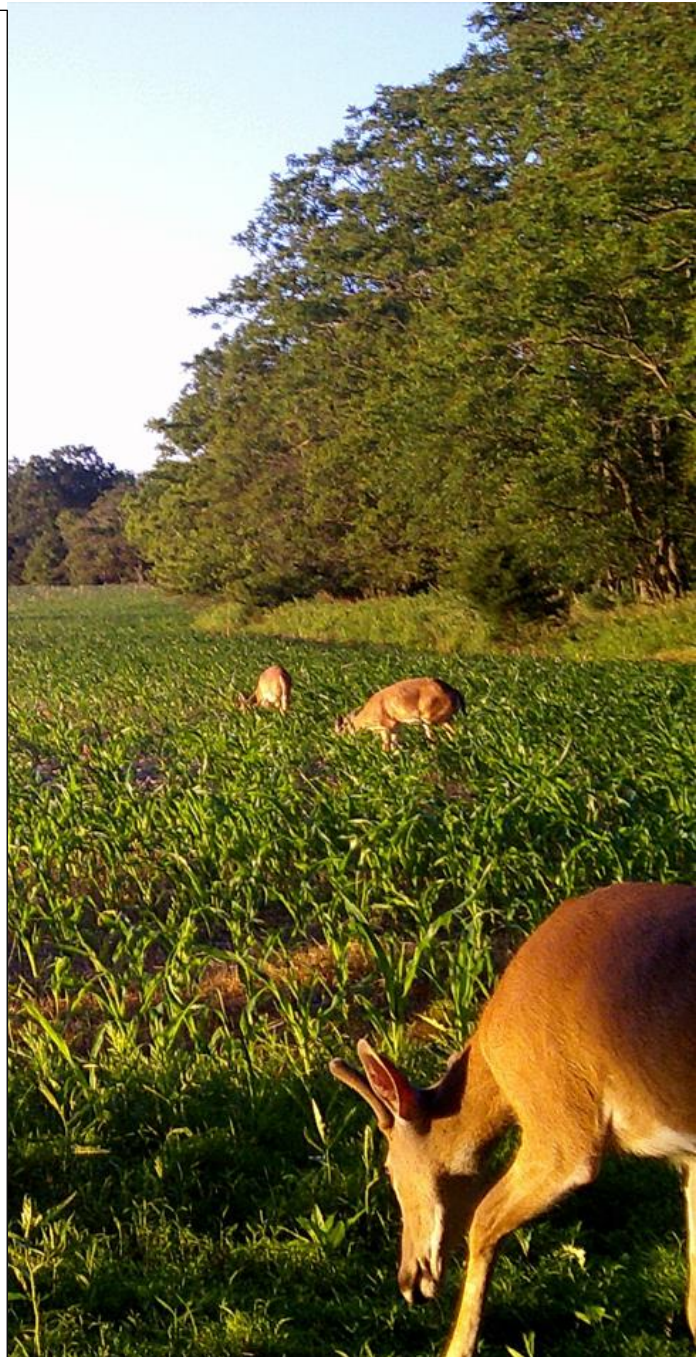


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**White-Tailed Deer and
the Costs to Farmers'
Livelihoods: A Case
Study of New Jersey
Stories**

Joseph B. Paulin
Nazia N. Arbab
Brian J. Schilling



RUTGERS

New Jersey Agricultural
Experiment Station



Figure 1. White-tailed deer captured by a camera trap while feeding in a cornfield at night.

Abstract

A group of 27 New Jersey farmers shared their stories of struggling with increasing numbers of deer and how it has impacted their farms. These case studies include estimates of direct financial losses from deer eating crops and reduced yields. There is also information on “hidden costs” associated with pressure from deer, such as having to abandon fields, not being able to grow preferred crops that would increase profits, having to change crop rotations, the need for increased use of fertilizers and herbicides, time and money spent on deer management, and the emotional toll it can take. Within this small pool of 27 farmers, the conservatively estimated impact of wildlife damage in 2019 was nearly \$1.4 million. This includes direct deer damage to crops and reduced yields (\$520,940), deer-related “hidden costs” that can be assigned a dollar value (\$755,200), and crop damage from other wildlife species (\$97,749). Farmers’ recommendations to policymakers for enhancing deer management in the state cover: (1) general deer management, (2) venison donation programs and helping those in need, (3) residential development and deer refuge areas, (4) private leased farmland and wildlife management plans, (5) public lands and wildlife management plans, (6) education and outreach for policymakers and communities, (7) deer fencing, (8) enhancing deer management through hunting, and (9) farmer depredation permits.

White-Tailed Deer and the Hidden Costs to Farmers' Livelihoods: A Case Study of New Jersey Stories

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Authors

Joseph B. Paulin, Ph.D. Candidate, Conservation Expert, Wildlife Management, Rutgers University, New Jersey Agricultural Experiment Station, Rutgers Cooperative Extension. jpaulin@njaes.rutgers.edu

Nazia N. Arbab, Ph.D., Assistant Professor, Rutgers University, Department of Agricultural, Food and Resource Economics. nazia.arbab@rutgers.edu

Brian J. Schilling, Ph.D., Director, Rutgers Cooperative Extension and Senior Associate Director, New Jersey Agricultural Experiment Station. brischi@njaes.rutgers.edu

About the Cover Photo—*Photo Joseph B Paulin*

Three deer are eating in a farmer's 40 acre cornfield during the 2021 growing season. At the time the photo was taken, there were actually 11 deer feeding throughout the field. At other times, during surveys, over 40 deer were observed at one time within and immediately adjacent to the field. That's over four times the number of deer you would want in one square mile to try and balance social benefits and reduce economic and landscape damage. Throughout the growing season, the deer ate many of the cornstalks down to waist-high, some to the ground. Weeds took over much of the field. In fact, in much of the field you couldn't even tell corn had been planted. The farmer lost approximately 50% of the 40 acres. They wanted to grow soybeans in the field for a higher profit, but the deer would have caused even more crop damage. The surrounding areas include residential, forested, public, and private lands, many without deer management programs. These lands act as deer refuge areas. Deer often stay in these areas during the day and feed in the farm fields at night causing a tremendous amount of crop damage. Similar stories have been told by farmers throughout the state. In this report, 27 New Jersey farmers share their stories of struggling with increasing numbers of white-tailed deer and how it has impacted their farms and livelihoods. Some, to the point of questioning if they can continue.

Project Reviewers

Larry S Katz, Ph.D., Director Emeritus Cooperative Extension and Professor Emeritus, Rutgers University Department of Animal Sciences

Jason Grabosky, Ph.D., Professor in Urban Forestry, Rutgers University, Department of Ecology, Evolution, and Natural Resources, New Jersey Agricultural Experiment Station, Rutgers Cooperative Extension.

Kevin P. Sullivan, Assistant Director of Statistical Analysis, Office of Research Analytics, New Jersey Agricultural Experiment Station.

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Ashley Kerr, New Jersey Farm Bureau

Stephen Komar, Rutgers Cooperative Extension of Sussex County

Jodi Powers, New Jersey Division of Fish and Wildlife

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Executive Summary

White-tailed deer (*Odocoileus virginianus*) damage to agricultural crops is often associated with direct impacts from feeding and financial losses associated with reduced yields. However, there are many other costs associated with deer damage that are not as obvious. These other costs include having to abandon fields (field abandonment), not being able to grow preferred crops that would increase profits (crop abandonment), having to change crop rotations, the need for increased use of fertilizers and herbicides, time and money spent on deer management, and the emotional toll it can take. We use the term “**hidden costs**” to describe these additional negative impacts that farmers experience relating to damage from white-tailed deer. The current study builds on the findings of previous New Jersey Agricultural Experiment Station (NJAES) research that estimated costs associated with direct deer damage to crops (Fritzell, 1998; Drake, 2005).

The following pages contain information from a collection of case studies conducted by the Rutgers University, NJAES between October 2020 and March 2021. A group of 27 New Jersey farmers shared their stories of struggling with increasing numbers of white-tailed deer and how it has impacted their farms and livelihoods.

Purpose of this study:

- (1) Gain a deeper understanding of “hidden costs” and the extent to which deer are impacting farms and livelihoods throughout New Jersey.
- (2) Identify opportunities to enhance partnerships, management, and outreach efforts.
- (3) Increase awareness of these issues to inform future conversations relating to white-tailed deer policy and management.

Case study farms were selected from the membership of the New Jersey Farm Bureau in areas documented as having high deer numbers (New Jersey Farm Bureau and Steward Green, 2019; NJAES 2020). Deer density estimates for participating farms ranged from 60 to 239 deer per square mile. For better context, densities of 10 deer per square mile are recommended to maintain benefits for social, economic, and ecosystem integrity (Kelly, 2019).

Counties represented in the case study include Atlantic, Burlington, Cape May, Cumberland, Salem, Hunterdon, Mercer, Monmouth, Passaic, Somerset, and Warren. The sample of farmers was constructed to provide a cross section by region (North, Central, and South), farm type (cash grains and oil seeds, vegetable, fruits or berries, and nursery/Christmas tree/ornamental), and farm size (6 acres to > 2,000 acres), where deer damage to agricultural crops is known to occur. Although not every county was directly represented in this study, similar experiences to those captured in the current research were reported in a previous NJAES survey of over 2,000 farmers throughout the state (Fritzell, 1998).

Case studies were originally planned as face-to-face interviews. However, due to the COVID-19 pandemic, the research team adapted the study to include a mixed-method approach that involved mail-back questionnaires, structured interviews, and follow-up telephone conversations to address the research objectives. The mail-back questionnaire posed a series of questions regarding the extent to which deer are impacting farms in New Jersey and the level of effectiveness of available deer management options. Questions for the case study were informed by (Fritzell, 1998), and consultation with agricultural leaders, New Jersey Farm Bureau (NJFB), and the New Jersey Division of Fish and Wildlife (NJDFW).

Through follow-up telephone conversations and structured interviews, farmers shared stories dating back as far as the 1960s. For some, seeing a deer as a child was a rare and thrilling experience. As deer numbers increased dramatically over time, farmers describe the increase in damage to their crops, challenges to keep farming, emotional toll, and impacts to their families and livelihoods. Some even question if they can continue farming.

Responses from questionnaires and the stories farmers shared during follow-up telephone conversations were used to prepare:

- **Farmers' Recommendations to Enhance Deer Management**
- **APPENDIX I: What Farmers Want You to Know: Key Topics and Messages from Case Study Stories**
- **APPENDIX II: Complete Farmer Case Studies**

In the current study, participating farmers collectively owned 4,185 acres and rented 8,769 acres. In 2019, of the 12,052 acres in production, 3,844 acres of crops were directly damaged by deer. An additional 661 acres were abandoned because of deer. On another 2,620 acres, farmers did not plant their preferred crops that could have generated higher profits because of high deer pressure. Nearly 3,000 hours were spent on deer management activities.

Results revealed that the conservative estimate associated with damage from deer and other wildlife in crop year 2019 was nearly \$1.4 million for the 27 participating farmers. These costs include direct deer damage to crops and reduced yields (\$520,940), deer-related hidden costs that can be assigned a dollar value (\$755,200), and crop damage from other wildlife species (\$97,749).

It should be noted that not all "hidden costs," can be assigned a dollar value. The emotional tolls of struggling to grow crops with high deer numbers and constant damage is one example. Additionally, the \$755,200 estimate mentioned earlier does not represent the true extent of all losses from deer-related "hidden costs" that were experienced by participants. Some farmers did not provide estimates for acres lost to crop and field abandonment. Estimates that were provided include \$36,500 for 211 of 661 acres that were completely abandoned. Losses from crop abandonment were \$383,800 for 1,685 of 2,620 acres. Deer fencing costs reported for 398 acres by 10 farmers totaled \$220,500. Reported costs to implement deer management options, primarily labor, were \$51,400. Costs associated with increased use of fertilizers, herbicides, and pesticides because of changing crop rotations and soil damage due to deer pressure were estimated at \$63,000.

This study provides a better understanding of the complex variety of situations and livelihood impacts that New Jersey farmers are encountering as a result of high deer numbers around the state. Results provide New Jersey's policymakers, communities, landowners and managers, and educators with a more complete understanding of the extent to which deer are currently impacting farm operations and identify opportunities to enhance partnerships, management and outreach efforts. Such knowledge is essential for expanding and enhancing deer management and future policy development.

Based on their experiences, participating farmers offered recommendations to policymakers for enhancing deer management in the state. The following is an overview of farmers' recommendations. Additional information on recommendations is provided later in the *Discussion and Management Recommendations* section.

Overview of farmers' recommendations to policymakers to enhance deer management in New Jersey:

1) General Deer Management

- Promote opportunities for consultation between state agencies and stakeholders impacted by deer damage to coordinate efforts, identify challenges, and pool resources to increase the overall effectiveness of deer management programs throughout New Jersey. Participants should include, among others, the agricultural community, public and private land managers, developers, wildlife managers, researchers and educators, and state and local decision-makers.
- Expand coordinated regional deer management programs where municipal and county representatives can work together with state partners to enhance the effectiveness of deer management activities on public lands.
- Promote the expansion of doe-focused hunting programs on public and private lands wherever possible and raise awareness of the importance of harvesting does in reducing overall deer numbers.

2) Venison Donation Programs and Helping Those in Need

- Provide funding to expand opportunities for venison donation programs, such as Hunters Helping the Hungry, that can benefit from deer taken through farmer depredation permits, and suburban community-based deer management programs.

3) Residential Development and Deer Refuge Areas

- Encourage suburban communities with high deer densities that serve as refuge areas, and where hunting is not possible, to apply for New Jersey Division of Fish and Wildlife, Community-Based Deer Management Permits (<https://www.nj.gov/dep/fgw/cbdmp.htm>).

4) Private Leased Farmland and Wildlife Management Plans

- Require landowners receiving Farmland Assessment, or who rent land to farmers for crop production, to allow deer management activities or develop wildlife management plans to reduce deer causing damage.

5) Public Lands and Wildlife Management Plans

- Establish wildlife management plans on public lands to reduce negative impacts to neighboring farms, forests, and residential areas and decrease deer-vehicle collisions.

6) Education and Outreach for Policymakers and Communities

- Facilitate education and outreach programs, especially for policymakers and the general public, to raise awareness of deer impacts to food production and farmers' livelihoods, environmental impacts, and safety concerns.

7) Deer Fencing

- Provide programs and funding for deer fencing for farmers. Fencing is an effective management option for reducing crop damage.

8) Enhancing Deer Management through Hunting

- Create more opportunities for doe-focused hunting to reduce overall deer numbers such as unlimited antlerless harvest in all Deer Management Zones and require that a doe be harvested before a buck can be taken.
- Expand hunting opportunities by lengthening seasons and allowing hunting on Sundays.
- Streamline the processes for obtaining hunting permits (possibly regional or county permits).

9) Farmer Depredation Permits

- Amend the current regulation for farmer depredation permits to include archery for compatibility near residential areas where shotgun is not permitted.

Setting the Stage

We are fortunate to have white-tailed deer in New Jersey. Deer provide many positive benefits including wildlife viewing, photography and recreational hunting that contribute hundreds of millions of dollars in economic benefits annually (Drake et al. 2005). Many New Jerseyans enjoy going for a hike and the thrill they get when they see deer. Then they may notice the negative impacts to the forest. The native plants that should be there are being replaced by thorny invasive species taking over the ecosystem. There are other times when that thrill can become anxiety like seeing a deer on the edge of the road when driving. For others, there may be frustration from deer eating backyard gardens or residential landscaping. Some people have concerns about ticks as deer are one of several species that carry them during their life cycle. Many of us can relate to these experiences as they touch our lives on a daily basis.



Figure 2. Research plot at the Rutgers Hutcheson Memorial Forest before (above) and after (below) invasive plant removal. Photos - Scarlett Simpson.



For decades white-tailed deer have been changing the composition of New Jersey forests

by eating native plants and facilitating the spread of invasive plant species that threaten native herbaceous plants and tree seedlings (NJAES 2020). This is illustrated by the photos of a student standing in the same research plot at the Rutgers Hutcheson Memorial Forest before and after invasive plants were removed (**Fig.2**).



Figure 3. Deer in a residential area of New Jersey. Photo - Joseph Paulin.

Residential areas (**Fig.3**), and unmanaged public and private lands serve as refuges where deer often spend time during the day before heading to the farm fields to feed at night (**Fig.1**).

“If we are going to see agriculture succeed near residential areas of New Jersey, we need to take into account for a balance of people, nature, and an appropriate amount of wildlife. We need to find a healthy balance for our forests and our roadways.” – Case Study Farmer

Approximately 25,000 deer-vehicle collisions take place in New Jersey each year with insurance payouts of over \$100 million (State Farm Insurance 2016). A deer standing next to the side of the road as traffic passes by is a common scene for New Jersey drivers (**Fig.4**).

As we drive around the Garden State and see the many farms that help put food on our tables, there are things that may go unnoticed. We may

not realize the damage and the losses that occur (**Fig.6**).



Figure 4. Deer standing by the side of the road as a vehicle drives by. Photo - Joseph Paulin.



Figure 5. Farmer planting field corn. Photo - Joseph Paulin.

We fail to recognize that the farmers we see out in the fields were up much of the night dealing with deer that were eating their crops.



Figure 6. Students help to demonstrate extreme deer damage to corn. Photo - Joseph Paulin.

The stalks in the cornfield we pass, that should be overhead, have been eaten down to a few feet from the ground, sometimes lower (**Fig.6**). This damage opens the ground to sunlight, allowing weeds to grow taller, and eventually take over much of the field (**Fig.7**).

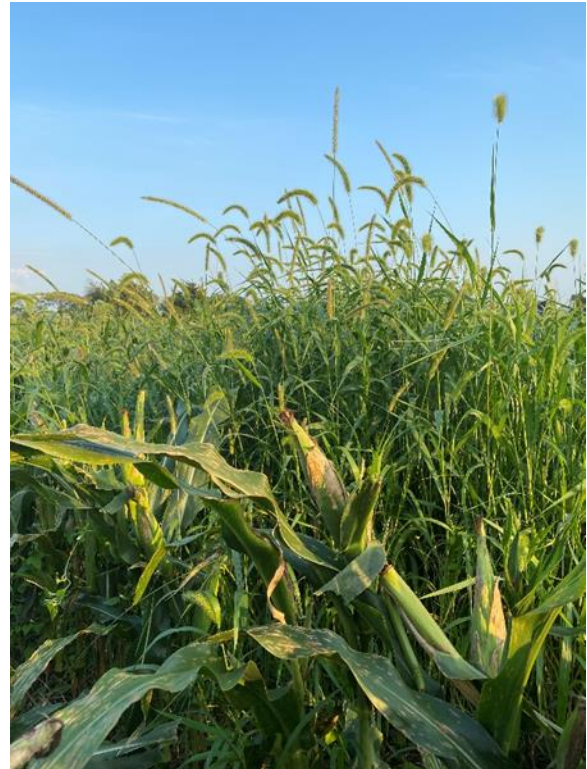


Figure 7. Weeds overtaking a cornfield as a result of deer damage. Photo - Joseph Paulin.

“Most people probably don’t think about financial losses to farms because they see green fields when driving down the road. People don’t realize when they’re looking at damage and how much of the crop has been eaten by the deer.”

- Case Study Farmer

We see a nice green, knee-high, soybean field, not knowing that it would be waist-high if the deer weren’t continuously eating the tops of the plants (**Fig.8**). Or another field that had been thriving only weeks before, now grazed to the ground by deer. Imagine the emotional toll that it takes.



Figure 8. Deer damage to soybeans. Photo - Geoff Slifer.

“What I tell nonfarmers – if you want us here, we can’t be here with all the deer. Imagine taking 10 to 15% of gross income every year and feeding it to the deer. Some farmers lose as much as 40% per year. A lot of us are disappearing.”

– Case Study Farmer

When we visit a tree nursery, we notice that the bark on several of the trunks is damaged (*Fig.9*).



Figure 9. Buck rub. Photo - Timothy J. Waller.

Some of the Fraser Firs appear to be damaged at the Christmas tree farm we visit during the holidays. A buck had been rubbing their antlers on them (*Fig.10*).

“It used to get kind of depressing. A few weeks before Christmas bucks would come in rubbing right before you were about to sell the trees. That’s a loss of \$35,000 per year.”

– Case Study Farmer



Figure 10. Antlered buck. Photo - Joseph Paulin.

Try thinking of it like this - after working around the clock for months, investing all your time, energy, and money into your job or business, someone just takes 10-25% of your paycheck. You don’t make any profit that year. You’re tired, frustrated, depressed, and just don’t know if the thing you have loved doing your whole life, is worth doing anymore at all. These are just some of the ways that white-tailed deer are impacting our farmers’ lives in New Jersey.

“There’s not a field I farm where there’s not deer damage. I’m starting to give up.”

– Case Study Farmer

In Their Words – Story from Case Study 1

When I was a boy, it was a treat to see a deer. You didn't want to shoot it. You wanted to shoot it with a camera. I've been farming my whole life. I started on my own in high school or college. I've done a lifetime of this.

I'm overridden with deer here. If you pull into my farm at night, you can easily see 30-40 deer. My income should be substantially better. My yields are \$150,000-\$200,000 less per year than they should be with my acreage. Each year, the deer can make the difference between a profit and a loss.

People don't realize that this affects several generations. There will be no more farms. You have to preserve those livelihoods. Understand that not only is it jeopardizing my ability to provide safe and healthy food, but it's also impacting the community around you, your health and safety.

Local farms had a major impact in us surviving COVID-19. People need to look at agriculture as essential to them and not just a business. A farm is part of the essential infrastructure around them that puts food on their tables. When you preserve a farm, you're preserving the future of your food source.

There are many hidden costs from deer. There are long-term environmental impacts from overgrazing. Soil erosion and impacts to the water supply. You have to use more fertilizers and herbicides. There's frustration and emotional costs. There's increased liability insurance for a fleet of farm trucks because of deer collisions. There's been impacts of damage to equipment from an antler going through a \$4,000 tire, more than once, and running a deer carcass through a combine. We're always concerned about a deer running out in front of you while you're in harvest or planting.

I've entirely dropped whole farms because of deer damage. The only reason I started growing sorghum at all was because deer don't like it as much as other crops. It's been so long that we've been having deer damage, my expectations for the yields are a lot less than they used to be. I'm probably underestimating the damage.

Over time, deer grazing on soybeans, it's going to kill you. I've had it grazed right to the ground. Some graze can help increase production in the beginning of the season. A little grazing in soybeans can be beneficial, but more often than not, because of the size of the deer herd, they're detrimental. They never just lightly graze, always over graze.

Deer eat a lot more than other wildlife. Corn damage is worst on the perimeter of the fields than the middle. Damage is always worst in smaller fields no matter what the crops are. Corn yields are consistently reduced by 20-30% every year.

Rye straw damage is mostly physical damage from rolling and a little grazing in early to mid-spring. Grass hay is hard to measure. There's grazing, take out about 5% of the overall crop. You end up with soil compaction. If a pasture is grazed, you're not even going to bale it.

Weather also affects deer damage. The later you get in the growing season, the more impact the deer will have. The deer will out graze the growing of the crop. In 2019 it was worse, we got the crop in late because of wet weather. The yields were lower than they should have been. In 2020 I got the crop in earlier, harvested more deer, and one of the landlords got up a deer fence around a few hundred acres.

I see financial incentive to fence. I just can't afford it. We don't always have authority to put it up or manpower to maintain it. I have leases for most of my crops, but I don't control it. If it's my own land it might be cost effective, but not for all the fields. You don't see a hay or grain farmer ever put it up. I've seen increases in

damage because operations around me are putting up fence. They divert the deer to me.

Depredation permits, years ago we used them. I've had issues in the past with homeowners, hunters, animal advocates, and landlords. That's just part of the problem. I don't want liability because of kids trespassing all the time.

Hunters can't take enough deer. Some hunters that hunt rented properties are not hunting does. Landlords control hunting rights, but some landlords don't allow hunting, or they lease to gun clubs.

Repellents, they don't do sh*t. They might do a little until it rains. It's too expensive for a crop growing from April to October. It has to be reapplied every time it rains. If you put them on, 5 days later there's new growth that it's not on. That's what the deer are eating.

It's hard to put a number on the hours spent every year on deer management because it's just incorporated into management period.

We've been telling our story for a long time. I think the damage and risk to society as a whole has not been told. Deer are responsible for damage to property, public safety, and people's livelihoods. This is a real problem, and the politicians need to take action. Unless they take action, they're contributing to the problem.

Policymakers need to take into account environmental impacts, residential damage, health and safety of deer collisions, and health of the deer population. There's a lot that needs to be considered. How long can you sustain this level of overpopulation without some type of detrimental effect to the herd?

We need a comprehensive herd reduction program. Future deer management and development have to adapt together. Until the herd becomes manageable, we need to make it a year-round effort.

