humans on the planet and the need to protect wildlife, growing alarmingly rare, rather than making them scapegoats for our mistakes.

It also fights pseudo-conservation notions offering cover to trophy hunters who claim ecological benefits to shooting and trapping animals that may be plentiful (or just not currently on the endangered list) or are labeled as "pests".

This progressive, compassionate approach fits perfectly within Ann Arbor's long-extolled values of peace, tolerance and innovation, and provides a model for nonviolent problem resolution to our young people.

(COMPASSIONATE CONSERVATION CONT'D)

From the Center for Compassionate Conservation: https://www.uts.edu.au/research-and-teaching/our-research/centre-compassionate-conservation

Compassionate Conservation is an interdisciplinary field which promotes the treatment of all wildlife with respect, justice, and compassion. With the guiding principles of first***, do no harm, individuals matter, inclusivity, and peaceful coexistence****,* compassionate conservation is forging a new path to enable positive human-wildlife interactions.

Whether species are common or rare, whether native or not, all wildlife have intrinsic value. Compassionate Conservation creates space for open dialogue, with the goal of helping to shape conservation thinking relevant to the Anthropocene.

It is well known that daily human activities can harm wildlife. Less well known is that many wildlife can also be harmed within conservation programs, when based on captivity, culling, handling, and translocation.

Compassionate Conservation aims to find solutions for conservation practitioners that minimize harming wildlife. A paradigm shift in our approach to other animals is vital because of what we now know about the cognitive and emotional capacities of other animals. Compassionate conservation offers a bold, inclusive, and forward-looking framework to promote a future whereby humans, wildlife, and nature can all flourish.

REFERENCES AND RESOURCES

Deer Population

- Deer Population Information provided by Wildlife Biologist John Griffin

DVCs

- Michigan Traffic Crash Facts (official data, updated through 2019): https://www.michigantrafficcrashfacts.org/
- Ann Arbor maps of DVCs: https://www2.a2gov.org/GIS/MapAnnArbor/DeerManagement/

Lyme Disease

- Cary Institute – leader in Lyme Disease research: https://www.caryinstitute.org/science/research-projects/lyme-disease-research
- CDC information on Lyme Disease: https://www.cdc.gov/lyme/index.html

Addressing Environmental Concerns

- Highstead Foundation's long-term (17+ year) ecological study on deer impact, presented without bias to/against deer: https://highstead.net/insights/the-impact-of-deer-on-forest-ecosystems/

Landscaping/Gardening

- Deer Resistant Plantings from MSU: https://www.washtenawcd.org/uploads/5/9/2/0/59207889/deerresistplants.pdf
- Exclusionary and repellant techniques: https://www.ncwildlife.org/Portals/0/Learning/documents/Species/Deer/DeerProblemsinResidentialAreas.pdf

Compassionate Conservation

- https://www.psychologytoday.com/us/blog/animal-emotions/201711/compassionate-conservation-matures-and-comes-age
- https://www.forbes.com/sites/michaeltobias/2013/05/09/compassionate-conservation-a-discussion-from-the-frontlines-with-dr-marc-bekoff/?sh=76ed069b509d

Compassionate Conservation cont'd

- https://www.conservationmagazine.org/2014/10/killing-for-conservation/
- https://www.huffpost.com/entry/compassionate-conservatio_1_b_6639964

Other Communities that are Solving Conflicts with Deer

Rochester Hills' (Michigan) non-lethal deer management program: https://www.rochesterhills.org/Committees/DeerManagementReport.pdf

New York City's deer education program: https://www1.nyc.gov/site/wildlifenyc/index.page

Massachusetts's deer education program (including a "Living with Deer" flyer): https://www.mass.gov/service-details/prevent-conflicts-with-deer

HSUS's deer conflict management program template (including forms): https://www.humanesociety.org/sites/default/files/docs/HSUS%20Deer%20Conflict%20Mgt%20Plan_FINAL.pdf