We need to reduce burdens, regulations, and fees to hunters. Find avenues to public good through processing and feeding programs to get protein to the needy so it doesn't go to waste. Incentivize doe harvest and donations to food banks. No cost to the hunter and not counted against the hunter's limit. Increase funding for programs like Hunters Helping the Hungry. Figure out ways for donation through depredation permits during the summer months. Use sharpshooters in suburban areas where you can't hunt and donate the venison.

- Case Study Farmer

In Their Words – Story from Case Study 2

We are a large, growing farm. We deal with the deer and add fencing as we expand. I've been trying to reduce losses, but because we are continuously expanding, there's not enough time to fence off more of the area.

If we are going to see agriculture succeed near residential areas of New Jersey, we need to take into account for a balance of people, nature, and an appropriate amount of wildlife. We need to find a healthy balance for our forests and our roadways. There's a lot of land in the area owned by the township. They do little to no deer management. There's also green space that has little to no management. That's a problem.

I see more deer in residential neighborhoods than on my farm. Because we have woods, they can disappear during the day and come out at night and feed on the farm. I have land enrolled in a golden-winged warbler conservation project for forest regeneration. The deer damage is getting bad enough that it may not be suitable for golden-winged warblers.

We haven't entirely stopped farming a field because of deer damage, but have restricted going to new areas until we can get a fence up. We could have farmed tomatoes, squash and other vegetables. The estimated loss is about \$5,000. We've used 4-ft electric fence and a 6-ft fence, but the deer hop over and have knocked down some of the fence. We plan to add 8-ft high-tensile woven wire fence in the future.

Early on we used repellents, chemical and cayenne pepper. Every time it rains you have to go out and reapply. I haven't seen anything worth the time in the long run.

I don't hunt myself, but allow others to hunt on the land. Pretty much every place that can be hunted in the area is hunted, but some people only hunt bucks. We need to find ways to better expand hunting to harvest more deer, seasons and bag limits.

We need to facilitate more ways for hunters to donate to foodbanks. Make it easier. A no-cost option to get the deer from the hunter to the foodbank.

We're interested in getting depredation permits for deer, bear and coyote. The coyotes eat our chickens. The coyotes and fox will take a hit on the electric fence to get a chicken. We've also had Cooper's hawks, red-tailed hawks, fox, bear, raccoons, and sometimes owls eating the chickens.

There's lots of bears in the area. The bears damaged the coop by ripping off the door and pulled out a 50-pound bag of corn. Sometimes a bear will grab a chicken. We lost about 100-feet of electric fence that was dragged off by a bear. Bears also damage fruit trees by breaking branches and eating the fruit.

- Case Study Farmer

Introduction

White-tailed deer are commonly found where forested areas meet a variety of public and private lands including agricultural areas, suburban neighborhoods (**Fig.11**), public parks, golf courses (**Fig.11**) and corporate landscapes (NJAES/HMFC 2020; Boulanger et al. 2014). Development in the state has created fragmented landscapes, and areas that can serve as wildlife refuges, often inaccessible to hunting that controls deer numbers. High deer densities can lead to intolerable levels of damage to native ecosystems, farmers' crops, commercial and residential landscaping, and increased safety concerns from deer-vehicle collisions. (NJAES/HMFC 2020; Boulanger et al. 2014).



Figure 11. Buck grazing on the edge of putting green with a golfer looking on (left). Homeowner looking at a group of deer in their backyard (right). Photos - Mary Beth Scumaci (left) and Joseph Paulin (right).

In a 1998 Rutgers University, New Jersey Agricultural Experiment Station (NJAES) study of over 2,000 farmers, deer densities exceeded the tolerance of producers throughout the state who reported losses from direct deer damage to crops estimated between \$5-\$10 million (Fritzell 1998). The economic impacts from unwanted deer-human interactions in New Jersey, including damage to vehicles and direct damage to agricultural crops were conservatively estimated to be \$69 million annually by a 2005 joint study of Rutgers University, Cornell University and Penn State University (Drake et al. 2005). In more recent years, deer-vehicle collisions have exceeded 25,000 in New Jersey and insurance payouts have averaged an estimated \$100 million (State Farm Insurance 2016). Additionally, damage by white-tailed deer has been estimated at approximately \$2 billion in the United States annually (Boulanger et al. 2014).

The following pages contain a collection of case studies. A group of 27 New Jersey farmers shared their stories of struggling with increasing numbers of deer and how it has impacted their farms. The current study builds on the findings of previous NJAES research that estimated costs associated with direct deer damage to crops (Fritzell, 1998; Drake, 2005). The case studies include estimates of direct financial losses from deer eating crops and reduced yields. There is also information on “hidden costs” associated with pressure from deer, such as having to abandon fields, not being able to grow preferred crops, having to change crop rotations, the need for increased use of fertilizers and herbicides, time and money spent on deer management, and the emotional toll it can take. Deer density estimates for

participating farms ranged from 60-239 deer per square mile. For better context, densities of 10 deer per square mile are recommended to maintain benefits for social, economic, and ecosystem integrity (Kelly, 2019).

A new component of the current study, that builds on previous research, is estimates for deer-related “hidden costs.” Although the Fritzell (1998) study provided insights into “hidden costs,” estimates for economic losses focused primarily on direct deer damage to crops (**Fig.13**). The current study of just 27 farms, found that estimates for direct damage to 3,842 acres affected by deer ranged from a minimum of \$520,940 to a maximum of \$670,250. Additionally, we found “hidden costs” to be substantial, were greater than estimates for direct deer damage to crops, and account for an additional \$755,200 for the 27 participating farms (**Fig.12**).

Minimum cost estimates to responding New Jersey farmers from direct deer damage to crops and reduced yields (\$520,940), hidden costs that can be assigned a dollar value (\$755,200), and crop damage from other wildlife species (\$97,749) was nearly \$1.4 million (**Fig.12**).

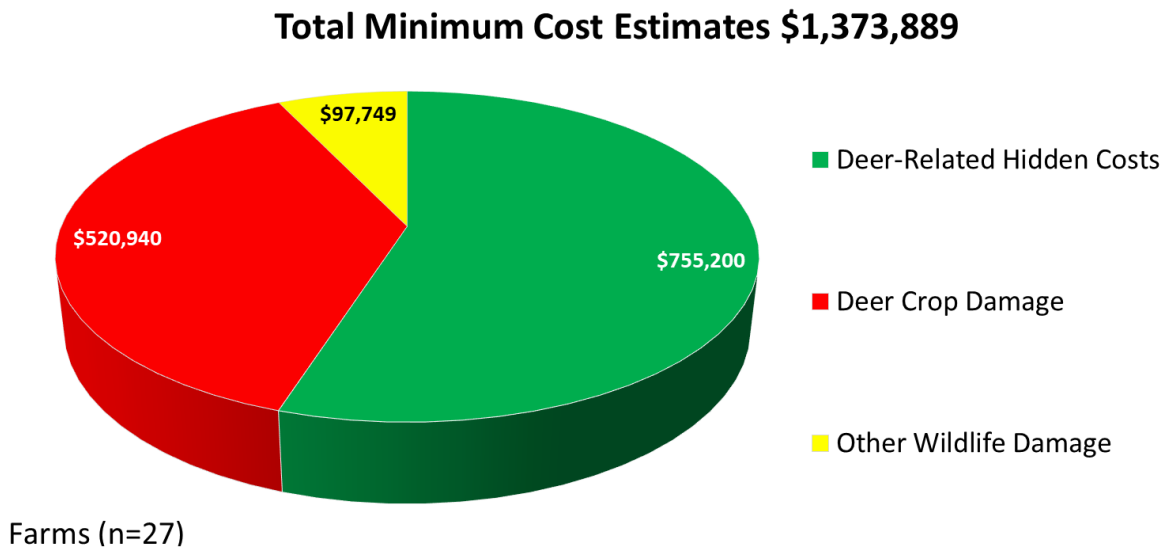


Figure 12. Minimum cost estimates for 27 New Jersey farmers from direct deer damage to crops, deer-related hidden costs that can be assigned a dollar value, and crop damage from other wildlife.



Figure 13. Examples of direct deer damage to corn (left) and soybeans (right). Photos - Joseph Paulin (left) and Kate Brown (right).

Deer damage was described by the New Jersey Farm Bureau as an epidemic and was voted as the #1 issue among farmers at the 2018 Annual Meeting. In 2021, deer damage was again identified as the #1 wildlife control issue faced by farmers at the State Agricultural Convention.

Purpose of this study:

- (1) Gain a deeper understanding of “hidden costs” and the extent to which deer are impacting farms and livelihoods throughout New Jersey.
- (2) Identify opportunities to enhance partnerships, management, and outreach efforts.
- (3) Increase awareness of these issues to inform future conversations relating to white-tailed deer policy and management.

Objectives:

- To obtain information from New Jersey farmers suffering crop losses due to deer.
- To document farmers’ estimates of the value of crops lost to deer in 2019.
- To document the effects of “hidden costs” from deer damage such as crop and field abandonment.
- To determine deer management activities implemented, or lack thereof, in the areas surrounding the farmland on public and private lands.
- To assess farmers’ use of various non-lethal and lethal deer management options.
- To communicate results to policymakers, managers, educators, and local communities.

Through mail-back questionnaires, structured interviews, and follow-up telephone conversations, farmers have shared their perspectives and perceptions on the number of deer in their communities, changes in the deer population over time, development that has created deer habitat and refuge areas, crop losses, and the effectiveness of deer management options. Case study farmers also conveyed messages they would like their communities to know, suggestions for policymakers and a series of recommendations for enhancing deer management in an ever-changing landscape.

This study approach provides a better understanding of the complex variety of situations and livelihood impacts that New Jersey farmers are encountering because of high deer densities around the state. Results provide a more complete understanding of the extent to which deer are currently impacting farm operations and identify opportunities to enhance partnerships, management and outreach efforts. Such knowledge is essential for expanding and enhancing deer management and future policy development.



Figure 14. White-tailed deer in a forested area. Photo - Peter Scumaci.

Research Design and Methods

Case study farms were selected from the membership of the New Jersey Farm Bureau in areas documented as having high deer numbers (New Jersey Farm Bureau and Steward Green, 2019; NJAES 2020). Deer density estimates for participating farms ranged from 60-239 deer per square mile (**Fig.15**). For better context, densities of 10 deer per square mile are recommended to maintain benefits for social, economic, and ecosystem integrity (Kelly 2019).

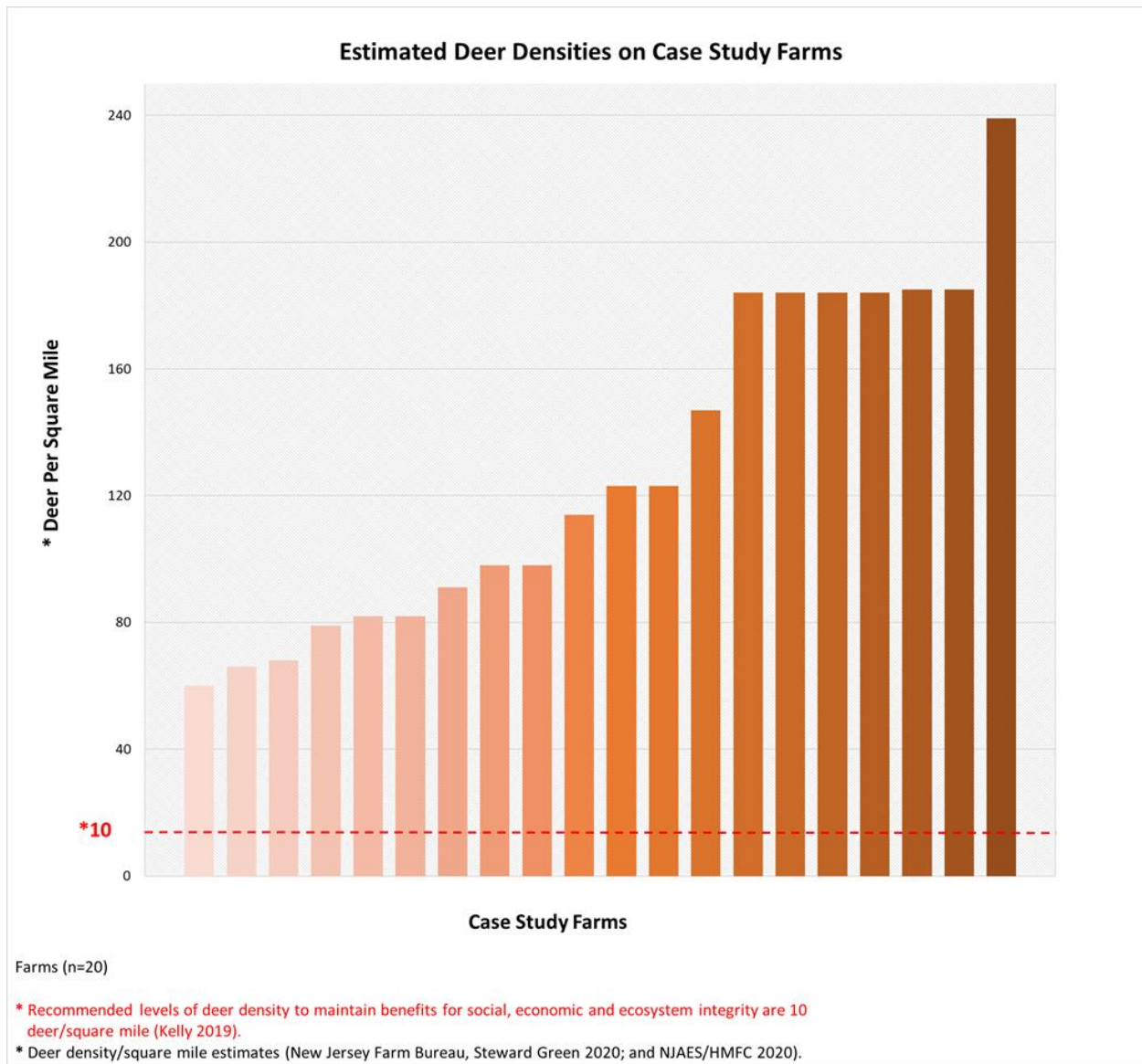


Figure 15. Actual deer density estimates for case study farms ranged from 60 to 239 deer per square mile. That's 6 to 23 times higher than recommended levels.

Counties represented in the case study include Atlantic, Burlington, Cape May, Cumberland, Salem, Hunterdon, Mercer, Monmouth, Passaic, Somerset, and Warren (**Fig.16**). Although not every county was directly represented in this study, similar experiences to those captured in the current research were reported in a previous NJAES survey of over 2,000 farmers throughout the state (Fritzell, 1998).

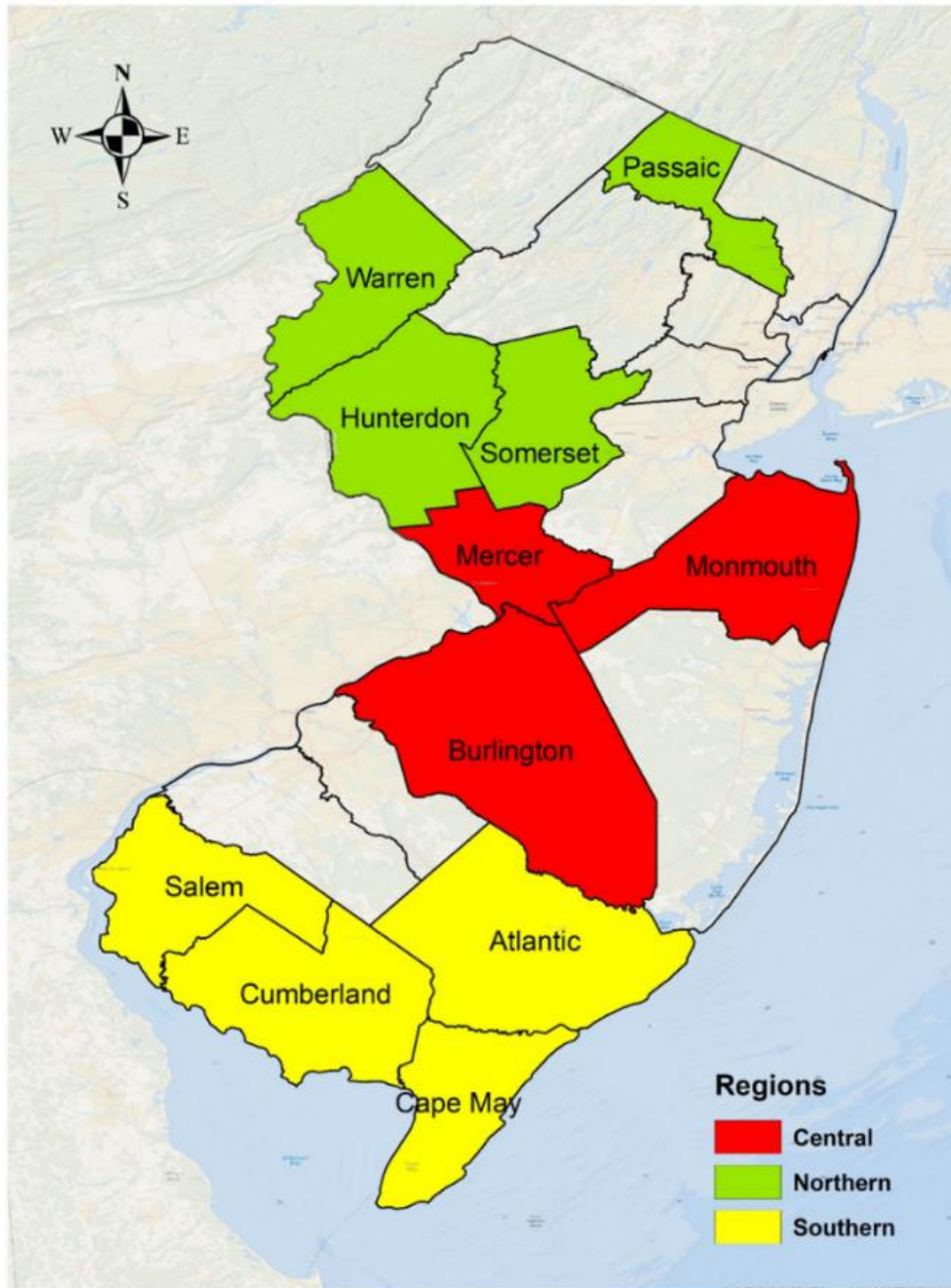


Figure 16. Counties where case study farms are located.

The sample of farmers was constructed to provide a cross-section by region (North, Central, and South) (**Fig.16**), farm type (cash grains and oil seeds, vegetable, fruits or berries, and nursery/ornamental) (**Fig.17**), and farm size (6 acres to > 2,000 acres), where deer damage to agricultural crops is known to occur.

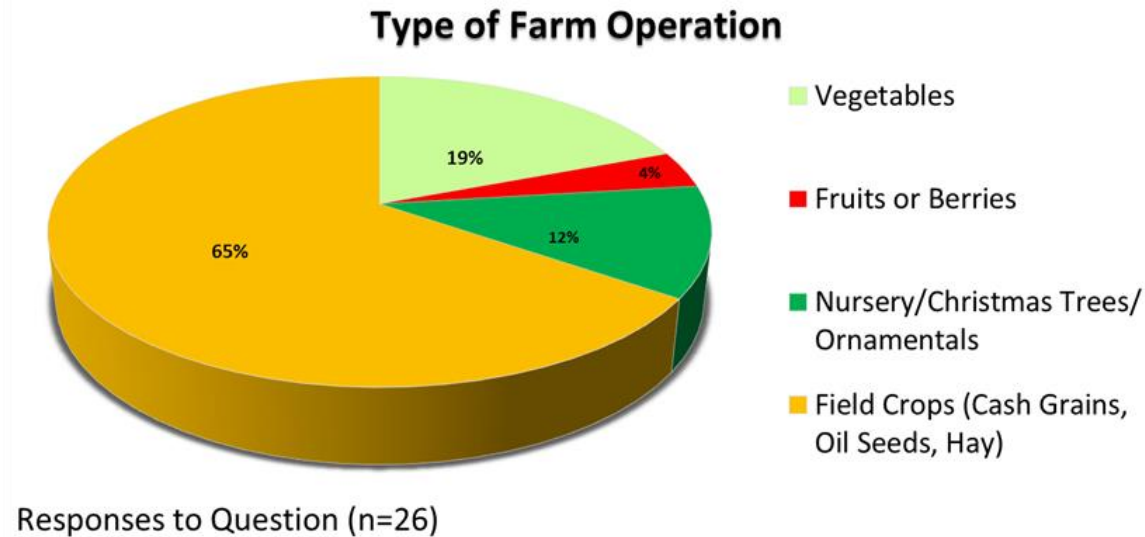


Figure 17. Percentage of primary output of revenues for case study farms by crop type.

Case studies were originally planned as face-to-face interviews. However, due to the COVID-19 pandemic, the research team adapted the study to include a mixed-method approach that involved mail-back questionnaires, structured interviews, and follow-up telephone conversations to address the research objectives. The mail-back questionnaire posed a series of questions regarding the extent to which deer are impacting farms in New Jersey and the level of effectiveness of available deer management options. Questions for the case study were informed by (Fritzell, 1998), and consultation with agricultural leaders, New Jersey Farm Bureau (NJFB), and the New Jersey Division of Fish and Wildlife (NJDFW).

Mail-back questionnaires were sent to farmers (N=28) between October 2020 and March 2021. Questionnaires contained multiple choice, open-ended questions, and fillable charts that addressed (1) general farm operations, (2) farmers' perceptions about the numbers of deer on the farm and surrounding area, (3) livelihood impacts including direct crop losses, and hidden costs such as crop and field abandonment, (4) deer management on farmed properties and surrounding areas, and (5) demographics.

Follow-up telephone conversations (n=25) took place between November 2020 and March 2021. The overall participation rate in the study was 96% (n=27). Most participating farmers (n=24) returned usable mail-back questionnaires via United States Postal Service (USPS). Some farmers (n=2) responded to questionnaires via telephone. An additional farmer (n=1) did not respond to the questionnaire, but did participate in a follow-up telephone conversation. Follow-up telephone conversations provided farmers with the opportunity to share additional details of how deer have impacted their farms and livelihoods in 2019 and previous years.

Farmer mail-back questionnaires were estimated to take approximately 1 hour to complete. Follow-up telephone calls with participating farmers lasted from 30 minutes to 3 hours depending on farmer availability and amount of information shared. Additional details on the case study process are below.

- 1) October 2020: Initial contact message was sent to 28 farmers via email, notifying them that they had been selected to participate in a case study being conducted by the New Jersey Agricultural Experiment Station, Rutgers Cooperative Extension on deer damage and management, and that a questionnaire would arrive in the near future. Farmer contact information was provided by the New Jersey Farm Bureau.
- 2) October 2020: Questionnaire packets were sent out via USPS priority mail and included brief instructions and assurance that all individual responses would be kept confidential. Packets included a Rutgers University "Consent to take part in a research study" form; initial contact letter with information on the study and instructions; and an addressed, prepaid envelope to mail-back the completed questionnaire.
- 3) November 2020: Reminder message to complete the questionnaire was sent to all potential respondents via USPS standard mail and email.
- 4) November 2020: Approximately one month after the first questionnaire packet was sent, a replacement questionnaire packet was sent via USPS priority mail to all non-respondents.
- 5) November 2020: Letters and emails were sent out to thank participants that had returned questionnaires, remind non-respondents to complete and mail-back outstanding questionnaires, and to arrange follow-up telephone conversations.
- 6) November 2020: Telephone follow-up conversations began.
- 7) January 2021: Participants were contacted via email and telephone call to remind non-respondents to complete and mail-back outstanding questionnaires, and to arrange follow-up telephone conversations.
- 8) January 2021: A final replacement questionnaire packet was sent via USPS priority mail to all non-respondents.
- 9) February 2021: Participants were contacted via email and telephone call to remind non-respondents to complete and mail-back outstanding questionnaires, and to arrange follow-up telephone conversations.
- 10) March 2021: Follow-up telephone conversations were completed.
- 11) April 2021-July 2021: Mail-back questionnaire data was entered and analyzed. Notes from follow-up telephone conversations was transcribed. Individual farmer case studies were developed. Overlapping themes, key messages, and farmer recommendations were extracted from case studies and categorized to highlight in the draft report for ease of review. Draft report was completed.
- 12) July 2021-November 2021: Review and revisions of draft report.
- 13) December 2021: Report content finalized.
- 14) February 2022: Final report layout completed and published.

Results

Case study results are presented in several subsections that cover a variety of topics relating to increasing deer numbers, impacts to farmers' livelihoods, and management challenges.

Demographics contains general information on farmers' gross household income generated from farm operations, top sources of income, gross sales from farm products, and acres owned and rented.

Deer Population includes farmers' experiences with changes in the deer population over time and deer numbers around the farms.

Livelihood Impacts presents information on crop losses from deer, direct financial losses and reduced yields, hidden and emotional costs, and other wildlife species impacting farm operations.

Management Challenges – Areas Surrounding Farms addresses deer-related management issues including increasing public awareness, residential development and deer refuge areas surrounding farms, and land access and challenges on public and private lands.

Management Implementation completes the results section and covers farmers' experiences using specific management options and effectiveness.

Additional information, stories of how deer impact farmers' lives, and recommendations to enhance deer management can be found in the following:

- **Discussion and Management Recommendations Section:** Farmers' Recommendations to Enhance Deer Management
- **APPENDIX I:** What Farmers Want You to Know: Key Topics and Messages from Case Study Stories
- **APPENDIX II:** Complete Farmer Case Studies

Demographics

Eighty-one percent of respondents were full-time farmers. More than half (56%) generated between 76-100% of their gross household income from their farm operation (**Fig.18**). The average age for respondents was 61 years and ranged from 42 to 85 years. All respondents were male. Fifty-two percent of farmers ranked cash grains and oil seeds as their highest source of income, followed by vegetables (20%), nursery/Christmas trees/ornamentals (12%), hay (12%), and berries and vineyard (4%).

“It’s been so long that we’ve been having deer damage, my expectations for the yields are a lot less than they used to be. I’m probably underestimating the damage.”

– Case Study Farmer

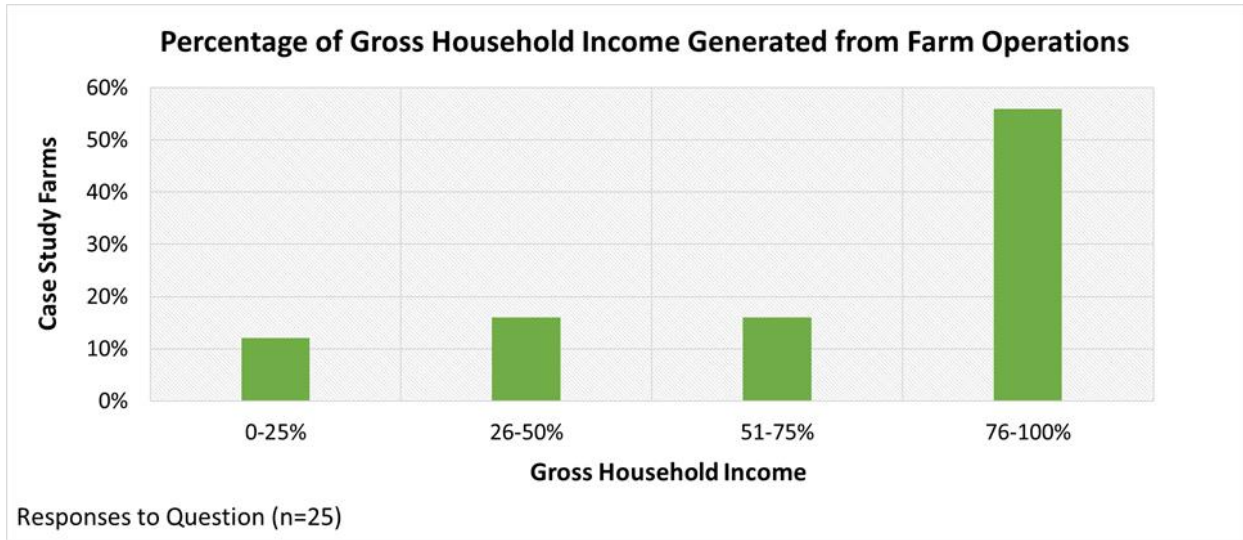


Figure 18. Percentage of gross household income generated from farm operations in 2019.

Annual gross sales for 2019 ranged from less than \$2,500 to \$3 million or more, with 43% of farmers reporting sales between \$100,000 to \$499,999 (Fig.19).

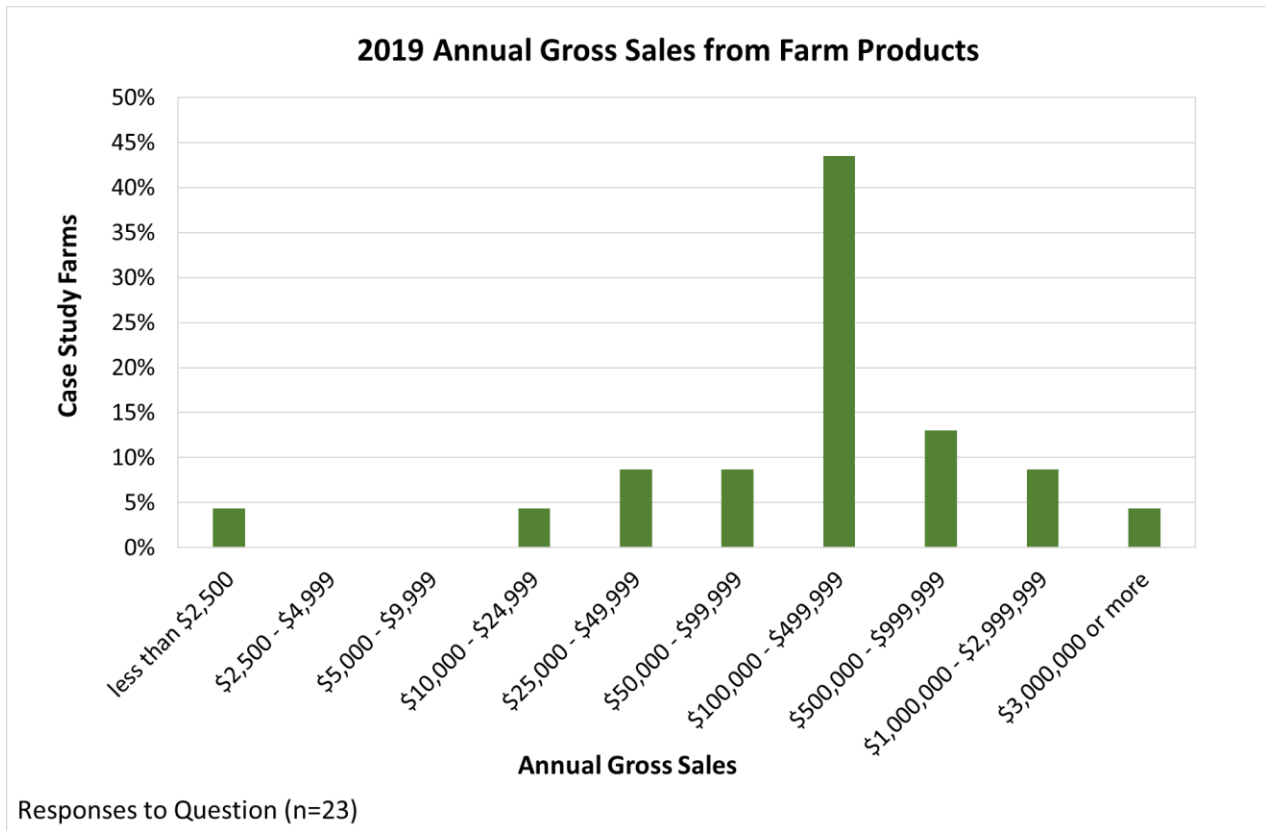


Figure 19. Annual gross sales from farm products in 2019.

Case study farmers collectively owned 4,185 acres and rented 8,769 acres. In 2019, of the 12,052 acres in production, 3,844 acres of crops were directly damaged by deer. Acres owned ranged from 6 acres to 1,200 acres per farmer (**Fig.20**). Rented acres ranged from 0 acres to 2,000 acres per farmer (**Fig.21**).

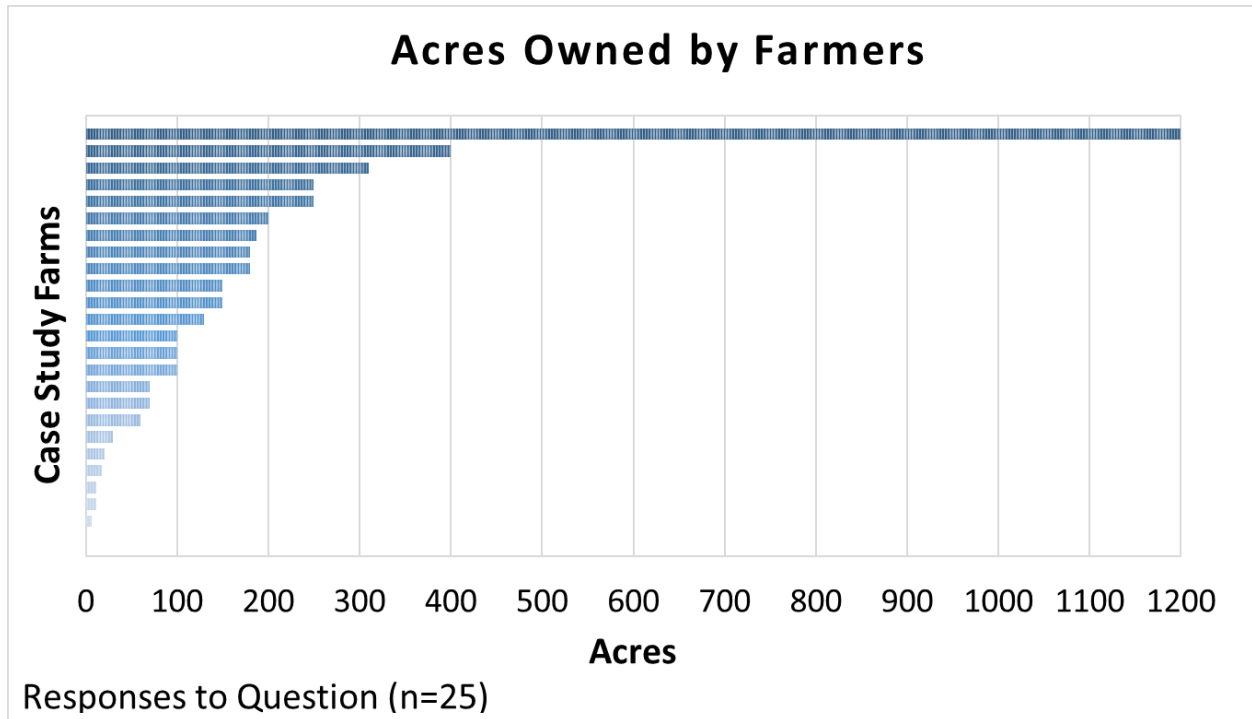


Figure 20. Farmer-owned acres in 2019.

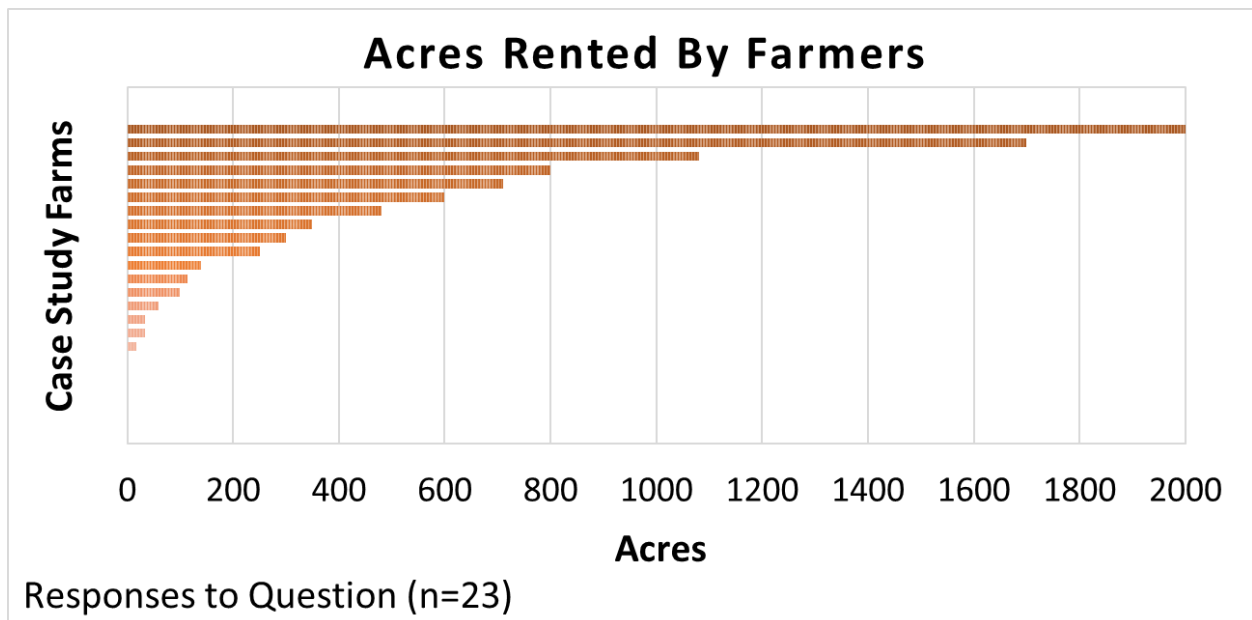


Figure 21. Farmer-rented acres in 2019.

Deer Population

Changes in Deer Population Over Time:

Farmers shared stories of how the deer population has changed in New Jersey over their lifetimes. Several farmers noted that when they were young, back in the 1960s and 1970s, it was rare and exciting to see a deer. Deer numbers increased to levels where crop damage started to become a problem for farmers in the 1980s and 1990s in North and Central New Jersey. More frequent problems in the southern part of the state were noted in the past 20 years. Sightings that were once rare, started becoming frequent visits with groups of 25 or more deer at one time being sighted around the farm and in the fields. Farmers reported regularly seeing groups of deer around farmed properties (**Fig.22**) and seeing does with three fawns (**Fig.23**). An additional consideration for deer management is that adult does can produce two and sometimes three fawns per year under ideal conditions (Boulanger et al. 2014).

“When I was young it was exciting to see a deer. You’d call everyone out to see them. Now it’s common to see 25 deer at a time running across the field.”

– Case Study Farmer



Figure 22. Group of deer in a cornfield. Photo - Kate Brown.

“When I was young growing up here you didn’t really see deer.”

– Case Study Farmer

“The late 1980s and early 1990s, that’s when it started being a problem and we started using fencing. As development went up, pressure started getting worse over the years. I see as many as 25-30 deer at night on the farm. I’ve seen does with 3 fawns this spring.”

– Case Study Farmer



Figure 23. Doe with three fawns in a New Jersey residential neighborhood. Photo - Joseph Paulin.

“It’s not just affecting the farmers. It’s affecting the neighborhoods too. They’re eating all the plants. Everybody in the neighborhood is affected.”

– Case Study Farmer

Perceptions of Deer Numbers Around Farms:

Farmers (96%) believed there were “too many” deer on farmed properties (**Fig.24**). The one farmer who believed there were the “right number” of deer on their property had a small 6-acre farm and had recently installed a deer fence. For the areas surrounding farmed properties, 100% of farmers believed there were “too many” deer.

“For years we’ve been talking about - what we are we going to do about the deer? Nothing has been enough. They’re getting bad.”

– Case Study Farmer

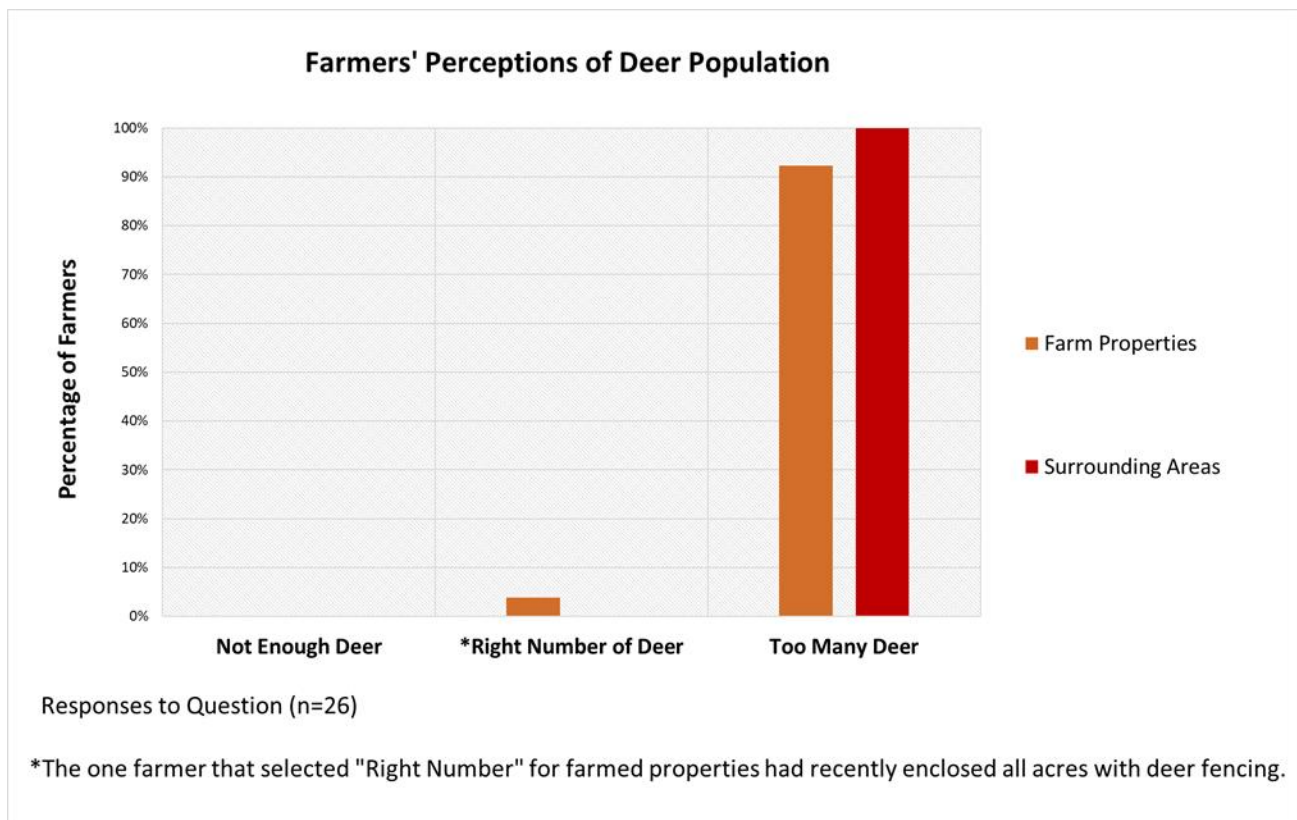


Figure 24. Case study farmers' perceptions of deer numbers on farm properties and surrounding areas.

“The surrounding areas, easily hundreds of acres, are serving as a refuge for huge herds of deer.”

- Case Study Farmer

Livelihood Impacts

Farmers noted significant impacts to their livelihoods from high deer numbers that can affect several generations. Direct damage to crops and deer-related “hidden costs” were estimated from less than \$1,000 to over \$200,000 depending on the size of the farm. It is difficult sometimes to understand the true impact of these estimates. For some farmers, this works out to financial losses from 10% to 25% of their gross income every year, sometimes more. Total crop losses to deer were considered a “problem” for 96% of participating farmers (**Fig.25**) and 81% of farmers were trying to reduce losses.

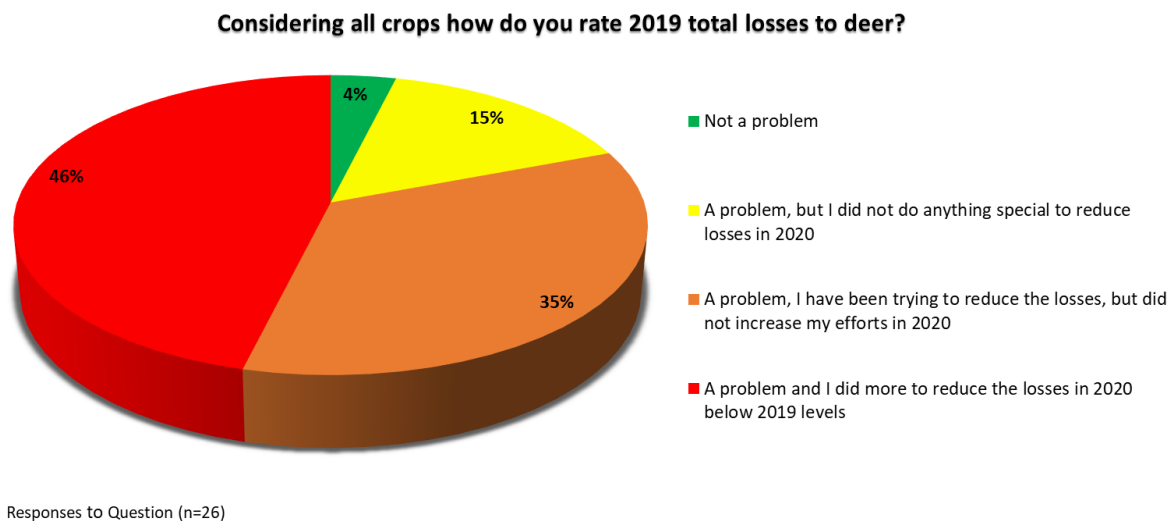


Figure 25. Case study farmers' rating of 2019 total losses to deer.

“The deer take 25% of every paycheck.”

– Case Study Farmer

The current study builds on the findings of previous NJAES research that estimated costs associated with direct deer damage to crops (Fritzell, 1998; Drake, 2005). We found direct deer damage to 3,842 acres on 27 farms ranged from a minimum of \$520,940 to a maximum of \$670,250 (**Table 1**). A new component of the current study, that builds on previous research, is estimates for deer-related “hidden costs.” We found these “hidden costs” to be substantial, were greater than direct deer damage to crops, and account for an additional \$755,200 for participating farms (**Fig.27**).

Results revealed that the conservative estimate associated with damage from deer and other wildlife in crop year 2019 is nearly \$1.4 million for the 27 participating farmers (**Fig.12**). These costs include direct deer damage to crops and reduced yields (\$520,940), deer-related hidden costs that can be assigned a dollar value (\$755,200), and crop damage from other wildlife species (\$97,749).

“My wife and I used to say if we lose less than \$10,000 per year it would be a good year. We haven't had a good year in over 10 years.”

– Case Study Farmer

Crop losses were considered “unacceptable” for 68% to 87% of responding farmers for all years between 2010 and 2019 (**Fig.26**).

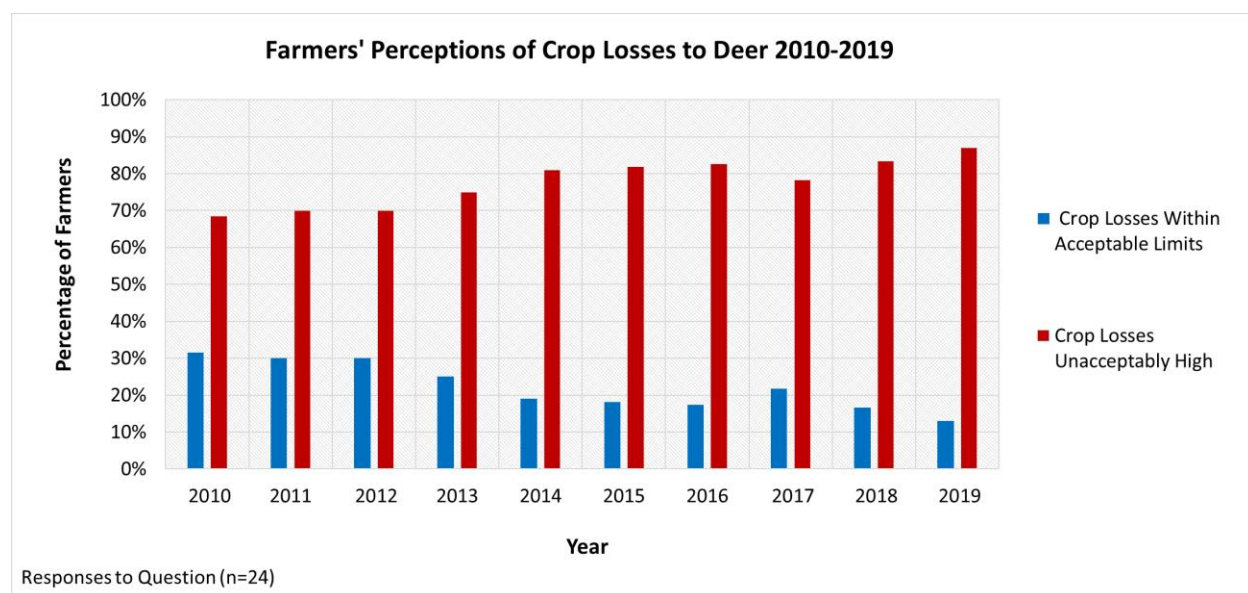


Figure 26. Case study farmers' perceptions of crop losses to deer between 2010-2019.

Direct Financial Losses from Crop Damage and Reduced Yields:

Financial losses that farmers experience from direct deer damage to crops and reduced yields is significant and can be challenging to quantify. Direct losses from the crops that deer eat or damage so badly that they can't be harvested or sold ranged from \$2,000 for a small 6 acre farm to over \$200,000 for a large farm over 2,000 acres. Many farmers believe true losses from deer damage are often underestimated. Participating farmers collectively owned 4,185 acres and rented 8,769 acres. In 2019, of the 12,052 acres in production, 3,844 acres of crops were directly damaged by deer. For the 3,844 acres affected by direct deer damage, loss estimates ranged from a minimum of \$520,940 to a maximum of \$670,250 (**Table 1**).

Table 1. Minimum and maximum cost estimates for direct deer damage to crops and acres affected. Responses to question (n=26).

Crops	Total Acres In Production 2019	Acres Affected by Deer 2019	Minimum Damage Estimate (\$)	Maximum Damage Estimate (\$)
Field Crops (Cash Grains, Oil Seeds, & Hay)	9,669	3,650	\$466,700	\$577,000
Vegetables & Melons	2,319	179	\$39,990	\$75,500
Fruits or Berries	5	2	\$5,750	\$6,250
Nursery, Christmas Trees, & Ornamentals	59	13	\$8,500	\$11,500
Total All Crops	12,052	3,844	\$520,940	\$670,250

“Things would look good at the beginning of the season and by the end it wouldn’t even be worth harvesting.”

– Case Study Farmer

Hidden and Emotional Costs:

Deer damage to agricultural crops is often associated with direct impacts from feeding and financial losses associated with reduced yields. However, there are many other costs associated with deer damage that are not as obvious. These other costs include having to abandon fields (field abandonment), not being able to grow preferred crops that would increase profits (crop abandonment), having to change crop rotations, the need for increased use of fertilizers and herbicides, time and money spent on deer management, and the emotional toll it can take. We use the term **“hidden costs”** to describe these additional negative impacts that farmers experience relating to damage from white-tailed deer. Hidden costs that farmers shared are described in detail in **APPENDIX III: Complete Farmer Case Studies**.

“There’s not a field I farm where there’s not deer damage. I’m starting to give up.”

– Case Study Farmer

In some cases, dollar values can be estimated for financial costs such as reduced yields from having to abandon fields, and not being able to grow preferred crops that would increase profits. Early season losses from deer can require replanting fields a second or even third time. There are also additional costs associated with the need for increased fertilizer, herbicide, and pesticide applications resulting from deer pressure. Farmers often spend considerable time and money on implementing deer management activities such as hunting or implementing depredation permits late into the night after spending all day in the fields. The costs of materials and labor for fence construction and maintenance can also be extremely high, and for many, cost prohibitive.

“I can accept some damage, but this is too much!”

– Case Study Farmer

The \$755,200 estimate mentioned earlier just for “hidden costs,” does not represent the true extent of all losses that were experienced by case study farmers. Some farmers did not provide estimates for acres lost to crop and field abandonment. Estimates that were provided include \$36,500 for 211 of 661 acres that were completely abandoned. Losses from crop abandonment were \$383,800 for 1,685 of 2,620 acres. Deer fencing costs reported for 398 acres by 10 farmers totaled \$220,500. Reported costs to implement deer management options, primarily labor, were \$51,400. Costs associated with increased use of fertilizers, herbicides, and pesticides because of changing crop rotations and soil damage due to deer pressure were estimated at \$63,000 (**Fig.27**).

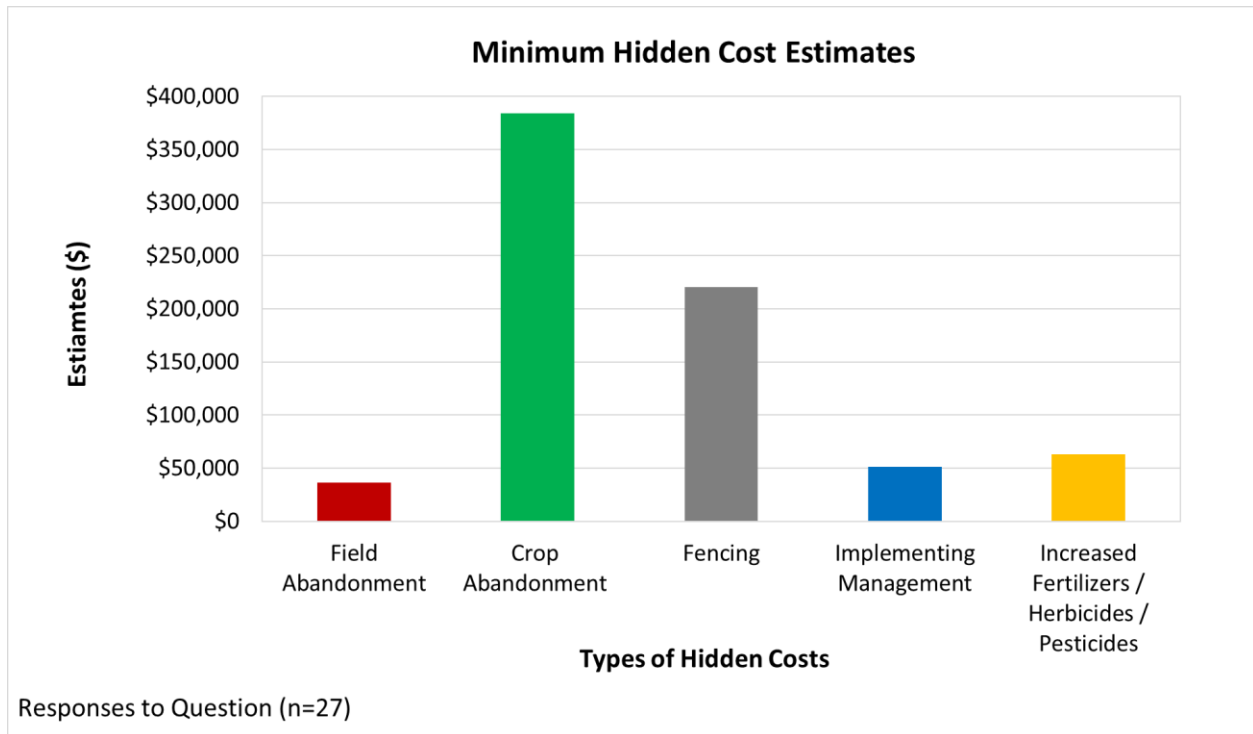


Figure 27. Minimum hidden cost estimates.

“It’s fun to watch the deer and all that, but not when it’s your livelihood they’re eating up. It’s not profitable and hurting the farmers and everybody that depends on them for food.”

– Case Study Farmer

There are also costs that farmers experience that are difficult to estimate or cannot be assigned a dollar value. These can be emotional costs such as frustration and depression from putting time, energy, and money into producing a crop that is starting to thrive just to watch the deer eat it down to the ground in a matter of weeks. There are concerns about being able to pay the bills and wondering if it’s still worth the effort. Crops that are so severely damaged that fields are not worth harvesting at the end of the growing season. Deer browse leads to increased weed growth that overtakes the crop (**Fig.28**). Crop rotations have to be changed in response to deer pressure and can result in soil damage and loss of fertility. Sometimes there is opposition in the community to the use of lethal management options that result in strained relationships with neighbors. For rented farmland, hunting or depredation permits to reduce deer numbers in efforts to decrease crop damage may not be allowed by the landowner.

“Once the deer ate the corn off, the sun got down to the ground and let the weeds grow.”

– Case Study Farmer

Deer have eaten the corn on the left (**Fig.28**) down to waist-high and the field is being overgrown by weeds that are competing with the corn for resources such as light and water. The photo on the right (**Fig.28**) shows undamaged corn in the same field that is 7-feet tall and shading out the smaller weeds between the rows.



Figure 28. Deer damage to corn leading to weeds overtaking the field (left). Undamaged corn in the same field that is outcompeting and shading out the smaller weeds (right). Photos - Joseph Paulin.

Financial Losses from Field Abandonment:

There are costs that often go unnoticed such as having to abandon a field because of deer pressure. These costs lead to significant financial losses. Forty-four percent of responding farmers (n=11) reported having to abandon a field because of deer in 2019. Reported losses ranged from \$2,000 to \$15,000 per farm. Several farmers found losses difficult to estimate. Estimates include \$36,500 for 211 of 661 acres that were completely abandoned (**Fig.27**).

“I’ve entirely dropped whole farms because of deer damage.”

– Case Study Farmer

Financial Losses from Crop Abandonment:

Many farmers are not able to plant preferred crops. In 2019, 63% of case study farmers reported abandoning crops like corn, soybeans, alfalfa, oats, vegetables, and Christmas trees. Financial losses associated with crop abandonment ranged from \$3,500 to \$55,000 per farm. Reported losses from crop abandonment were \$383,800 for 1,685 of 2,620 acres (**Fig.27**).

“There’s 12 acres where I would be growing vegetables if not for the deer damage. That costs \$15,000 to \$20,000 per year.”

– Case Study Farmer

Other Wildlife Damage:

In addition to losses suffered from white-tailed deer, most farmers 81% (n=21) also experienced significant financial losses from other wildlife species in 2019. Farmers (n=26) were “very confident” (88%) or “somewhat confident” (12%) in their ability to correctly distinguish losses caused by deer from losses caused by other wildlife. Depending on the crop and wildlife species, losses ranged from less than \$1,000 to \$35,000 per farm.



Figure 29. Canada geese landing in a recently harvested cornfield. Photo – Joseph Paulin.

“Canada geese damage is in the thousands every year.”

– Case Study Farmer

Table 2. Cost estimates for direct crop damage and acres affected by other wildlife. Responses to question (n=26).

Species	Crop Type	Acres Affected	Minimum Damage Estimates (\$)	Maximum Damage Estimates (\$)
Black Bear	Field crop	7	\$2,249	\$6,249
Black Bear	Fruits	Not provided	\$600	\$650
Blackbirds/Red-winged Blackbirds/Crows	Field crop	102	\$5,000	\$9,000
Blackbirds/Red-winged Blackbirds/Crows	Vegetables	40	\$15,000	\$20,500
Canada Geese	Field crop	622	\$35,900	\$52,900
Canada Geese	Vegetables	Not provided	\$5,000	\$5,000
Groundhogs	Field crop	Not provided	\$3,000	\$3,000
Groundhogs	Vegetables	25	\$27,500	\$33,500
Raccoons	Field crop	Not provided	\$2,000	\$2,000
Squirrels	Field crop	Not provided	\$850	\$1,650
Turkey	Field crop	Not provided	\$650	\$650
Total	All Crops	796	\$97,749	\$135,099

Damage estimates were reported for red-winged blackbirds, blackbirds, crows, black bear, Canada geese (**Fig.29**), groundhogs, raccoons, squirrels, and turkey (**Table 2**). Reported estimates for direct crop damage from these species ranged from a minimum of \$97,749 to a maximum of \$135,099 (**Table 2**). Not all reports included estimates for financial losses or acres affected.

Additional damage reported for other wildlife included beavers flooding fields by blocking ditches and creeks. Black bears (**Fig.30**), damaged chicken coops, beehives, and fencing. There were also reports of coyotes, fox, owls, Cooper's hawks, and red-tailed hawks killing chickens.

“Bears up in north Jersey are getting bad in the cornfields. They roll around and knock down all the corn and eat it.”

– Case Study Farmer



Figure 30. Bear roll damage in a cornfield in northern New Jersey. Photo - Stephen Komar.

“Beaver have been a problem blocking ditches and creeks that flood the lower fields.”

– Case Study Farmer

Management Challenges – Areas Surrounding Farms

Public Awareness:

New Jersey depends on locally produced crops. During case study interviews, farmers stated that this became even more clear to people in 2020 and 2021 during the COVID-19 global pandemic. Many New Jerseyans enjoy locally grown fruits, vegetables, and products made from corn and soybeans. Farmers want communities to know that deer-related crop damage is jeopardizing their ability to provide safe and healthy food. They would like people to make the connection and understand that deer are negatively impacting farmers' properties and lives, as well as the health and safety of local communities.

“Local farms had a major impact in us surviving COVID-19. People need to look at agriculture as essential to them and not just a business. A farm is part of the essential infrastructure around them that puts food on their tables. When you preserve a farm, you’re preserving the future of your food source.”

– Case Study Farmer

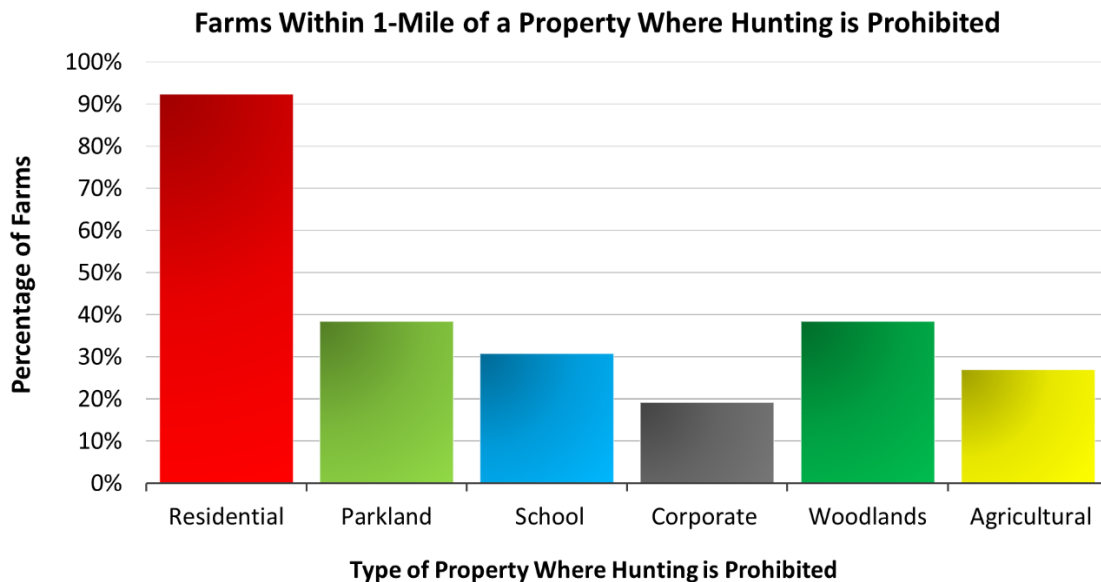


Figure 31. Deer feeding in a wooded area (left) and deer eating residential landscaping (right). When unmanaged and near farms, these types of properties can be refuge areas for deer that feed in farmers' fields. Photos - Mary Beth Scumaci (left) and Joseph Paulin (right).

Residential Development and Refuge Areas:

A deer refuge is an area of publicly or privately owned land with suitable habitat, where the ability to manage deer is limited or restricted (Drake et al. 2002; Department of Environmental Protection, Division of Fish, Game and Wildlife 1999). Farmers noted that as development increased in the state, starting as early as the 1970s, pressure from deer has increased. Many farmers have noted that adjacent neighborhoods, woodlands and open spaces, are serving as refuge areas (**Fig.31**), for deer that feed in the farm fields at night and cause extensive crop damage.

Ninety-six percent of responding farmers (n=25) were within 1-mile of a refuge area, including residential areas (92%), parklands (38%), schools (31%), corporate parks (19%), woodlands (38%), and other agricultural lands (27%) (**Fig.32**).



Responses to Question (n=26)

Figure 32. Percentage of case study farms within 1-mile of a property where hunting is not practical or prohibited.

“There are a lot of refuges in neighborhoods and private lands around the state that are next to farms. The deer use them during the day and feed in the farm fields at night.”

– Case Study Farmer

For developed and residential areas where hunting is not allowed or practical (**Fig.33**), or where hunting alone cannot remove enough deer, farmers encourage townships to apply for a New Jersey Division of Fish and Wildlife, Community Based Deer Management Program permit (<https://www.nj.gov/dep/fgw/cbdmp.htm>). The permit allows for additional lethal management options and removal of deer outside of regulated hunting seasons. Townships can also look for opportunities to donate the venison to foodbanks to help those in need in their community.



Figure 33. Deer that find refuge in suburban areas (left) often find nearby farm fields (right) where they feed and cause crop damage. Photos – Joseph Paulin (left) and Hank Bignell (right).

“When developments started going in the 1980s and 1990s it got worse. The deer would feed in the farm fields that were left.”

– Case Study Farmer

Public Lands (Access and Management):

Public lands near farm fields can act as refuges for deer causing crop damage. Farmers promote expanding coordinated regional deer management programs where municipal and county representatives can work together with each other and the state partners to enhance the effectiveness of deer management activities on public lands. Farmers recommended that public lands should have wildlife management plans to reduce negative impacts to neighboring farms, forests, residential areas and decrease deer-vehicle collisions. Farmers noted county programs for managing deer on public lands, including doe-focused bowhunting programs and allowing depredation permits on leased land as positive steps. It was further recommended that hunting take place as much as possible on public lands to reduce refuge areas.

“There should be hunting allowed as much as possible on public lands. Public lands should have wildlife management programs so deer don’t affect neighboring farms, residential areas, and there are fewer vehicle collisions.”

– Case Study Farmer

Leased Lands (Access and Management):

Many farmers rent land to grow crops throughout New Jersey. Case study farmers (n=19) leased 8,769 acres in 2019. In some cases, landowners that lease land to farmers do not allow them to control access to the properties, or implement management options such as hunting and depredation permits to decrease deer numbers. The percentage of rented acres where hunting was not allowed ranged from 3% to 100% for participating farmers that leased land (**Fig. 34**).

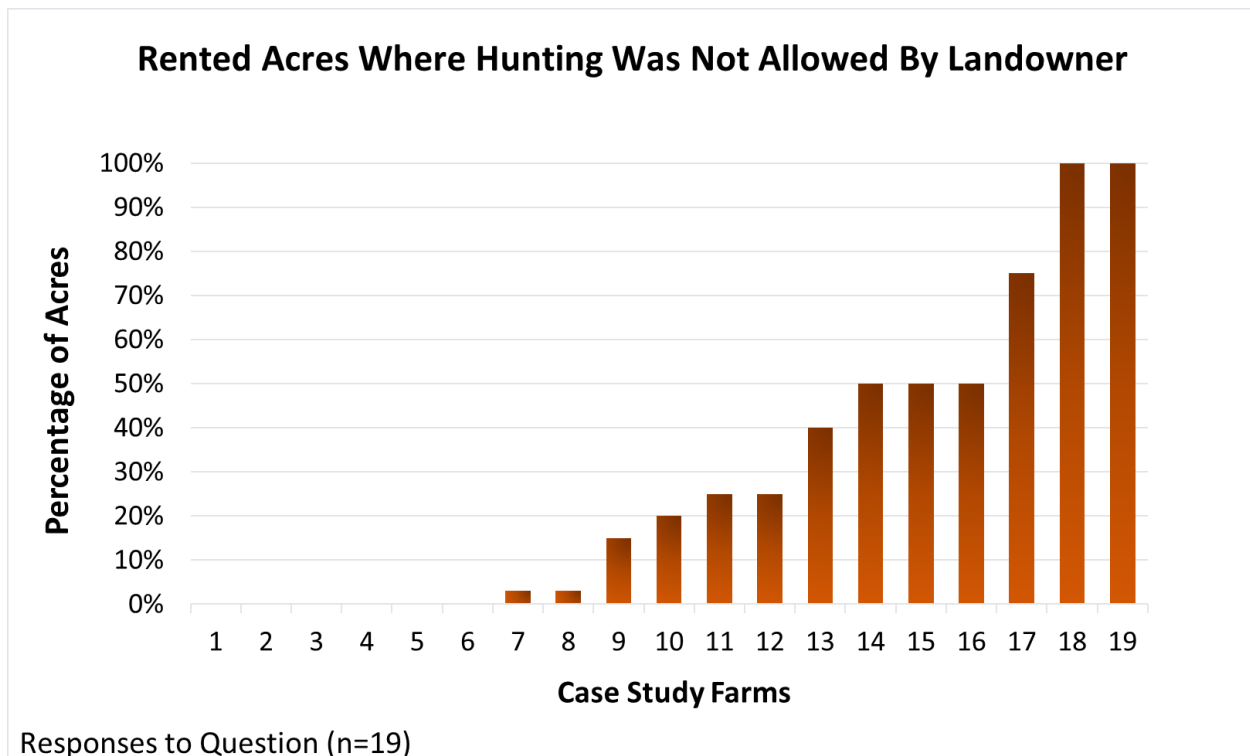


Figure 34. Percentage of acres rented in 2019 where case study farmers were not allowed to hunt by the landowners.

“Landowners that lease should have to allow hunting or be required to create a wildlife management plan. Some don’t allow any hunting and the land is a deer refuge. People that have properties that are refuges should have to develop a wildlife management plan or be assessed a fee or penalty if their land is a refuge for deer causing damage to farms.”

– Case Study Farmer

“Farmers need to be able to hunt on properties that are leased and use deprecation permits. Areas where I can control hunting - it makes a big difference for damage.”

– Case Study Farmer

Although several farmers had positive relationships with local hunting clubs that practiced doe-focused management, others noted clubs that were more focused on buck hunting, that alone, is not as effective in reducing deer numbers. It was recommended that landowners receiving Farmland Assessment, or who rent land to farmers for crop production, should be required to allow deer management activities or be required to develop a wildlife management plan. Promoting the expansion of doe-focused hunting programs on public and private lands wherever possible and raising awareness of the importance of harvesting does was also recommended.

“I’ve been talking with the neighbors that hunt about the need to shoot more does.”

– Case Study Farmer

In 2019, the percentage of rented acres where landowners allowed case study farmers to use deprecation permits ranged from 0 to 100%. Some farmers (n=10) were allowed to use deprecation permits on 2 to 100% of the rented land. However, other farmers (n=6) were not allowed to use deprecation permits on any of the rented property (*Fig.35*).

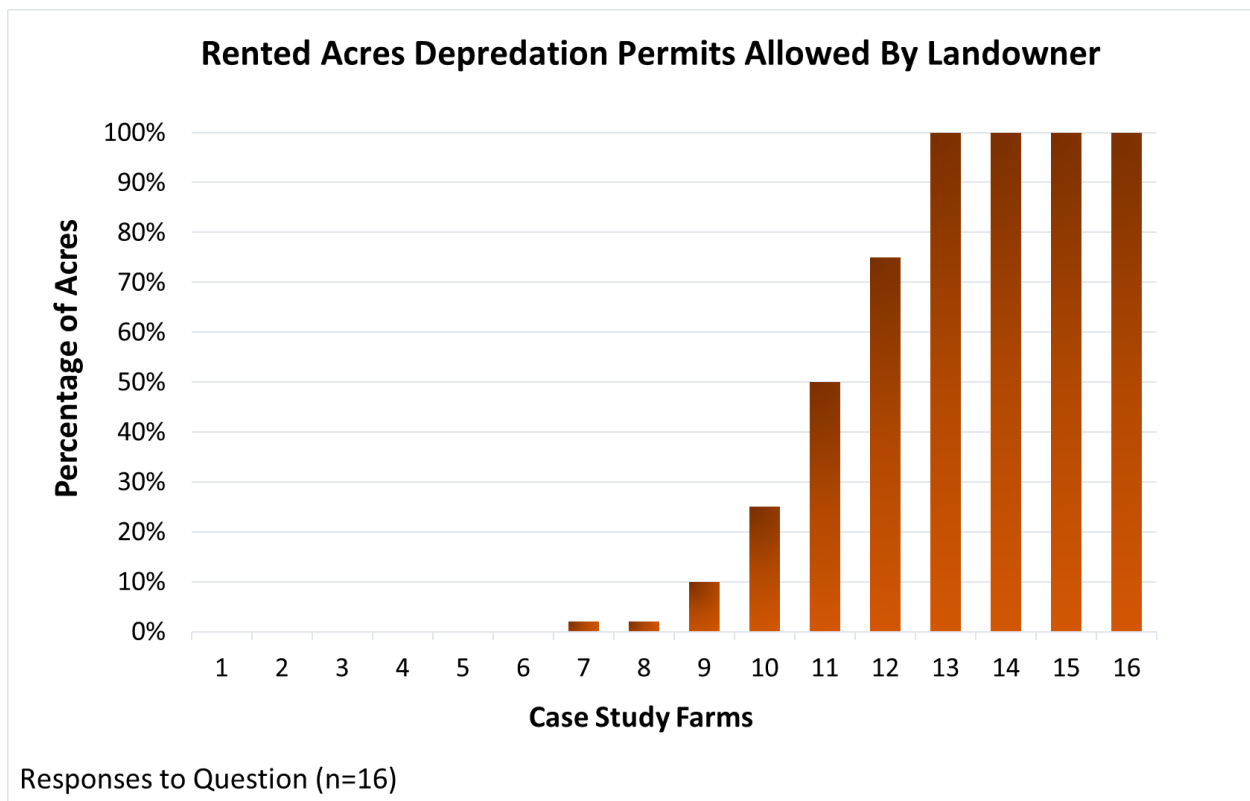


Figure 35. Percentage of rented acres where landowners allowed farmers to use deprecation permits.

Management Implementation

Management and Effectiveness:

Farmers reported using several deer management options that vary in effectiveness, cost, and time required for implementation. Management options implemented in 2019 included 8-foot high-tensile woven wire fencing (31%), electric fencing (23%), hunting (100%), depredation permits (42%), repellents (23%), and harassment techniques (15%) (**Fig.36**). **For more information on wildlife management options available to farmers, see the New Jersey Division of Fish and Wildlife "Information for Farmers" (<https://www.njfishandwildlife.com/farmer.htm>).*

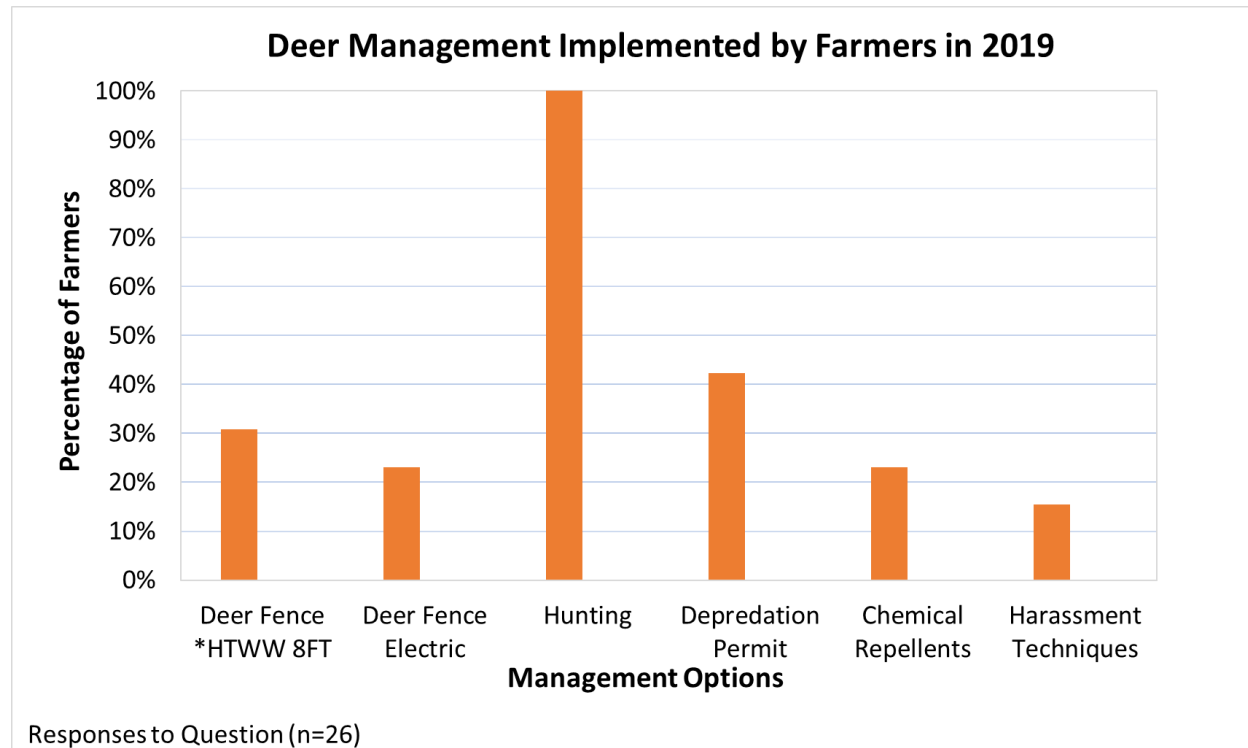


Figure 36. Management options used by case study farmers in 2019. * HTWW= High-Tensile Woven Wire.

Fencing:

Deer fencing costs reported for 398 acres by case study farmers totaled \$220,500 (**Fig.27**). The most effective fences were constructed of 8-foot high-tensile woven wire (**Fig.37**) and were used on 347 acres for a combined cost of \$171,000. This option was typically used for high-value crops such as vegetables. Farmers using 8-foot tall, high-tensile woven wire fencing spent from \$6,000 to over \$100,000 to fence their fields. Several farmers noted that this type of fencing was too expensive and not cost-effective to fence crops such as hay, field corn and soybeans. Additionally, fencing leased land is not always permitted by the landowner. Farmers supported expanding state programs that provided fencing and materials.

“The way my farm is laid out I can’t just go and fence the whole farm. We rent from several different landowners. It’s near impossible with all the roadways. The costs would be huge. I’m pretty much out of options other than to take a beating.”

– Case Study Farmer

Case study farmers also reported using temporary 8-foot plastic and metal fences on a combined 44 acres at a cost of \$44,000. They noted that initially deer would run through the plastic fence, but it became more effective over time. Other types of fences reported by farmers included wooden, and temporary plastic and electric fencing ranging from 4 to 6-foot. These types of fences were used on a combined 7 acres at a total cost of \$5,550. Farmers reported that deer often jumped over these types of fences, and they were typically seen as ineffective.



Figure 37. High-tensile woven wire fencing at least 8-feet tall can be an effective option to protect agricultural crops (left) and forested areas (right). Photos – Joseph Paulin.

“We fenced in the property about 5 years ago. It was either stop the deer or stop farming. You can live with some of the damage, but it just got to be too much.”

– Case Study Farmer

Hunting and Ideas for Decreasing Deer Numbers in Refuge Areas:

All farmers either hunted or allowed hunting on farmed properties (**Fig.38**). Hunting was seen as one of the most effective management options. Adjacent properties where hunting was not allowed or practical acted as deer refuges that created challenges for deer management. These areas included public and private lands, leased farmlands, county parks, corporate parks, schools, golf courses, nature preserves, and residential neighborhoods. Farmers recommended opening as much public land as possible to hunting to decrease deer numbers. Additional recommendations included requiring that wildlife management plans for private lands that receive Farmland Assessment.

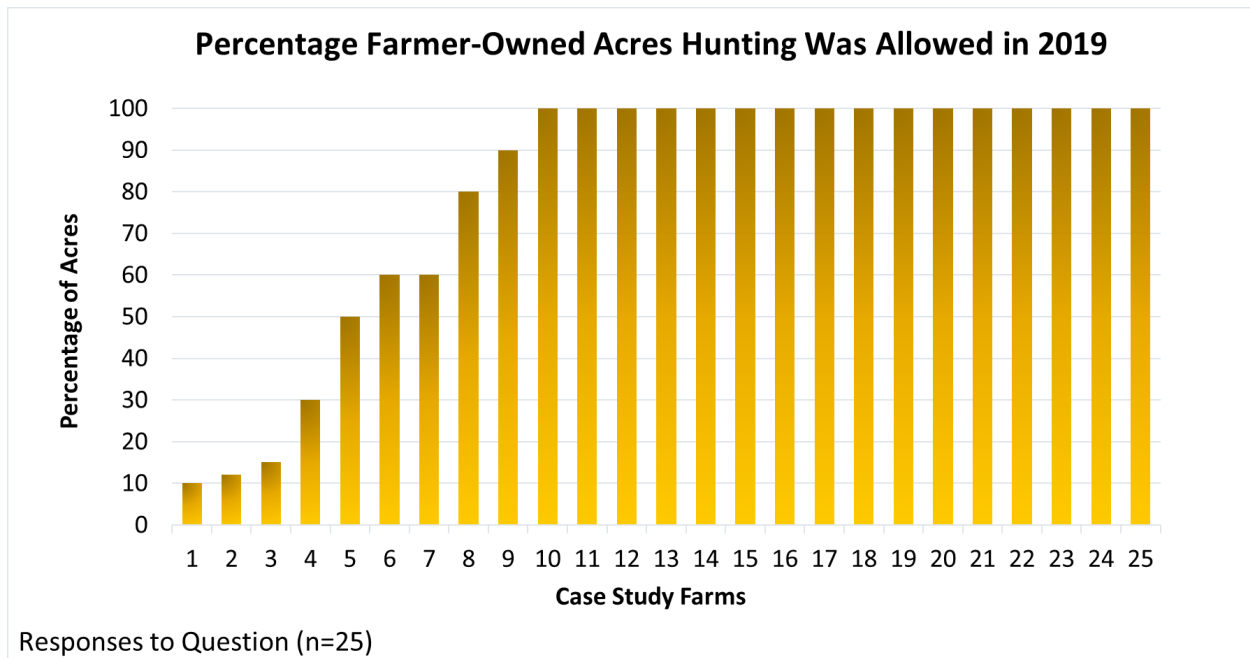


Figure 38. Percentage of farmer-owned acres where hunting was allowed on case study farms in 2019.

“There should be hunting allowed as much as possible on public lands. Public lands should have wildlife management programs so deer don’t affect neighboring farms, residential areas and there are fewer vehicle collisions.”

– Case Study Farmer

Depredation Permits:

Farmers can apply for depredation permits to shoot deer causing crop damage. This option was used by 42% of case study farmers. These permits are an effective management option and are often implemented outside of regulated hunting seasons. Permits can be obtained for year-round use when damage is extensive. Depredation permits are typically implemented using shotgun, but farmers can also apply for permission to use crossbows. This option can be effective for farms that are too close to residential areas and where firearms cannot be discharged.

However, deer damage is often the worst during the summer growing season, the busiest time of year for most farmers. Farmers noted that going out to shoot deer for 3 to 4 hours per night after working sunup to sundown in the heat is extremely difficult.

“It takes a physical toll after working in the field all day. Sometimes you have to go out at 1:00 am. Try doing that after working all day in 90 degree heat.”

– Case Study Farmer

In some cases, farmers would not use depredation permits if the meat could not be eaten as they didn't want the deer to go to waste. Additionally, 63% of case study farmers mentioned previously encountering opposition to the use of depredation permits from residents of adjacent properties, animal advocates, local hunters, and owners of leased farmland. Recommendations included expanding programs that combine the implementation of depredation permits with venison donation programs to help local foodbanks and those in need in the community.

“Figure out ways for donation through depredation permits during the summer months.”

– Case Study Farmer

Repellents:

Taste-based repellents are applied directly to plants to discourage deer from eating them. Area-based or odor-based repellents are applied near plants and are intended to discourage deer browse through smell. Other than temporary relief to landscape plants, of the 23% of case study farmers that had used repellents in 2019 (**Fig.36**), all found them to be ineffective in achieving their desired result. Repellents had to be reapplied after rain and after several days deer would eat new growth that hadn't been treated yet. High deer densities can also lead to repellents being a less effective management option.

“Early on we used repellents, chemical and cayenne pepper. Every time it rains you have to go out and reapply. I haven't seen anything worth the time in the long run.”

– Case Study Farmer

Harassment Techniques:

These techniques are used in attempts to scare deer or other wildlife, often Canada geese, out of an area. They include devices that make loud noises such as propane cannons, cracker shells, and sirens. Visual deterrents included scarecrows, flare guns, and strobes. Driving through areas to scare deer away was also reported. Of the 15% of case study farmers that reported using harassment techniques in 2019 (**Fig.36**), all found them to be ineffective in achieving their desired result.

“I've tried it all, scare them, scarecrows, repellents, harassment techniques. Nothing works for long.”

– Case Study Farmer

Discussion and Management Recommendations

Wildlife management involves striving to achieve a positive balance when it comes to human-wildlife interactions. There are many factors that must be considered including ensuring healthy wildlife populations, benefits associated with wildlife, damage impacts, and safety concerns. This is especially challenging in the most densely peopled state in the US. Development has created fragmented landscapes. People and wildlife live in close proximity and interact regularly.

White-tailed deer numbers have increased in New Jersey over the past several decades. This has presented many challenges to farmers growing crops throughout the state. Although densities of 10 deer per square mile are recommended to maintain benefits for social, economic, and ecosystem integrity (Kelly, 2019), numbers observed around case study farms ranged from 60 to 239 deer per square mile. The majority of participating farmers overwhelmingly reported that there were too many deer on farmed properties and surrounding landscapes.

Nearly all case study farmers reported that adjacent neighborhoods, woodlands, and open spaces, are serving as refuge areas for deer that feed in the farm fields at night causing extensive crop damage. For developed and residential areas where hunting is not allowed or practical, or where hunting alone cannot remove enough deer, farmers encourage townships to apply for a New Jersey Division of Fish and Wildlife, Community Based Deer Management Program permit. This permit allows for additional lethal management options and removal of deer outside of regulated hunting seasons. Townships are also encouraged to look for opportunities to donate the venison to foodbanks to help those in need in their community.

Public and private lands near farm fields also act as refuges for deer causing crop damage. Further, many farmers rent land to grow crops where they do not control access or are not allowed to implement options such as hunting and depredation permits. Case study farmers recommended that owners and managers of these types of lands should allow access for management activities or be required to develop wildlife management plans to reduce negative impacts to neighboring farms, forests, residential areas and decrease deer-vehicle collisions. Some existing county programs for managing deer on public lands, including doe-focused bowhunting programs and allowing depredation permits on leased land, were reported as positive steps.

Farmers noted significant impacts to their livelihoods from high deer numbers that can affect several generations. Deer-related crop losses were unacceptable for the majority of case study farmers from 2010 to 2019. In 2019, total crop losses to deer were considered a problem for 96% of participating farmers and 81% of farmers were trying to reduce losses.

The current study builds on the findings of previous NJAES research that estimated costs associated with direct deer damage to crops (Fritzell, 1998; Drake, 2005). In addition to estimates for direct damage, this new research includes estimates for "hidden costs" that may not be obvious. These costs, resulting from increased deer pressure, include abandoning fields and crops, changing rotations, increased use of fertilizers and herbicides, time and money spent on management, and the emotional toll it can take. Hidden costs (\$755,200) for case study farmers, exceeded minimum estimates for direct deer damage (\$520,940) and crop damage from other wildlife (\$97,749).

Case study farmers reported using several deer management options that varied in effectiveness, costs, and time required for implementation. Fencing was effective, but was often used for high value crops such as vegetables. The most effective fences were constructed of 8-foot tall high-tensile woven wire.

However, for many farmers, this type of fencing was too expensive, not cost effective for field crops, and not always allowed on rented land. All responding farmers hunted or allowed hunting on farmer owned properties where they controlled land access. For rented land, landowners often did not allow access for hunting, or the use of depredation permits. Depredation permits were typically implemented during the summer months, the busiest time of year for most farmers that were already working sunup to sundown. Less than 25% of case study farmers used repellents and harassment techniques in 2019. These options were reported as time consuming and often ineffective in achieving desired results.

Farmers' Recommendations to Enhance Deer Management

Farmers provided many ideas and recommendations on items policymakers can support and take action on to reduce deer numbers and associated negative impacts to native forests, residential landscapes, farmers' livelihoods, and health and safety concerns.

“Policymakers need to take into account environmental impacts, residential damage, health and safety of deer collisions, and health of the deer population. There’s a lot that needs to be considered. How long can you sustain this level of overpopulation without some type of detrimental effect to the herd?”

– Case Study Farmer

1) General Deer Management

- Promote opportunities for consultation between state agencies and stakeholders impacted by deer damage to coordinate efforts, identify challenges, and pool resources to increase the overall effectiveness of deer management programs throughout New Jersey. Participants should include, among others, the agricultural community, public and private land managers, developers, wildlife managers, researchers and educators, and state and local decision-makers.
- Expand coordinated regional deer management programs where municipal and county representatives can work together with state partners to enhance the effectiveness of deer management activities on public lands.
- Promote the expansion of doe-focused hunting programs on public and private lands wherever possible and raise awareness of the importance of harvesting does in reducing overall deer numbers.

“We need a comprehensive herd reduction program. Future deer management and development have to adapt together. Until the herd becomes manageable, we need to make it a year-round effort.”

– Case Study Farmer

2) Venison Donation Programs and Helping Those in Need

- Provide funding to expand opportunities for venison donation programs, such as Hunters Helping the Hungry, that can benefit from deer taken through farmer depredation permits, and suburban community-based deer management programs.

Venison is healthy protein that is needed by foodbanks and will benefit those in need throughout the state. Funding can cover processing costs and incentives that would increase the number of approved and participating butchers. This will increase access for those willing to donate deer and increase the benefits to those in need.

Additionally, funding can be used for regional coolers where deer can be dropped off for processing. This will be especially helpful for donation of deer taken under farmer depredation permits and prevent venison from going to waste during warmer times of the year.

Hunters Helping the Hungry (HHH) participants have donated over 2,000,000 servings of protein to New Jersey families in need over the past 25 years, mostly through private donations. As of summer 2021, HHH has a mobile refrigerated trailer that enables venison donation during warmer months when farmers are taking deer under depredation permits outside of regular hunting seasons. The depredation program was made possible with state funding and a partnership between HHH, Farm Bureau, NJ Department of Health, and the NJ Division of Fish and Wildlife.

“Find avenues to public good through processing and feeding programs to get protein to the needy so it doesn’t go to waste. Incentivize doe harvest and donations to food banks. No cost to the hunter and not counted against the hunter’s limit. Increase funding for programs like Hunters Helping the Hungry. Figure out ways for donation through depredation permits during the summer months. Use sharpshooters in suburban areas where you can’t hunt and donate the venison.”

– Case Study Farmer

3) Residential Development and Deer Refuge Areas

- Encourage suburban communities with high deer densities that serve as refuge areas, and where hunting is not possible, to apply for New Jersey Division of Fish and Wildlife, Community-Based Deer Management Permits (<https://www.nj.gov/dep/fgw/cbdmp.htm>).

This program allows for townships, counties, airports, and County Boards of Agriculture to apply for a permit allowing alternative control measures to take deer in areas where hunting is not a viable option to remove deer.

“The suburban neighborhoods are definitely acting as refuges.”

– Case Study Farmer

4) Private Leased Farmland and Wildlife Management Plans

- Require landowners receiving Farmland Assessment, or who rent land to farmers for crop production, to allow deer management activities or develop wildlife management plans to reduce deer causing damage.

Farmers lease many acres of farmland around the state. In some cases, farmers do not control access to the properties and are not allowed to implement deer management options such as hunting and depredation permits.

“Landowners that lease should have to allow hunting or be required to create a wildlife management plan. Some don’t allow any hunting and the land is a deer refuge.”

– Case Study Farmer

5) Public Lands and Wildlife Management Plans

- Establish wildlife management plans on public lands to reduce negative impacts to neighboring farms, forests, and residential areas and decrease deer-vehicle collisions.

Public lands near farm fields can act as refuges for deer causing damage to crops and native ecosystems. Farmers promote expanding coordinated regional deer management programs where municipal and county representatives can work together with each other and the state partners to enhance the effectiveness of deer management activities on public lands.

“The county is making an effort to allow hunting on ground they rent out to farm and allowing farmers to apply for depredation permits.”

– Case Study Farmer

6) Education and Outreach for Policymakers and Communities

- Facilitate education and outreach programs, especially for policymakers and the general public, to raise awareness of deer impacts to food production and farmers' livelihoods, environmental impacts, and safety concerns.

Programs can include:

1. Deer impacts on farmers' livelihoods, food security, and the ability to provide locally grown, safe and healthy foods that New Jerseyans depend on.
2. The hidden costs of deer damage such as emotional costs, having to replant crops, impacts to crop rotations, and soil damage that can result in the need for increased use of herbicides and fertilizers.
3. Environmental impacts including how high deer numbers and increases in deer herbivory on native plants is changing and threatening forest ecosystems by contributing to the invasion of non-native species.
4. Deer-related safety concerns and the high costs of deer-vehicle collisions.

“There needs to be more education on the damage the deer cause.”

– Case Study Farmer

7) Deer Fencing

- Provide programs and funding for deer fencing for farmers. Fencing is an effective management option for reducing crop damage.

However, fencing can be extremely expensive depending on the size of the farm operation. Many farmers cannot afford to fence in their fields.

“I’m fortunate that I can fence, but some growers can’t fence. It’s too expensive.”

– Case Study Farmer

8) Enhancing Deer Management through Hunting

- Create more opportunities for doe-focused hunting to reduce overall deer numbers such as unlimited antlerless harvest in all Deer Management Zones and require that a doe be harvested before a buck can be taken.
- Expand hunting opportunities by lengthening seasons and allowing hunting on Sundays.
- Streamline the processes for obtaining hunting permits (possibly regional or county permits).

“The permitting process needs to be streamlined, possibly regional permits.”

– Case Study Farmer

As of October 2021, the New Jersey Division of Fish and Wildlife now offers a “Multi-Zone Permit” to hunt antlerless deer in any zone within Regulation Set 7 or 8 for the specified permit season. For additional information see (<https://www.nj.gov/dep/fgw>).

9) Farmer Depredation Permits

- Amend the current regulation for farmer depredation permits to include archery for compatibility near residential areas where shotgun is not permitted.

“Now that I have all these houses on top of me - I can't get a depredation permit anymore.”

– Case Study Farmer

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APPENDIX I

What Farmers Want You to Know: Key Topics and Messages from Case Study Stories

Messages to Policymakers:

Farmers continue to state their desire to work together with policymakers, to effectively address issues relating to deer damage, that have spanned the past several decades. In addition to extensive crop damage and negative impacts on farmers' livelihoods; deer cause damage to native ecosystems, residential landscapes, and raise health and safety concerns such as approximately 25,000 deer-vehicle collisions in New Jersey every year.

- We want to work with the policymakers. Farmers don't usually ask for too much. If we do, there's a pretty good reason. If we can work together to help get things done, we can make it better.
- For years we've been talking about - what we are we going to do about the deer? Nothing has been enough. They're getting bad.
- We've been telling our story for a long time. I think the damage and risk to society as a whole has not been told. Deer are responsible for damage to property, public safety, and people's livelihoods. This is a real problem, and the politicians need to take action. Unless they take action, they're contributing to the problem.
- Policymakers need to take into account environmental impacts, residential damage, health and safety of deer collisions, and health of the deer population. There's a lot that needs to be considered. How long can you sustain this level of overpopulation without some type of detrimental effect to the herd?
- We need a comprehensive herd reduction program. Future deer management and development have to adapt together. Until the herd becomes manageable, we need to make it a year-round effort.
- Decision-makers should listen to farmers. We're not making it up. Sometimes our complaints fall on deaf ears. I think they care. They just don't know what to do. If we don't speak, we're not heard. Should have more deer hunting zones with unlimited deer hunting. Could use more deer processors to donate harvested deer at no expense to the farmer.
- There's a lot of land in the area owned by the township. They do little to no deer management. There's also green space that has little to no management. That's a problem.
- Some of our legislators need to take up the issue and gain public support.
- We're lucky the township has an aggressive deer management program.
- We need to get more people in the woods hunting. Look at increasing the length of the seasons. Make it easier for hunters to get out there.

- How many Deer Management Zones do we have now? I realize different areas need to be treated differently, but it's too many permits. It can get expensive. It's why a lot of guys are getting out of it now.
- Liability is an issue. You can't just let anyone come hunt on your farm. The state should pay for it or make it a law that we can't be liable if people come on the farm and hunt. Pass legislation that the farmers aren't held liable.

Food Security:

The United States Department of Agriculture defines food security as the ability to access enough nutritionally adequate and safe foods for an active and healthy life at all times (Coleman-Jensen et al. 2020). New Jersey farmers play a critical role in this process for people throughout the state. Many New Jerseyans enjoy locally grown fruits, vegetables, and products made from corn and soybeans. Farmers want communities to know that deer-related crop damage is jeopardizing their ability to provide safe and healthy food.

- Local farms had a major impact in us surviving COVID-19. People need to look at agriculture as essential to them and not just a business. A farm is part of the essential infrastructure around them that puts food on their tables. When you preserve a farm, you're preserving the future of your food source.
- Understand that not only is it jeopardizing my ability to provide safe and healthy food, but it's also impacting the community around you, your health and safety.
- There has been opposition to hunting by special interest groups. People don't understand the impact of these animals on the property and our lives. They want to be able to eat the products made with corn and soybeans. They're not making the connection with where the food comes from. People need to work together to come up with some type of solution that is productive for everybody.

Venison Donation:

Venison donation programs benefit foodbanks and those in need throughout New Jersey. Facilitating opportunities that connect hunting, implementation of farmer depredation permits, and suburban deer management programs, with efforts helping to feed those in need, can enhance deer management throughout the state. An example of a successful statewide venison donation program is the Hunters Helping the Hungry Program <http://www.huntershelpingthehungry.org>. Since 1997, the program has provided over 2,000,000 servings of healthy protein to those in need.

- Find avenues to public good through processing and feeding programs to get protein to the needy so it doesn't go to waste. Incentivize doe harvest and donations to food banks. No cost to the hunter and not counted against the hunter's limit. Increase funding for programs like Hunters Helping the Hungry. Figure out ways for donation through depredation permits during the summer months. Use sharpshooters in suburban areas where you can't hunt and donate the venison.

- If there are people out there that don't have food on the table, that should be a priority. The meat is healthy and good. There needs to be a comprehensive program to facilitate shooting, transport, processing and giving meat to people that need something to eat. There should be some coordination that provides jobs for people. It needs to facilitate butchers to do it on a larger scale. It could be a year-round thing. We don't need hunting year-round. You can process the deer taken under the depredation permit.
- We need to facilitate more ways for hunters to donate to foodbanks. Make it easier. A no-cost option to get the deer from the hunter to the foodbank.
- I'd like to see more programs for donating deer to people in need.
- There should also be more advertising for venison donation programs like Hunters Helping the Hungry and more butchers.

Environmental Impacts:

All of New Jersey's forests are over-browsed and, in many areas, it is severe (Baiser et al 2008). Kelly (2019) noted impacts from increased densities of white-tailed deer of concern to forest managers in northern New Jersey that included declines in seedlings, saplings, trees, herbs and shrubs and a shift from mostly native to exotic species. Deer take refuge in neighborhoods and forested areas not open to regulated hunting programs and cause damage to adjacent lands including agricultural fields.

- If we are going to see agriculture succeed near residential areas of New Jersey, we need to take into account for a balance of people, nature, and an appropriate amount of wildlife. We need to find a healthy balance for our forests and our roadways.
- I always enjoyed seeing deer. Now that I own a farm it's tough. The deer just eat everything. Nothing can even grow in some places. Nothing comes up, even after replanting. We're trying to make a living. I don't mind if they eat some of it, but they eat too much.
- The park in the area implements a controlled hunt. Unfortunately, not all of the park. The deer were removing the understory of the forest.
- I have land enrolled in a golden-winged warbler conservation project for forest regeneration. The deer damage is getting bad enough that it may not be suitable for golden-winged warblers.

Changes in Deer Population Over Time:

Farmers shared stories of how the deer population has changed in New Jersey over their lifetimes. Several farmers noted that when they were young, back in the 1960s and 1970s, it was rare and exciting to see a deer. Deer numbers increased to levels where crop damage started to become a problem for farmers in the 1980s and 1990s in north and central New Jersey.

- They're beautiful, majestic animals. There are just too many of them. They're not wild anymore.
- When I was a boy, it was a treat to see a deer. You didn't want to shoot it. You wanted to shoot it with a camera.

- When I was young growing up here you didn't really see deer.
- When I was young there really weren't many deer. In the early 1960s you really had to go to the Pine Barrens.
- When I was a kid, you couldn't even find a deer. Now, I can sit on the porch and they walk right up.
- Deer started becoming a problem in the late 1980s and early 1990s.
- The deer started becoming a problem in the 1990s. It was never really a problem before that. It didn't seem like there were that many deer around.
- About 20 years ago deer were not an economic problem. We had what we thought were too many, but damage was acceptable. I started having problems about 10 years ago in sweet corn. I haven't grown it since 2016.
- I've always enjoyed hunting, been doing it since I was 10 years old. I've hunted on this property for over 50 years. The deer population has increased over time. I really noticed an increase around 2000.
- When I was young it was exciting to see a deer. You'd call everyone out to see them. Now it's common to see 25 deer at a time running across the field.
- I don't know what happened. They're just more of them.
- People don't realize why a deer population explosion has been happening. The does are having twins and triplets and there are less people hunting.
- There's just way too many deer.
- I've always had problems with deer, more in the last 10 years.
- I don't know what happened in 2018. It seems like there were more does.
- Years back we lost 60% of the deer herd when there was EHD [Epizootic Hemorrhagic Disease]. That was the only time losses were acceptable in many years. The deer bounced back in 3 years.

Livelihood Impacts:

Farmers noted significant impacts to their livelihoods that can affect several generations. For some farmers, this works out to financial losses from 10% to 25% of their gross income every year, sometimes more.

- The deer are at such high numbers that farms can't be sustained.

- Most people probably don't think about financial losses to farms because they see green fields when driving down the road. People don't realize when they're looking at damage and how much of the crop has been eaten by the deer. It's not coming out of their pockets. You have to come up with the money from somewhere to cover the costs. Even when you have losses. The bills still have to be paid.
- My wife and I used to say if we lose less than \$10,000 per year it would be a good year. We haven't had a good year in over 10 years.
- We all need to make a living. I'm not against wildlife. I love it. There needs to be some type of program so the deer are not overwhelming to farming and nature. The deer do a lot of damage.
- People don't realize that this affects several generations. There will be no more farm. You have to preserve those livelihoods.
- It's fun to watch the deer and all that, but not when it's your livelihood they're eating up. It's not profitable and hurting the farmers and everybody that depends on them for food. Deer just eat everything up. There's just way too many deer. I can go out and plant 10 acres of tomatoes and only harvest 5 acres. Farming is what pays my bills. That's what puts money in the bank. I can't have deer eating up all my profits.
- They're ruining my income.
- I grow a lot of hay where I can't grow anything else. Hay pays the bills, but it takes more time and people and you don't make as much money. To farm in New Jersey costs a lot of money. If I was able to actively grow without the deer problem, I wouldn't have to grow as much hay. It takes all summer long to do it. If I could grow row crops I could do it cheaper and by myself, but I'd be out of business in about 15-minutes.
- In 2019 I lost 25 to 30 acres of soybeans. That's \$16,000 worth of beans.
- I don't want to kill all the deer, but they have to be managed. How would you like to take a 10% pay cut because of deer? It's not that we want them all dead, the damage is just too much. It has to be reasonable. I don't mind feeding some. I just can't feed them all.
- What I tell nonfarmers – if you want us here, we can't be here with all the deer. Imagine taking 10 to 15% of gross income every year and feeding it to the deer. Some farmers lose as much as 40% per year. A lot of us are disappearing.
- Many people have no idea that deer destroy Christmas trees. I'm going to stop growing Christmas trees entirely. That's a loss of \$35,000 per year.
- Deer funnel to us in the summer and go to the neighborhoods in winter where people are feeding them. I can go take pictures of beautiful bucks laying right in the backyard under a feeder. By

people in the neighborhoods harboring these deer, it costs me about 25% of my paycheck every year.

- Before you fault me for doing what I have to do to manage the deer, come see what I'm dealing with.
- I'm overridden with deer here. If you pull into my farm at night, you can easily see 30 to 40 deer. My income should be substantially better. My yields are \$150,000 to \$200,000 less per year than they should be with my acreage. Each year, the deer can make the difference between a profit and a loss.

Hidden and Emotional Costs:

Costs go well beyond financial losses. These costs can often be hidden and take a toll. Several farmers have noted these costs, especially after putting time, energy and money into producing a crop that is starting to thrive just to watch the deer eat it down to the ground in a matter of weeks. Crops are so severely damaged that fields have to be replanted or are not worth harvesting at the end of the growing season. Having to change crop rotations in response to deer pressure can result in damage to the soil, having to use more chemical herbicides and major expenditures for additional fertilizers. Increased competition from weeds can result after deer start eating a crop. Farmers are also forced to spend a significant amount of time on deer management.

- The deer issue is devastating!
- I can accept some damage, but this is too much!
- There's not a field I farm where there's not deer damage. I'm starting to give up. Farmers like deer just as much as anyone, but they eat everything. I just want to survive.
- I love seeing them, but you get mad when 6 rows of corn are gone on the edge of the field.
- We all need to make a living. I'm not against wildlife. I love it. There needs to be some type of program so the deer are not overwhelming to farming and nature. It gets frustrating at times. The deer do a lot of damage.
- I would like the neighbors to know about the damage to the crops and the costs. It's emotional for the farmer. Things are looking good, I'll be able to pay my bills, and then you come across the deer damage. You see how much you're going to lose. Talk about taking the wind out of your sails. It's very emotional. It's a big letdown.
- Things would look good at the beginning of the season and by the end it wouldn't even be worth harvesting.
- From August through late October, it's brutal, that's the worst of it! If the crops are still in the field, they'll tolerate me. Once the crops are harvested a lot move on. You just do the same thing you do every year and hope for the best.

- It used to get kind of depressing. A few weeks before Christmas bucks would come in rubbing right before you were about to sell the trees. The recovery period for the tree can be 5 to 7 years after rubbing. It takes longer than replacing the tree. You spend a lot of extra time pruning to try and make it look nice in hopes you can sell it.
- It's something that strikes home around here. I really feel for the guys with large operations.
- I had a conversation with a neighbor once who saw a deer stand on the property. Their little girls said – you're a hunter? You murderer! I said, no girls, I'm just trying to protect my crops. Their mother said, that makes sense. She said they were dealing with landscaping being devoured and the deer were eating her flowers.
- We're always concerned about a deer running out in front of you while you're in harvest or planting.
- Unfortunately, with age, we tend to lose our patience and energy. The expanding deer population has tested that patience left, making you wonder if it's still worth the effort.

Soil Health, Erosion, Grazing, Replanting, Fertilizer and Herbicide Use:

- I haven't heard anyone talk about deer damage as a soil health issue. I have deer problems where they basically leave bare ground. It's just like overgrazing a pasture. If you put a cover crop out like clover for a nitrogen return, they eat it right to the ground. You get no return.
- There's a problem with soil fertility. I can't keep fertility up because of the depleted organic matter. We're losing organic matter. There's no residue that would naturally fertilize the soil for the next year. This isn't a short-term problem. I've been dealing with it for 20 years. I can see it in the soil and other crop response where the deer pressure is bad. I can't get as much cover or organic matter to grow back.
- There are long-term environmental impacts from overgrazing. Soil erosion and impacts to the water supply. You have to use more fertilizers and herbicides.
- Weather also affects deer damage. The later you get in the growing season, the more impact the deer will have. The deer will out graze the growing of the crop.
- In the summer months I easily spend over 200 hours replanting what the deer eat. I've replanted some fields 3 to 4 times in one season. That also means you're using a lot more herbicide than you want to use. It can also be a waste of time. If the deer eat the crop to the ground, it's not worth replanting. They're just going to do it again.

Crop Rotations:

- Crop rotation is an imperative part of any operation and is impacted by the deer. If you can't rotate crops through you end up with severely limited production for crops that have been grown on the land too long.
- You get an increase in corn and soybean production through rotation. It makes it easier for weed control. We are losing those benefits by not being able to rotate the crops the way we need to.
- My crop rotation is limited. I can't offset the damage by just changing crops. I can only un-diversify the crops so much. I can't handle 500 acres of hay.
- I've switched rotations, should have been soybeans, but switched to corn.

Financial Losses from Field Abandonment:

There are also many costs that often go unnoticed such as the financial costs of having to abandon a field entirely because of the pressure from deer in the area. These costs can also lead to significant financial losses. In 2019, nearly 40% of participating farmers reported having to abandon a field. Several farmers found losses difficult to estimate.

- I've entirely dropped whole farms because of deer damage. The only reason I started growing sorghum at all was because deer don't like it as much as other crops.
- We haven't entirely stopped farming a field because of deer damage, but have restricted going to new areas until we can get a fence up. We could have farmed tomatoes, squash and other vegetables. The estimated loss is about \$5,000.
- Starting next year there will be fields that I stop farming because of the deer damage. That will be a loss of another \$7,800.
- We lost 2 fields last year and a couple fields we couldn't even plant.
- I never entirely stopped farming a field because of deer damage, but I should have.

Financial Losses from Crop Abandonment:

When a farmer can't grow their preferred crop that would generate more income. Many farmers are not able to plant preferred crops that will generate higher profits. In 2019, nearly 60% of participating farmers reported abandoning crops like corn, soybeans, alfalfa, oats, vegetables and Christmas trees.

- There's 12 acres where I would be growing vegetables if not for the deer damage. That costs \$15,000 to \$20,000 per year.
- There are 28 acres where I would grow corn and oats, but I won't plant there anymore except for hay because of the deer pressure. If I plant corn down there I don't make any money at all. The financial loss is \$7,800 per year.

- I stopped growing pumpkins because if I don't fence it's a total loss. When I grew 10 acres of pumpkins I was making an additional \$20,000 just on the weekends. Now I have to get pumpkins from other farmers to sell.
- The land that I own I put in a cover crop or field corn. It's not what I prefer or want. Something is better than nothing.
- If we know we have susceptible fields we have to constantly change production. We switched to hay, they even damage that, mow it down.

Time Spent on Deer Management:

Farmers often spend hundreds of hours each year on deer management activities. For many, it is difficult to quantify the true cost of these activities in terms of time and money. Management can include deer fence installation and maintenance, harassment techniques, state regulated hunting, and farmer depredation permits.

- It's hard to put a number on the hours spent every year on deer management because it's just incorporated into management period.
- For deer management, there is hunting about 4 hours per day most days from mid-October through January. There is a couple of days of cutting wood for the fence and repairs. I never add it all up. It's just something that you do. It's definitely 100s, maybe 1,000 hours per year. That's a lot of hours, especially in the summer.
- I spend about 90 days per year on hunting and deer management. The family hunts the main property. I lease land to a hunting club. The same people have hunted every year for about 20 years.

Direct Crop Damage and Reduced Yields:

Financial losses that farmers experience from deer damage to crops and reduced yields is significant and can be challenging to quantify. Many farmers believe true losses from deer damage are often underestimated.

- It's been so long that we've been having deer damage, my expectations for the yields are a lot less than they used to be. I'm probably underestimating the damage.
- All crops are affected by deer damage. They eat the corn stalks down to about 6 inches, sometimes right down to the ground. It is very hard to determine yield potential and actual loss. I don't know what kind of yield I would get if I didn't have deer damage.
- Over time, deer grazing on soybeans, it's going to kill you. I've had it grazed right to the ground. Some graze can help increase production in the beginning of the season. A little grazing in soybeans can be beneficial, but more often than not because of the size of the deer herd, they're detrimental. They never just lightly graze, always over graze.

Other Wildlife Causing Damage:

In addition to losses suffered from white-tailed deer, most farmers are also experiencing significant financial losses from other wildlife. Depending on the crop and wildlife species, losses ranged from less than \$1,000 to \$35,000 per farm. Species causing crop damage included blackbirds, red-winged blackbirds and crows, black bear, Canada geese, coyotes, fox, groundhogs, raccoons, squirrels, and various bird species such as blackbird, red-winged blackbirds, crows, Cooper's hawks, owls, red-tailed hawks, and turkeys.

Black bear damage included rolling around in cornfields and creating "crop circle-like" damage to eat corn. Bears also broke branches on fruit trees while feeding, and damaged chicken coops, beehives, fences, and animal feed.

Canada geese damage included eating and trampling crops. Crops affected included soybeans, rye, wheat, straw, and corn.

Black Bear:

- I've farmed the land since the 1990s. I don't recall seeing bear damage back then or hearing guys talking about it. The year the state opened the early bear season bow hunt, saw damage go way down. Since the hunt closed on state land, saw bear damage getting worse since then. It's not on par with deer damage yet, but it's getting there. When the early season opened, I didn't see as many bears. There wasn't as much damage. There were not as many problems around homes.
- We have bears here, but not doing me a lot of damage to hay. We saw more bears before they started the season.
- There's lots of bears in the area. The bears damaged the coop by ripping off the door and pulled out a 50 pound bag of corn. Sometimes a bears will grab a chicken. We lost about 100 feet of electric fence that was dragged off by a bear. Bears also damage fruit trees by breaking branches and eating the fruit.
- The bear damage is a lot worse than it's been in the past. They roll around in the corn. There used to be just a couple spots. Now it's 20 to 25 spots. It's hard to tell how much it's worth. What about public safety? That's my big concern.
- Bears up in north Jersey are getting bad in the cornfields. They roll around and knock down all the corn and eat it.
- Black bears cause an additional \$1,000 to \$2,500 in corn damage.
- The black bears roll around in the corn and eat it.
- A bear tore up the beehives on at my place last year. It happened while I was in the process of having electric fencing installed around them.
- We're interested in getting depredation permits for deer, bear and coyote.

Canada geese:

- Canada geese damage is in the thousands every year.
- The Canada geese damage to rye is at least \$1,000 to \$3,000 each year. The fall and winter are the worst time of year.
- Geese, mostly resident geese, cause about \$1,000 damage per year from eating the straw.
- The geese, there's just too many of them. They pollute all the ponds, eat all the crops. They're getting out of control. You know what they're doing all over the fields and the kids go play in it. It's terrible.
- It's harder to quantify resident and migratory Canada geese damage. They eat and trample the crop. When they leave a field, it looks like there wasn't even a crop there.
- The geese will walk right down the rows and eat the soybeans when they're coming in. Then they have to be replanted. It takes time and it screws up the maturity of the crop and timing if you have to keep replanting.
- There is also a local golf course with lots of Canada geese and deer. There are weed seeds in the goose droppings.
- If you add in damage from other wildlife, mostly Canada geese, that can be another \$2,000 to \$16,000 lost.

Coyotes, Fox, Hawks, Raccoons, Groundhogs and Owls:

- The coyotes eat our chickens. The coyotes and fox will take a hit on the electric fence to get a chicken. We've also had Cooper's hawks, red-tailed-hawks, fox, bear, raccoons, and sometimes owls eating the chickens.
- I see more coyotes around the farm, right next to the buildings. There's a lot of them. I can hear them all night long.
- We're getting more coyotes in the area this year.
- Coyotes are helping take care of the groundhogs. We used to have problems with the groundhogs before the coyotes.
- From 2000 to 2005 we used to see a lot of groundhogs. I don't know if it's the coyotes, but we only have 2 to 3 spots now where we see them and there doesn't seem to be as many holes in the field. We farmers need the coyotes.
- Groundhogs cause damage, but not as much now because there are more coyotes.
- Groundhogs do as much damage as the deer.
- I've also had problems with raccoons getting into the chicken coop.

- Raccoons were a problem in sweet corn. Groundhogs too, but the population seems down in the past few years.
- Raccoons cause a little corn damage. It's not terrible, the first two rows by the woods.

Squirrels:

- Squirrels used to cause damage on the corn.

Beaver:

- Beaver have been a problem blocking ditches and creeks that flood the lower fields.

Turkey:

- There's a lot of turkey. The turkey pull up the corn when it's a few inches. They also eat the kernels.

Other Birds:

- Black birds are also causing damage to corn. Black birds have always been a problem. They eat the top inch or two off every ear of field corn. Specialty corn, I have to throw away if 2 to 3 kernels are pecked.
- There is \$8,500 to \$10,000 lost per year from crow damage to the crops. Cannons and scarecrows don't work for long. They get habituated. I plant in plastic mulch with drip lines. The crows walk right down the rows and take the seeds out of the holes. They were taking watermelon seeds right out of the ground. At first, I thought I had bad or old seed that didn't germinate. It's harder for them without plastic. They have to search.
- Red-winged blackbirds cause a lot of damage. We tried repellents. They haven't worked. We've used cannons. They just fly from one end of the field to the other. You have to be there in the field to keep them out.
- The red-winged black birds caused up to \$8,000 damage to the sweet corn.
- Bird sanctuaries create good bedding areas. Deer like the standing grass to bed in.
- Black birds used to cause damage on the corn too, in the whole field, not just the edges like some other species.
- There's small black birds, crows maybe, eating the corn. It causes bad or moldy kernels.
- We witnessed a black headed vulture taking a baby fawn on our farm this year.

Management Challenges – Areas Surrounding Farms

Residential Development and Refuge Areas:

Farmers noted that as development increased in the state, starting as early as the 1970s, pressure from deer has increased. Many farmers have noted that adjacent neighborhoods, woodlands and open spaces that are not suitable for doe-focused hunting, or where hunting is not allowed, are serving as refuge areas for deer that will damage their crops.

- The late 1980s and early 1990s, that's when it started being a problem and we started using fencing. As development went up, pressure started getting worse over the years. I see as many as 25 to 30 deer at night on the farm. I've seen does with 3 fawns this spring.
- When developments started going in the 1980s and 1990s it got worse. The deer would feed in the farm fields that were left. Where guys could hunt it wasn't so bad.
- The impact of deer from the 1970s to now has really increased. It's affecting the homeowners and drivers too.
- It's not just affecting the farmers. It's affecting the neighborhoods too. They're eating all the plants. Everybody in the neighborhood is affected.
- There's too many houses now. Development gives the deer a place to hide.
- There are a lot of refuges in neighborhoods and private lands around the state that are next to farms. The deer use them during the day and feed in the farm fields at night.
- The suburban neighborhoods are definitely acting as refuges.
- Residential areas definitely act as refuges. Deer come from the backyards and around the houses. They go where they know they're safe and eat the plants around the houses. The houses are too close sometimes to be able to hunt.
- Deer stay in the neighborhoods during the day and come out in the evening and feed in the fields.
- The deer know where to find refuge. When the hunting season starts the deer all leave the park and move into the patches around the neighborhoods. Residential areas are absolutely acting as a refuge area for the deer.
- Developments have been built up a lot over the years. The deer hide out there during the day and come out to eat in the fields at night. They're acting as deer refuges.
- Some people feel deer habitat is being destroyed with development and don't realize that it is actually creating deer habitat.
- I see more deer in residential neighborhoods than on my farm. Because we have woods, they can disappear during the day and come out at night and feed on the farm.

- The problem exists on neighboring properties where the deer use as a refuge without consequences. It got worse since all the housing developments were built. The deer hangout in developments during the day and feed in the fields at night.
- Some of the surrounding areas are off limits to hunting. Areas big enough to hunt, but don't allow hunting. They are acting as a refuge to an extent.
- People on the neighboring lands are getting damage to their landscaping.
- Some of the ground that's been preserved won't allow hunting. The deer know where to go.
- The surrounding areas, easily hundreds of acres, are serving as a refuge for huge herds of deer. These deer know where to go. They know where they're safe.
- Most neighbors know deer are a problem. There's lots of deer vehicle collisions. The deer eat the bushes in the neighborhoods.

Public Lands (Access and Management):

Public lands near farm fields can act as refuges for deer causing crop damage. Farmers promote expanding coordinated regional deer management programs where municipal and county representatives can work together with each other and the state partners to enhance the effectiveness of deer management activities on public lands. Farmers recommended that public lands should have wildlife management plans to reduce negative impacts to neighboring farms, forests, residential areas and decrease deer-vehicle collisions.

- I think the property that the state owns should be for everyone. Everyone should be allowed to hunt on all state properties. We need to kill more does. There should be some kind of incentive program to kill more does. There should also be more advertising for venison donation programs like Hunters Helping the Hungry and more butchers.
- Challenges in the area include trying to get public grounds open to bowhunting. Hunters have had issues with neighbors in the area against hunting; harassing hunters and making noise while people were hunting. I haven't experiences issues on my own property, but had a neighbor scream in my face while hunting with my son – how can you teach him that? Later they wanted me to kill coyotes that were eating their cats.
- The county is making an effort to allow hunting on ground they rent out to farm and allowing farmers to apply for depredation permits. I'm not sure hunting alone is a remedy. I don't know if we can kill enough to make a difference.
- The park in the area implements a controlled hunt. Unfortunately, not all of the park. The deer know where to find refuge.

Leased Lands (Access and Management):

Farmers lease many acres of farmland around the state. In some cases, farmers do not control access to the properties and are not allowed to implement deer management options such as hunting and depredation permits. It was recommended that landowners receiving Farmland Assessment, or who rent land to farmers for crop production, should be required to allow deer management activities or be required to develop a wildlife management plan.

- Landowners that lease should have to allow hunting or be required to create a wildlife management plan. Some don't allow any hunting and the land is a deer refuge. People that have properties that are refuges should have to develop a wildlife management plan or be assessed a fee or penalty if their land is a refuge for deer causing damage to farms.
- Farmers need to be able to hunt on properties that are leased and use depredation permits. Areas where I can control hunting it makes a big difference for damage.
- As a farmer licensee, you get free hunt tags. If you're a non-occupant, you still have to buy a hunting license for farmland that is rented. For someone that rents 95% of their farmland, it limits the area that you hunt.
- Hunters can't take enough deer. Some hunters that hunt rented properties are not hunting does. Some landlords don't allow hunting. Landlords control hunting rights, but some landlords don't allow hunting, or they lease to gun clubs.
- If the land is not owned by the farmer, they may not be able to control access for hunting.
- Around 2015 I started taking on more land that the landowners leased to gun clubs. I didn't have the ability to hunt. The gun clubs are going after bucks. Other hunters are not shooting enough does to make a dent in the population.
- Some of the farmed properties that are rented, the rights are leased out to hunting clubs that only take a few deer. The majority are bucks, that hurts. One club on one of the properties weren't shooting does. The deer just got worse and worse.

Management Implementation and Effectiveness:

Farmers often spend hundreds of hours each year on deer management activities. For many, it is difficult to quantify the true cost of these activities in terms of time and money. Management can include deer fence installation and maintenance, harassment techniques, state regulated hunting, and farmer depredation permits.

- For deer management I've tried it all, scare them, scarecrows, repellents, harassment techniques. Nothing works for long. For time spent on hunting, harassment, depredation permits, and fence maintenance - it's at least a couple of thousand dollars per year.

Fencing:

High-tensile woven wire fencing at least 8-feet tall was one of the most effective management options used. This option was typically used for high-value crops such as vegetables. Although one of the most effective management options, it was too expensive for many farmers.

- I'm fortunate that I can fence, but some growers can't fence. It's too expensive.
- We fenced in the property about 5 years ago. It was either stop the deer or stop farming. You can live with some of the damage, but it just got to be too much.
- It cost \$6,000 to install deer fencing. I've seen deer jump over a 7-foot fence with my own two eyes. They break through electric fence. When they want in, they get in.
- I've had to fence in every field to make it profitable. Once I started fencing things in, I started harvesting a lot more crops. There's a very big difference of harvestable crops with and without fence. It's expensive. I've spent over \$40,000 on fencing.
- If you're not going to hunt, there's not a lot else you can do other than high-fence the field to keep the deer out. I never used fencing. It would cost about \$100,000. It's too expensive to fence the fields.
- It would be impossible for us to fence growing grain. It's not cost effective. Rented land you can't always fence. Where you can, it pushes the problem to the neighbors.
- We deal with the deer and add fencing as we expand. I've been trying to reduce losses, but because we are continuously expanding, there's not enough time to fence off more of the area.
- The damage has been acceptable the last 10 years, but only because I use fencing. It's just getting to the point where putting the fences up, moving them, time and labor, it's just too much.
- I see financial incentive to fence. I just can't afford it. We don't always have authority to put it up or manpower to maintain it. I have leases for most of my crops, but I don't control it. If it's my own land it might be cost effective, but not for all the fields. You don't see a hay or grain farmer ever put it up. I've seen increases in damage because operations around me are putting up fence. They divert the deer to me.
- I have to move the fencing every 3 to 4 years when I rotate the fields.
- The way my farm is laid out I can't just go and fence the whole farm. We rent from several different landowners. It's near impossible with all the roadways. The costs would be huge. I'm pretty much out of options other than to take a beating.
- Deer are getting into the fence [electric fencing]. They were getting in every night. Although not 100%, still effective. The fence goes about four and a half feet straight up. They break the strands and I have to repair them. It's usually young deer in the latter part of the summer or early fall. Fall is the busiest season on the farm. Once they get hit they respect it.

Hunting:

All farmers either hunted or allowed hunting on farmed properties. Hunting was seen as one of the most effective management options. Adjacent properties where hunting was not allowed or practical, acted as deer refuges that created challenges for deer management. These areas included public and private lands, leased farmlands, county parks, corporate parks, schools, golf courses, nature preserves, and residential neighborhoods.

- I don't hunt myself, but allow others to hunt on the land. Pretty much every place that can be hunted in the area is hunted, but some people only hunt bucks. We need to find ways to better expand hunting to harvest more deer, seasons and bag limits.
- I've been talking with the neighbors that hunt about the need to shoot more does.
- Some hunters need to be educated about the need to kill more does.
- Friends and family hunt every year during firearm season. We shoot as many does as we can on the property that we farm and adjacent properties we hunt.
- I hunt. I'm an avid sportsman. I don't kill anything I don't use and eat. The easiest way to control the deer herd is to hunt them.
- I have a pretty good gun club hunting the property.
- Maybe more could be done to recruit new hunters and promote eating wild meat. Several hunting clubs are good managers of the deer, but not all. Some just want to shoot bucks. That's the problem. We need to educate people that come in from the city that don't live here. The people that come and go, some in gun clubs. They need to see the whole picture, not just shoot a buck.
- The problem for farmers in southern New Jersey is that you can't shoot enough does to reduce the damage. You can only shoot 1 deer per season, doe or buck, and you have to buy both tags to shoot 1 deer.
- I have some fields that are in multiple deer management zones. Sometimes other people hunting the properties can only afford to buy permits for one of the zones. The permitting process needs to be streamlined, possibly regional permits.

Depredation Permits:

Farmers can apply for depredation permits to shoot deer causing crop damage. These permits are an effective management option and are often implemented outside of regulated hunting seasons. Permits can be obtained for year-round use when damage is extensive.

- It takes a physical toll after working in the field all day. Sometimes you have to go out at 1:00 am. Try doing that after working all day in 90 degree heat.
- I've been using depredation permits for years. In the summer, the last thing we want to think about after working in the 90 degree heat all day is shooting deer.

- I've used depredation permits in the past. I just didn't get one this year. It's just one more thing you have to do and there just isn't enough time.
- Some hunters don't like the depredation permits. I started showing them the damage the deer can cause.
- A lot of hunters won't shoot on a depredation permit.
- Neighborhoods are too close for depredation permits. The township has a no discharge of firearms ordinance.
- I've never used a depredation permit. I like to hunt and I don't consider depredation permits hunting. It's also a lot of work going out every night to do that. I don't want to use a depredation permit, but it might come to that.
- I haven't used depredation permits. I don't like to kill them and not use them. I will consider depredation permits in the future.
- Hunting and depredation permits has not worked well for our operation because of the neighboring safe zones.
- I haven't used a depredation permit in 20 to 30 years. I really don't believe in killing them and throwing them away. I don't have time to be out there all night long after working all day. It's too much.
- There have been neighbors in the past who have complained about hearing gun shots. I don't want to aggravate the neighbors. I start my day at 5:00 am. I didn't want to be out at 10:00 pm chasing deer, but what else was I going to do? Now that I have all these houses on top of me and I can't get a depredation permit anymore.
- I don't use depredation permits. I won't get them.
- Sometimes landowners are reluctant to let someone shoot deer on the property. Next year I'm going to ask the owners of the land I don't own to use a depredation permit.
- It's hard to get out. I don't have any employees.
- It's a challenge to implement after working all day.
- Depredation permits, years ago we used them. I've had issues in the past with homeowners, hunters, animal advocates and landlords. That's just part of the problem. I don't want liability because of kids trespassing all the time.
- We're interested in getting depredation permits for deer, bear and coyote.

Repellents:

Taste-based repellents are applied directly to plants to discourage deer from eating them. Area-based repellents or odor-based are applied near plants you are trying to protect and intended to discourage deer browse through smell. Other than temporary relief to landscape plants, farmers that had used repellents found them to be ineffective. Repellents had to be reapplied after rain and after several days deer would eat new growth that hadn't been treated yet. High deer densities can also lead to repellents being a less effective management option.

- Repellents, they don't do sh*t. They might do a little until it rains. It's too expensive for a crop growing from April to October. It has to be reapplied every time it rains. If you put them on, 5 days later there's new growth that it's not on. That's what the deer are eating.
- Repellents have worked on landscape plants until a heavy rain or there were too many deer.
- Repellents were pretty effective until it rained. I stopped using them at least 20 years ago. Fencing was more effective.
- Chemical repellents never worked for me, not even on landscape jobs. It just doesn't work.
- Early on we used repellents, chemical and cayenne pepper. Every time it rains you have to go out and reapply. I haven't seen anything worth the time in the long run.

Harassment Techniques:

These techniques are used in an attempt to scare deer or other wildlife, often Canada geese, out of an area. They include devices that make loud noises such as propane cannons, cracker shells, and sirens. Visual deterrents included scarecrows, flare guns, and strobes. Driving through areas to scare deer away was also reported. Farmers that reported using harassment techniques found them to be time consuming and ineffective.

- I've tried it all, scare them, scarecrows, repellents, harassment techniques. Nothing works for long.
- We've used cannons. They just fly from one end of the field to the other. You have to be there in the field to keep them out.
- Harassment is driving around chasing them off a bit. I just don't have time to chase deer out of a cornfield.
- I shoot flare guns every day to scare the geese. It's just another thing you have to do. They just keep flying from field to field.
- Cannons and scarecrows don't work for long. They get habituated.
- I'm not sure the neighbors would like cannons. Another farm in the area tried cannons and ended up in court.

APPENDIX II

Complete Farmer Case Studies

Case Study #1

General Information

- Type of operation: Cash grains and oil seeds
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: >1,000 acres
- Gross sales: \$500,000 to \$999,999

Crop Losses to Deer

- Crop losses caused by deer: \$200,035 to \$206,350
- Crops affected by deer: Corn, sorghum, rye straw, grass hay, alfalfa, and soybeans

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: At least \$10,000
- Wildlife causing damage: Black birds, groundhogs, raccoons, resident and migratory Canada geese
- Crops affected by other wildlife: Sorghum and rye straw
- It's harder to quantify resident and migratory Canada geese damage. They eat and trample the crop. When they leave a field, it looks like there wasn't even a crop there.

Hidden Costs

- Field abandonment: Entirely stopped farming 300 acres where corn, beans, grass hay, and soybeans would be grown.
- Crop abandonment (not being able to grow preferred crops) on approximately 300 acres where corn, beans, grass hay, and soybeans would be grown.
- Yields are \$150,000 to \$200,000 less per year than they should be with the amount of acreage.
- Reduced yields in years when the crops go in later because of bad weather. Yields are reduced. The deer out graze the growing crop.
- Changes to crop rotations.
- Soil damage.
- Increase use of fertilizers and herbicides.
- Frustration and emotional costs.
- Damage to farm equipment from deer that die in the field and concerns of deer running in front of equipment during harvest or planting.
- Increased liability insurance.
- At least 200 hours per year are spent on deer management at a cost of at least \$6,000.
- Opposition to the implementation of depredation permits from adjacent homeowners, local hunters, animal advocates, and landlords.

Management Options Implemented

- Deer fencing: high-tensile woven wire at least 8-feet tall
- Hunting during regular seasons
- Deer depredation permits (previously)
- Chemical repellents

Deer Density Estimates in the Area

- Closest known estimate is >100 deer per square mile within 10 miles of the farm

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem and I did more to reduce the losses in 2020 below 2019 levels.
- Crop losses to deer were "unacceptably high" for at least the previous 10 years from 2010 to 2019

Development/Surrounding Areas

- Residential neighborhoods
- Parkland
- School
- Corporate park/commercial
- Woodlands
- Agricultural

Overview

When I was a boy, it was a treat to see a deer. You didn't want to shoot it. You wanted to shoot it with a camera. I've been farming my whole life. I started on my own in high school or college. I've done a lifetime of this.

I'm overridden with deer here. If you pull into my farm at night, you can easily see 30 to 40 deer. My income should be substantially better. My yields are \$150,000 to \$200,000 less per year than they should be with my acreage. Each year, the deer can make the difference between a profit and a loss.

People don't realize that this affects several generations. There will be no more farms. You have to preserve those livelihoods. Understand that not only is it jeopardizing my ability to provide safe and healthy food, but it's also impacting the community around you, your health and safety.

Local farms had a major impact in us surviving COVID-19. People need to look at agriculture as essential to them and not just a business. A farm is part of the essential infrastructure around them that puts food on their tables. When you preserve a farm, you're preserving the future of your food source.

There are many hidden costs from deer. There are long-term environmental impacts from overgrazing. Soil erosion and impacts to the water supply. You have to use more fertilizers and herbicides. There's frustration and emotional costs. There's increased liability insurance for a fleet of farm trucks because of deer collisions. There's been impacts of damage to equipment from an antler going through a \$4,000 tire,

more than once, and running a deer carcass through a combine. We're always concerned about a deer running out in front of you while you're in harvest or planting.

I've entirely dropped whole farms because of deer damage. The only reason I started growing sorghum at all was because deer don't like it as much as other crops. It's been so long that we've been having deer damage, my expectations for the yields are a lot less than they used to be. I'm probably underestimating the damage.

Over time, deer grazing on soybeans, it's going to kill you. I've had it grazed right to the ground. Some graze can help increase production in the beginning of the season. A little grazing in soybeans can be beneficial, but more often than not, because of the size of the deer herd, they're detrimental. They never just lightly graze, always over graze.

Deer eat a lot more than other wildlife. Corn damage is worst on the perimeter of the fields than the middle. Damage is always worst in smaller fields no matter what the crops are. Corn yields are consistently reduced by 20 to 30% every year.

Rye straw damage is mostly physical damage from rolling and a little grazing in early to mid-spring. Grass hay is hard to measure. There's grazing, take out about 5% of the overall crop. You end up with soil compaction. If a pasture is grazed, you're not even going to bale it.

Weather also affects deer damage. The later you get in the growing season, the more impact the deer will have. The deer will out graze the growing of the crop. In 2019 it was worse, we got the crop in late because of wet weather. The yields were lower than they should have been. In 2020 I got the crop in earlier, harvested more deer, and one of the landlords got up a deer fence around a few hundred acres.

I see financial incentive to fence. I just can't afford it. We don't always have authority to put it up or manpower to maintain it. I have leases for most of my crops, but I don't control it. If it's my own land it might be cost effective, but not for all the fields. You don't see a hay or grain farmer ever put it up. I've seen increases in damage because operations around me are putting up fence. They divert the deer to me.

Depredation permits, years ago we used them. I've had issues in the past with homeowners, hunters, animal advocates, and landlords. That's just part of the problem. I don't want liability because of kids trespassing all the time.

Hunters can't take enough deer. Some hunters that hunt rented properties are not hunting does. Landlords control hunting rights, but some landlords don't allow hunting, or they lease to gun clubs.

Repellents, they don't do sh*t. They might do a little until it rains. It's too expensive for a crop growing from April to October. It has to be reapplied every time it rains. If you put them on, 5 days later there's new growth that it's not on. That's what the deer are eating.

It's hard to put a number on the hours spent every year on deer management because it's just incorporated into management period.

We've been telling our story for a long time. I think the damage and risk to society as a whole has not been told. Deer are responsible for damage to property, public safety, and people's livelihoods. This is a

real problem, and the politicians need to take action. Unless they take action, they're contributing to the problem.

Policymakers need to take into account environmental impacts, residential damage, health and safety of deer collisions, and health of the deer population. There's a lot that needs to be considered. How long can you sustain this level of overpopulation without some type of detrimental effect to the herd?

We need a comprehensive herd reduction program. Future deer management and development have to adapt together. Until the herd becomes manageable, we need to make it a year-round effort.

We need to reduce burdens, regulations, and fees to hunters. Find avenues to public good through processing and feeding programs to get protein to the needy so it doesn't go to waste. Incentivize doe harvest and donations to food banks. No cost to the hunter and not counted against the hunter's limit. Increase funding for programs like Hunters Helping the Hungry. Figure out ways for donation through depredation permits during the summer months. Use sharpshooters in suburban areas where you can't hunt and donate the venison.

Case Study #2

General Information

- Type of operation: Fruits or berries
- Status: Part-time farmer
- Percentage of gross household income from farming: 0 to 25%
- Acres in production: <100 acres
- Gross sales: \$50,000 to \$99,999

Crop Losses to Deer

- Crop losses caused by deer: \$1,500 to \$2,000 (We deal with deer and put-up fence as we expand.)
- Crops affected by deer: Raspberries, strawberries, tomatoes, cucumbers, and zucchini squash

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: \$3,200 to \$3,700
- Wildlife causing damage: Black bear, coyote, fox, raccoons, groundhogs, owls, Cooper's and red-tailed hawks
- Crops and livestock affected by other wildlife: Vegetables, fruit trees, and chickens

Hidden Costs

- Field abandonment: No, but restricted from expanding 5 acres until deer fencing can be installed where tomatoes, squash, and other vegetables would be grown. Estimated financial cost is \$5,000 per year.
- Estimated costs for installing deer fencing for 2019 to 2021 is \$22,000.
- Estimated labor costs is \$4,000 per year for 160 hours to implement deer management options.
- Spending a lot of time to strategize on deer management.

Management Options Implemented

- Fencing (4-foot electric and 6-foot fencing)
- Hunting during regular seasons
- Repellents

Deer Density Estimates in the Area

- >60 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, I have been trying to reduce the losses, but did not do increase my efforts in 2020 (because continuously expanding, not enough time to fence off more area).
- Crop losses to deer were "within acceptable limits" from 2014 to 2018 and "unacceptably high" for 2019 to 2020.

Development/Surrounding Areas

- Residential neighborhoods
- Woodlands
- Agricultural

Overview

We are a large, growing farm. We deal with the deer and add fencing as we expand. I've been trying to reduce losses, but because we are continuously expanding, there's not enough time to fence off more of the area.

If we are going to see agriculture succeed near residential areas of New Jersey, we need to take into account for a balance of people, nature, and an appropriate amount of wildlife. We need to find a healthy balance for our forests and our roadways. There's a lot of land in the area owned by the township. They do little to no deer management. There's also green space that has little to no management. That's a problem.

I see more deer in residential neighborhoods than on my farm. Because we have woods, they can disappear during the day and come out at night and feed on the farm. I have land enrolled in a golden-winged warbler conservation project for forest regeneration. The deer damage is getting bad enough that it may not be suitable for golden-winged warblers.

We haven't entirely stopped farming a field because of deer damage, but have restricted going to new areas until we can get a fence up. We could have farmed tomatoes, squash and other vegetables. The estimated loss is about \$5,000. We've used 4-ft electric fence and a 6-ft fence, but the deer hop over and have knocked down some of the fence. We plan to add 8-ft high tensile woven wire fence in the future.

Early on we used repellents, chemical and cayenne pepper. Every time it rains you have to go out and reapply. I haven't seen anything worth the time in the long run.

I don't hunt myself, but allow others to hunt on the land. Pretty much every place that can be hunted in the area is hunted, but some people only hunt bucks. We need to find ways to better expand hunting to harvest more deer, seasons and bag limits.

We need to facilitate more ways for hunters to donate to foodbanks. Make it easier. A no-cost option to get the deer from the hunter to the foodbank.

We're interested in getting depredation permits for deer, bear and coyote. The coyotes eat our chickens. The coyotes and fox will take a hit on the electric fence to get a chicken. We've also had Cooper's hawks, red-tailed hawks, fox, bear, raccoons, and sometimes owls eating the chickens.

There's lots of bears in the area. The bears damaged the coop by ripping off the door and pulled out a 50 pound bag of corn. Sometimes a bear will grab a chicken. We lost about 100 feet of electric fence that was dragged off by a bear. Bears also damage fruit trees by breaking branches and eating the fruit.

Case Study #3

General Information

- Type of operation: Cash grains as oil seeds
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: >1,000 acres
- Gross sales: >\$500,000 to \$999,999

Crop Losses to Deer

- Crop losses caused by deer: \$37,000
- Crops affected by deer: Field corn and soybeans

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: at least \$9,000
- Wildlife causing damage: Resident and migratory Canada geese
- Crops affected by other wildlife: Rye (resident and migratory Canada geese) and soybeans (resident Canada geese)

Hidden Costs

- Field abandonment: Entirely stopped farming 25 acres where soybeans and corn would be grown at a cost of at least \$2,500.
- Crop abandonment: Stopped growing preferred crops of soybeans on 80 acres at a cost of at least \$3,500.
- At least 140 hours and \$3,800 per year for time to implement deer management options including hunting and depredation permits.
- Lower crop production and more weed control from not being able to rotate crops as needed.
- Changing insurance policy to be able to hunt the property at an additional cost of \$1,000.
- Opposition to the use of depredation permits from adjacent landowners, animal advocates, and local hunters.
- Time spent replanting soybeans from Canada goose damage.

Management Options Implemented

- Hunting during regular seasons
- Deer depredation permits

Deer Density Estimates in the Area

- Closest known estimate is >60 deer per square mile within 10 miles of the farm

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, I have been trying to reduce the losses, but did not increase my efforts in 2020.
- Crop losses to deer were "unacceptably high" for at least 10 years between 2010 to 2019.

Development/Surrounding Areas

- Residential neighborhoods
- Parklands
- Schools
- Corporate park/commercial
- Woodlands

Overview

The family has been farming for almost 100 years. We've had cows, tomatoes, sweet corn, and grain. It's evolved now to grain because of the ease of operation, and we have to do it at a large scale to make a profit, at least 700 to 800 acres for one person. It's hard to put that many acres together with all the development. Things keep changing. When developments started going in the 1980s and 1990s it got worse. The deer would feed in the farm fields that were left. Where guys could hunt it wasn't so bad.

I don't want to kill all the deer, but they have to be managed. How would you like to take a 10% pay cut because of deer? It's not that we want them all dead, the damage is just too much. It has to be reasonable. I don't mind feeding some. I just can't feed them all.

Most people probably don't think about financial losses to farms because they see green fields when driving down the road. People don't realize when they're looking at damage and how much of the crop has been eaten by the deer. It's not coming out of their pockets. You have to come up with the money from somewhere to cover the costs. Even when you have losses. The bills still have to be paid.

We entirely stopped farming 25 acres where soybeans and corn would be grown. The potential loss was \$2,500. It was rented ground. We don't farm it anymore. We stopped growing soybeans on 80 acres because of the deer damage. The financial loss is \$35,000, but that might be a bit low. Damage is worst around the edges of the fields. You get an increase in corn and soybean production through rotation. It makes it easier for weed control. We are losing those benefits by not being able to rotate the crops the way we need to.

Other wildlife are also causing damage. Resident and migratory Canada geese damage about 75 acres at a cost of more than \$9,000 per year. The geese will walk right down the rows and eat the soybeans when they're coming in. Then they have to be replanted. It takes time and it screws up the maturity of the crop and timing if you have to keep replanting. Coyotes are helping take care of the groundhogs. We used to have problems with the groundhogs before the coyotes.

We used to use depredation permits before we got the hunting rights on the land we don't own. It's one more job. There was also opposition to the use of depredation permits from adjacent landowners, animal advocates, and local hunters.

I started hunting in the 1960s. Back then, if you saw a deer you were lucky. Now we have about 40 guys hunting the properties that take around 100 deer per year. I had to go to a \$4 million insurance policy to be able to hunt the property. The cost was \$1,000 that I wasn't expecting.

Farmers need to be able to hunt on properties that are leased. Areas where I can control hunting it makes a big difference for damage. Where my guys hunt they kill both does and bucks. The crop damage is pretty much acceptable for those fields. Where you can't access the land near corporate, parkland, and schools, that's where the damage is worst. Access is one of the main things, but I don't know what you do about private land.

Some of the farmed properties that are rented, the rights are leased out to hunting clubs that only take a few deer. The majority are bucks, that hurts. One club on one of the properties weren't shooting does. The deer just got worse and worse. When a depredation permit was implemented to shoot does, the hunt club complained to the landlord. Do you want farmland assessment or lease to hunt clubs?

We want to work with the policymakers. Farmers don't usually ask for too much. If we do, there's a pretty good reason. If we can work together to help get things done, we can make it better. If the township, county, or state buys open space, it should have a workable deer management plan.

Case Study #4

General Information

- Type of operation: Cash grains as oil seeds
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: 500 to 999 acres
- Gross sales: No information provided

Crop Losses to Deer

- Crop losses caused by deer: \$47,500 to \$70,000
- Crops affected by deer: Field corn, specialty corn, and soybeans

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: at least \$5,500 to \$10,500
- Wildlife causing damage: Black birds
- Crops affected by other wildlife: Field corn and specialty corn

Hidden Costs

- Crop abandonment: There are 50 acres of fields that are still cultivated, but deer damage prevents growing preferred crop of soybeans. No estimate for financial loss.

Management Options Implemented

- Hunting during regular seasons

Deer Density Estimates in the Area

- Closest known estimate is >100 deer per square mile within 20 miles of the farm

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem and I did more to reduce losses in 2020 below 2019 levels.
- Crop losses to deer were "unacceptably high" for at least 10 years between 2010 to 2019.

Development/Surrounding Areas

- Residential neighborhoods
- Parklands
- Schools
- Woodlands
- Agricultural

Overview

When I was young there really weren't many deer. In the early 1960s you really had to go to the Pine Barrens. The deer population has been building. About 20 years ago deer were not an economic problem. We had what we thought were too many, but damage was acceptable.

I started having problems about 10 years ago in sweet corn. Every night they would eat 1 to 2 rows of unharvested corn. I haven't grown it since 2016. Deer would be a much, much bigger problem if I was still growing sweet corn. I started seeing more and more soybean damage 5 to 6 years ago. In 2014, it got to a point where it's hard to tolerate. I've switched rotations, should have been soybeans, but switched to corn.

Friends and family hunt every year during firearm season. We shoot as many does as we can on the property that we farm and adjacent properties we hunt. Some of the surrounding areas are off limits to hunting. Areas big enough to hunt, but don't allow hunting. They are acting as a refuge to an extent.

There should be hunting allowed as much as possible on public lands. Public lands should have wildlife management programs so deer don't affect neighboring farms, residential areas, and there are fewer vehicle collisions. The county is making an effort to allow hunting on ground they rent out to farm and allowing farmers to apply for depredation permits. I'm not sure hunting alone is a remedy. I don't know if we can kill enough to make a difference.

I've never used a depredation permit. I like to hunt and I don't consider depredation permits hunting. It's also a lot of work going out every night to do that. I don't want to use a depredation permit, but it might come to that.

There's other wildlife causing damage to the crops. Black birds are also causing damage to corn. Black birds have always been a problem. They eat the top inch or two off every ear of field corn. Specialty corn, I have to throw away if 2 to 3 kernels are pecked. Raccoons were a problem in sweet corn. Groundhogs too, but the population seems down in the past few years.

Case Study #5

General Information

- Type of operation: Cash grains and oilseeds
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: 100 to 499 acres
- Gross sales: \$100,000 to \$499,999
- 2019's total losses to deer: A problem and I did more to reduce the losses in 2020 below 2019 levels

Crop Losses to Deer

- Crop losses caused by deer: \$36,000 to \$52,000
- Crops affected by deer: field corn, soybeans, and wheat

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: \$3,000 to \$6,000 (Canada geese)
- Crops affected by other wildlife: wheat

Hidden Costs

- Crop abandonment (not being able to grow preferred crops) on approximately 1,000 acres, was an issue before spending \$120,000 on an 8-foot high-tensile woven wire fence to enclose all acres in production.
- Prior to fence installation the estimated financial loss due to crop abandonment in previous years was 30-40% of the net revenue at an estimated loss of \$250,000 annually.
- Additional fertilizers and pesticides, that would not be needed if not for the change in the crop rotation resulting from the deer pressure, raised costs and additional \$25,000 per year.
- Time to implement depredation permits. People would go out 2 to 3 hours for 50 to 60 days per year. There was also opposition from people in the community.

Management Options Implemented

- Deer fencing (high-tensile woven wire at least 8-feet tall, achieved desired result) – Total cost \$120,000
- Hunting during regular seasons (prior to fencing)
- Deer depredation permit (prior to fencing)

Deer Density Estimates in the Area

- >60 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- Crop losses to deer were “unacceptably high” for at least 9 years prior to 2020 and deer fence construction

Development/Surrounding Areas

- Residential neighborhoods

Overview

There are lands that have been farmed since the early 1700s. The original areas of the farm have been in the family since the 1800s with more parcels added over time. At times as much as 1,500 acres were farmed. It has been increasingly difficult to farm the land over the past 10 to 15 years because of the deer eating the crops.

The direct losses from deer eating the crops can be anywhere from \$30,000 to \$50,000 each year. There have also been hidden costs from the deer pressure that can be harder to see. In previous years, when more acreage was farmed, it was not possible to grow the preferred crops of corn, soy and wheat on about 1,000 acres. The farm stopped growing preferred crops [crop abandonment] and started growing hay because the deer damage was so extensive. The estimated financial loss due to crop abandonment in previous years was 30-40% of the net revenue at an estimated loss of \$250,000 annually. Not being able to plant the desired crops also changed the crop rotation and had negative impacts on the soil. Additional fertilizers and pesticides, that would not be needed if not for the change in the crop rotation, had to be used to manage the fields. This also raised farm costs by about \$25,000 annually.

The landscape has changed in the past 15 years. There are more houses and housing developments. There are other agricultural lands in the area, but they can't be hunted because they are too close to the neighborhoods. There is also a local golf course with lots of Canada geese and deer. There are weed seeds in the goose droppings. The biggest problem is deer hanging out in residential developments. The deer take refuge among the houses during the day. They know where to go. They enter the fields when the sun goes down and feed throughout the night when no one is around.

In previous years, mostly friends and family would hunt the property. Hunting activities were focused on taking does and 20 to 25 deer were typically harvested on the land. There were a few years when the property was leased to a hunting club. Too few deer were taken, and they were usually bucks, so we stopped leasing.

Depredation permits to kill deer causing crop damage outside of regular hunting seasons were used in previous years. People would go out 2 to 3 times per week for 50 to 60 days per year. This was a lot of extra work and mostly in the summer months when damage was the worst. There was a minimum of 100 deer taken annually and sometimes up to 150 deer. It could be difficult to find people to implement the depredation permits. It was also difficult to get out at night after working in the fields all day. The police were often called to investigate when people heard gunshots. There was sometimes opposition from people living in the area and animal advocates. Sometimes people would make comments in town, "how can you do that to the deer?"

Case Study #6

General Information

- Type of operation: Cash grains and oil seeds
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: 100 to 499 acres
- Gross sales: \$100,000 to \$499,999

Crop Losses to Deer

- Crop losses caused by deer: \$20,000 to \$35,000
- Crops affected by deer: sweet corn, soybeans, and pumpkins

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: \$5,000 to \$10,000 (Canada geese)
- Crops affected by other wildlife: rye

Hidden Costs

- Changing crop rotations and costs of additional fertilizers and herbicides.
- Emotional costs, frustration and depression from putting all of your time into growing a crop and the deer eat it.
- Crop abandonment (not being able to grow preferred crops) on approximately 200 acres accounts for between \$5,000 to \$20,000 each year.
- At least 50 hours of work and \$2,000 for time to implement wildlife management options including hunting, harassment techniques, depredation permits, and electric deer fence maintenance.
- Time to implement depredation permits. There was no estimate for total number of days spent implementing the permit, but approximate 35 deer were removed. There was also opposition from adjacent landowners and local hunters.
- Deer pressure increased after other farms in the area installed deer fencing around their crops.

Management Options Implemented

- Electric deer fencing
- Hunting during regular seasons
- Deer depredation permit

Deer Density Estimates in the Area

- >60 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, I have been trying to reduce the losses, but did not increase my efforts in 2020.
- Crop losses to deer were "unacceptably high" for at least 10 years prior to 2020.

Development/Surrounding Areas

- Residential neighborhoods
- Parkland
- Schools
- Woodlands
- Agriculture

Overview

The family has been farming for over 300 years and farming in the current areas since the 1800s. The deer issue is devastating! Deer are impacting economies and nature. The impact of deer from the 1970s to now has really increased. Deer stay in the neighborhoods during the day and come out in the evening and feed in the fields. When I was a kid, you couldn't even find a deer. Now, I can sit on the porch, and they walk right up. They disappear for a bit when the fawns are born. In early summer they come back - does, fawns, bucks, it gets crazy!

It's affecting the homeowners and drivers too. Most neighbors know the deer are a problem. The deer eat the bushes in the neighborhoods. There's lots of deer-vehicle collisions. I'll head out to market at 3:00 – 4:00 am. I have to be real careful driving down the road because there are so many deer.

Hunting helps. The number of hunters has decreased over the years. There's too many houses now. Development gives the deer a place to hide. We need something to reduce the population more.

It can be depressing and frustrating putting all your time into growing a crop and the deer eat it. We lost 2 fields last year and a couple fields we couldn't even plant. There are fields the deer never let the beans get going. If we know we have susceptible fields, we have to constantly change production. Some fields we switched to hay. They even damage that. They mow it down. We can only do so much hay. We don't have the storage space or the labor. I've even lost \$1,000 on a tire from running over the antler of a deer that got hit by a car and wandered into the field and died.

The neighboring farm put up a deer fence. We have a total loss near that fence. I've tried electric fencing. The deer go right through them. There's constant maintenance to keep it from getting grounded.

We used depredation permits for more than 10 years. Depending on how many people could come out to help we would take 20 to 50 deer a year. There was some opposition from adjacent homeowners and local hunters. A lot of guys are just trophy buck hunters. They're not killing enough does and get territorial of the area they work in. It's my farm!

Other wildlife are causing damage too. Canada geese damage is in the thousands every year. Flags work for about a week and then the geese get used to them. We try to scare them away with noise, shotguns, firecrackers, and skyrockets. I'm not sure the neighbors would like cannons. Another farm in the area tried cannons and ended up in court.

Case Study #7

General Information

- Type of operation: Vegetables
- Status: Part-time farmer
- Percentage of gross household income from farming: 0 to 25%
- Acres in production: <100 acres
- Gross sales: No information provided

Crop Losses to Deer

- Crop losses caused by deer: \$1,000 to \$2,000
- Crops affected by deer: Leafy greens, cabbage, tomatoes, and cucumbers

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: \$1,000 to \$2,000
- Wildlife causing damage: Groundhogs
- Crops affected by other wildlife: vegetables

Hidden Costs

- Installation of 8-foot tall high-tensile woven wire deer fencing at a cost of \$12,000.
- Approximately 280 paid hours to install the deer fence at a cost of \$4,000
- At least 4 hours per year and \$250 for fence maintenance.

Management Options Implemented

- 8-foot tall high-tensile woven wire deer fencing
- Hunting during regular seasons

Deer Density Estimates in the Area

- Closest known estimate is >100 deer per square mile within 25 miles of the farm

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem and I did more to reduce losses in 2020 below 2019 levels. There has been almost no damage since an 8-foot high-tensile woven wire fence was installed in 2020.
- Crop losses to deer were "unacceptably high" for at least 10-years between 2010 to 2019.

Development/Surrounding Areas

- Residential neighborhoods
- Woodlands
- Agricultural

Overview

My father bought the farm in the 1950s. There are a lot of refuges in neighborhoods and private lands around the state that are next to farms. The deer use them during the day and feed in the farm fields at night. In our area there are a lot of absentee landowners. No houses, just vacant large lots. The owners live out of state.

There needs to be more education on the damage the deer cause. I'm fortunate that I can fence, but some growers can't fence. It's too expensive. My Dad put up the first deer fence over 60 years ago. It was 6-foot woven wire metal fence given out by the state with two strands of barbed wire above. Much of the farm has had some type of fencing since the 1970s. When we put up a fence the deer would find weak spots and push right through it. It was like they knew where to go.

The deer have caused from \$1,000 to \$2,000 of damage per year on a couple of acres. I put up a plastic woven fence that worked good for the first 5 years. The next 5 years there was a lot of maintenance. The deer would charge right through it if they got spooked. There has been almost no damage since an 8-foot high-tensile woven wire fence was installed last year.

We haven't used depredation permits in a long time. You didn't really need it with the fence. Family and friends hunt on the property. Some hunters need to be educated about the need to kill more does. I've been talking with the neighbors that hunt about the need to shoot more does. Some hunters want to only shoot a buck.

For access, if the land is not owned by the farmer, they may not be able to control access for hunting. They may be able to allow access in the field, but often people want to hunt in adjacent woodlots. The farmer may not own all the land.

The state could look into some more progressive opportunities for hunting such as fewer deer management zones or regional permits good for all public land in that region. A permit good for all wildlife management areas in that region. Having to buy multiple permits for some people is too expensive.

It would also be good to look at opportunities to expand venison donation programs to help those in need. The Hunters Helping the Hungry program money doesn't last the whole season. The \$100,000 helps, but more is needed. The state could also look into coolers like are used in Delaware where hunters can drop off deer to be donated for foodbanks.

Case Study #8

General Information

- Type of operation: Hay
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: >1,000 acres
- Gross sales: >\$100,000 to \$499,999

Crop Losses to Deer

- Crop losses caused by deer: \$15,000 to \$30,000
- Crops affected by deer: Soybeans and hay

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: At least \$900
- Wildlife causing damage: Canada geese and groundhogs
- Crops affected by other wildlife: Soybeans

Hidden Costs

- Field abandonment: There are 65-acres where farming has stopped because of excessive deer damage. The estimated financial loss is \$6,000 per year.
- Crop abandonment: There are 65-acres of fields still cultivated, but where deer damage prevents growing the preferred crop of soybeans. The estimated financial loss is \$19,500 per year.
- Time spent implementing depredation permits. At least 4 hours per night, 1 to 2 days per week, between May and September.
- Opposition from adjacent landowners and local hunters to the use of depredation permits.
- Relationships with some neighbors have been affected. Some are not happy about shooting deer.
- Emotional costs from deer damage and considerations of giving up.

Management Options Implemented

- Hunting during regular seasons
- Deer depredation permits
- Harassment techniques

Deer Density Estimates in the Area

- >100 deer per square mile within 5 miles

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, I have been trying to reduce the losses, but did not increase my efforts in 2020.
- Crop losses to deer were "unacceptably high" for at least the previous 10 years from 2010 to 2019

Development/Surrounding Areas

- Residential neighborhoods
- Parkland
- School
- Woodlands
- Agricultural

Overview

I'm a fourth generation farmer. My son is the fifth generation. I've always had problems with deer, more in the last 10 years. The problem exists on neighboring properties where the deer use as a refuge without consequences. It got worse since all the housing developments were built. The deer hangout in developments during the day and feed in the fields at night. There's not a field I farm where there's not deer damage. I'm starting to give up. Farmers like deer just as much as anyone, but they eat everything. I just want to survive.

What I tell nonfarmers – if you want us here, we can't be here with all the deer. Imagine taking 10 to 15% of gross income every year and feeding it to the deer. Some farmers lose as much as 40% per year. A lot of us are disappearing.

Every acre the deer eat, I have to grow about 5 to 6 acres just to pay for the acre lost. It adds up. Some years you make money, some you don't. This past year the deer were really hitting the hay fields hard. Last year they grazed a 10 acre field off right in front of us, but we couldn't do anything because it was too close to neighborhoods to shoot. The state Community Based Deer Management Program in neighborhoods might work, but there's a lot of public opposition.

Farming county owned land and farming next to county owned land is not easy. Some farms in the area don't allow hunting. There's landowners that rent farmland that don't allow hunting. Hunting and depredation permits has not worked well for our operation because of the neighboring safe zones. We spend 4 hours per night, 1 to 2 days per week, between May and September. Hunters don't like depredation permits. Homeowners complained about shooting deer.

For harassment, I just drive a vehicle in the area to scare them away. It's very time consuming. It would be impossible for us to fence growing grain. It's not cost effective. Rented land you can't always fence. Where you can, it pushes the problem to the neighbors.

Decision-makers should listen to farmers. We're not making it up. Sometimes our complaints fall on deaf ears. I think they care. They just don't know what to do. If we don't speak, we're not heard. Should have more deer hunting zones with unlimited deer hunting. Could use more deer processors to donate harvested deer at no expense to the farmer.

There's other wildlife around. Beaver have been a problem blocking ditches and creeks that flood the lower fields. We witnessed a black headed vulture taking a baby fawn on our farm this year. We're getting more coyotes in the area this year.

Case Study #9

General Information

- Type of operation: Vegetables
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: 100 to 400 acres
- Gross sales: >\$500,000 to \$999,999

Crop Losses to Deer

- Crop losses caused by deer: \$6,000 to \$17,500
- Crops affected by deer: Leafy greens, herbs, lettuce, sweet corn, soybeans and hay

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: \$9,000 to \$17,000
- Wildlife causing damage: Canada geese, groundhogs, raccoons and red-winged black birds
- Crops affected by other wildlife: Leafy greens and winter squash (groundhogs), sweet corn (red-winged black birds) and field corn (raccoons)

Hidden Costs

- Field abandonment: Entirely stopped farming 10 to 15 acres where herbs, leafy greens, and sweet corn would be grown. Estimated cost is unknown. It's too hard to put a number on it.
- Crop abandonment: Stopped growing preferred crops of herbs, leafy greens, and sweet corn on 20 acres. Estimated cost is unknown. It's too hard to put a number on it.
- Installing 8-foot high tensile woven wire deer fencing at a cost of \$6,000.
- At least a couple of thousand dollars for time to implement wildlife management options including hunting, harassment techniques, depredation permits, and deer fence maintenance.
- Soil fumigants from not being able to rotate the crops properly and soil diseases from having to put the same crops in over and over again. It costs \$350 to \$400 per acre.
- Working late at night to implement depredation permits when you have to start the next day at 5:00 am.

Management Options Implemented

- For deer management I've tried it all, scare them, scarecrows, repellents, harassment techniques. Nothing works for long.
- Deer fencing: high tensile woven wire fencing at least 8-feet tall. Fencing is not achieving desired result at there are open areas due to landowner restrictions.
- Electric fence – deer break through
- Hunting during regular seasons
- Deer depredation permits
- Chemical repellents
- Harassment techniques (propane cannons, cracker shells, sirens, strobes, etc.)

Deer Density Estimates in the Area

- >60 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, I have been trying to reduce the losses, but did not increase my efforts in 2020.
- Crop losses to deer were "unacceptably high" for at least 10 years between 2010 to 2019.

Development/Surrounding Areas

- Residential neighborhoods
- Schools
- Corporate park/commercial
- Woodlands
- Agricultural

Overview

There's deer all around me. There's less and less woods because of developing and deer do what they have to do to keep eating. More houses were built in the area in the last 20 years. As more houses were built, there was less woodlands, and the deer started changing their patterns.

Once deer became more comfortable living closer to me, they don't want to leave. In the evenings the deer come out to eat in the fields. There have been times when there were 30 to 40 deer at once. Once they get a taste for the crops they keep coming back.

I've noticed seasonal changes around me. Early in the year it's not too bad. We see a fair amount of deer in the spring. In mid to late March, they'll come in for 3 to 4 weeks. Once the woods come alive, they'll back off until summer. From August through late October, it's brutal, that's the worst of it! If the crops are still in the field, they'll tolerate me. Once the crops are harvested a lot move on. You just do the same thing you do every year and hope for the best.

There's other wildlife causing damage. Ground hogs caused up to \$9,000 damage to leafy greens and winter squash. The red-winged black birds caused up to \$8,000 damage to the sweet corn. Raccoons cause a little corn damage. It's not terrible, the first two rows by the woods.

There are a lot of hidden costs. We have to use soil fumigants from not being able to rotate the crops properly and to prevent soil diseases from having to put the same crops in over and over again. Some years we have to fumigate 20 to 30 acres. It costs \$350 to \$400 per acre.

It's hard to put a number on the financial losses from things like crop and field abandonment. We stopped growing preferred crops of herbs, leafy greens, and sweet corn on 20 acres. The land that I own I put in a cover crop or field corn. It's not what I prefer or want. Something is better than nothing. We also entirely stopped farming 10 to 15 acres where herbs, leafy greens, and sweet corn would be grown. It's hard to put a number on the losses.

For deer management I've tried it all, scare them, scarecrows, repellents, harassment techniques. Nothing works for long. For time spent on hunting, harassment, depredation permits, and fence maintenance - it's at least a couple of thousand dollars per year. It cost \$6,000 to install deer fencing.

I've seen deer jump over a 7-foot fence with my own two eyes. They break through electric fence. When they want in, they get in. The way my farm is laid out I can't just go and fence the whole farm. We rent

from several different landowners. It's near impossible with all the roadways. The costs would be huge. I'm pretty much out of options other than to take a beating.

We can only bow hunt because of the amount of houses around. I bought a high-tech crossbow, but can't take out enough deer. Our Deer Management Zone used to be unlimited does. Now they cut it back to just a few. I don't know why that is. The state should go back to unlimited does for all zones. Firearms on Sundays would be a big help.

There was opposition from adjacent homeowners and animal advocates to the use of depredation permits. There have been neighbors in the past who have complained about hearing gun shots. I don't want to aggravate the neighbors. I start my day at 5:00 am. I didn't want to be out at 10:00 pm chasing deer, but what else was I going to do? Now that I have all these houses on top of me - I can't get a depredation permit anymore.

Case Study #10

General Information

- Type of operation: Vegetables
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: >1,000 acres
- Gross sales: >\$1,000,000

Crop Losses to Deer

- Crop losses caused by deer: \$20,000
- Crops affected by deer: green beans, tomatoes, sweet potatoes, and strawberries

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: \$35,000
- Wildlife causing damage: groundhogs and Canada geese
- Crops affected by other wildlife: groundhogs (beans, cabbage, cauliflower, broccoli, and squash), Canada geese (sweet corn, and soybeans)

Hidden Costs

- Can't grow some crops because the deer will eat them.
- Having to fence crops as soon as they are planted to try and keep deer from eating them.
- 100-paid hours per year implementing deer management options.
- \$8,000 per year to implement deer management options.

Management Options Implemented

- Electric fencing has been somewhat effective
- Hunting during regular seasons
- Deer depredation permit
- Chemical repellents

Deer Density Estimates in the Area

- >60 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: between the right number and too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem and I did more to reduce the losses in 2020 below 2019 levels
- Crop losses to deer were somewhere between "within acceptable limits" and "unacceptably high" for at least 10 years prior to 2020

Development/Surrounding Areas

- Residential neighborhoods
- Woodlands
- Agricultural

Overview

I've farmed all my life. Me, my Dad, and Great Grand Father all farmed. We farm mainly vegetables and some grain for rotations. The owned properties were fenced to protect the crops from the deer. I've never entirely stopped farming a field because of excessive deer damage, but knew from past experience what I can't grow. Crops like sweet potatoes, the deer will eat the heck out of, so I just don't plant them. I learned how to rotate out crops that the deer damaged more. I know what they'll eat and grow something else.

It's fun to watch the deer and all that, but not when it's your livelihood they're eating up. It's not profitable and hurting the farmers and everybody that depends on them for food. Farming is what pays my bills. That's what puts money in the bank. I can't have deer eating up all my profits.

There's just way too many deer. They just eat everything up. I can go out and plant 10 acres of tomatoes and only harvest 5 acres. There are big fields where deer don't eat the middle, but eat the edges. Electric fencing has been somewhat effective. It's a pain. The deer run through it until they get used to it and then avoid it. I just put up an 8-foot fence. Once you plant something you have to get fence around it right away.

Other wildlife are a problem too. Groundhogs do as much damage as the deer. Canada geese are right behind them. The groundhogs will eat the heck out of the potatoes and broccoli as soon as it's planted. The deer wait until it gets a little bigger and then eat it.

There's no refuges where I am. I'm thankful for that. People in the area generally understand the need to manage deer. Everyone in this area hunts or gets hunting. All the land around me can be hunted. I am an active hunter. I like hunting as a time of enjoyment and as a way to get away. There are some lands that are rented though that can't be hunted because they're too close to houses.

I have some fields that are in multiple deer management zones. Sometimes other people hunting the properties can only afford to buy permits for one of the zones. The permitting process needs to be streamlined, possibly regional permits.

A problem we have in New Jersey is that we have some hunters that don't want to shoot does. I don't like doing it, but we have to do it for management. I have one neighbor that thinks the more does you have the more bucks you'll have. They would shoot a small buck before a doe. Some people sneak onto my farm and just shoot bucks. The whole state needs to be "earn-a-buck" for every season. If you want to shoot a buck you should have to shoot a doe first.

I've used depredation permits. It seems like such a waste to kill deer in the summer. There needs to be more money and a way to process the deer in the summer to help feed the hungry. It should be state funded. If you have a butcher where you can take the deer, and it costs as little as possible, I think more people would shoot does to donate.

Case Study #11

General Information

- Type of operation: Hay
- Status: Full-time farmer
- Percentage of gross household income from farming: 51 to 75%
- Acres in production: 500 to 999 acres
- Gross sales: \$100,000 to \$499,999

Crop Losses to Deer

- Crop losses caused by deer: \$24,000 to \$39,000
- Crops affected by deer: Field corn, soybeans, oats, and hay

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: \$500 to \$3,000
- Wildlife causing damage: Black bear
- Crops affected by other wildlife: Field corn

Hidden Costs

- Field abandonment: stopped farming 2 acres where corn and soybeans would be grown because of excessive deer damage. Estimated loss is \$2,000 per year.
- Crop abandonment: Preferred crops of corn, soybeans, and alfalfa are not grown on 100-acres. Estimated loss is \$8,000 per year.
- Limited ability to rotate crops.
- Loss of soil fertility.
- At least \$1,250 per year spent implementing deer management options.
- At least 25 days and 50 hours per year implementing depredation permits.
- Opposition to implementing a depredation permit from local hunters and landowners.
- Time spent implementing harassment techniques.

Management Options Implemented

- Hunting during regular seasons
- Harassment techniques

Deer Density Estimates in the Area

- >100 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem and I did more to reduce the losses in 2020 below 2019 levels.
- Crop losses to deer were "unacceptably high" for at least 4 years between 2016 to 2019.

Development/Surrounding Areas

- Residential neighborhoods
- Parkland
- Woodlands
- Agricultural

Overview

Deer numbers are definitely back up again from what they were 10 years ago. In the late 1990s there was also a lot. The years in between the blue tongue knocked some pockets of deer out in other areas.

Deer damage varies depending on where I have the crop and what I'm doing. Five years ago it started getting progressively worse.

All crops are affected by deer damage. They eat the corn stalks down to about 6 inches, sometimes right down to the ground. It is very hard to determine yield potential and actual loss. I don't know what kind of yield I would get if I didn't have deer damage.

My crop rotation is limited. I can't offset the damage by just changing crops. I can only un-diversify the crops so much. I can't handle 500 acres of hay. I'd love to be able to plant a corn and soybean rotation on all my acres. I put hay on areas where there's a lot of deer. How do I rotate it out of hay? The other big problem I have is when I put out less corn, the deer problem is worse for the corn I do put in. There has to be a sacrificial area somewhere.

I haven't heard anyone talk about deer damage as a soil health issue. I have deer problems where they basically leave bare ground. It's just like overgrazing a pasture. If you put a cover crop out like clover for a nitrogen return, they eat it right to the ground. You get no return.

There's a problem with soil fertility. I can't keep fertility up because of the depleted organic matter. We're losing organic matter. There's no residue that would naturally fertilize the soil for the next year. This isn't a short-term problem. I've been dealing with it for 20 years. I can see it in the soil and other crop response where the deer pressure is bad. I can't get as much cover or organic matter to grow back.

Residential areas definitely act as refuges. Deer come from the backyards and around the houses. They go where they know they're safe and eat the plants around the houses. The houses are too close sometimes to be able to hunt. Harassment is driving around chasing them off a bit. I just don't have time to chase deer out of a cornfield.

Most of the ground in the area that is huntable is hunted. We need to promote more hunting. One problem is getting enough hunters in the woods that the deer move. There's not enough hunters to move the deer, or there is enough safe havens for the deer to hide. I don't know how, but we need to promote a recruitment effort for hunters, especially youth.

As a farmer licensee, you get free hunt tags. If you're a non-occupant, you still have to buy a hunting license for farmland that is rented. For someone that rents 95% of their farmland, it limits the area that you hunt.

The landowner controls who can hunt and what type of wildlife management is implemented. I can't hunt on a piece of rented land I farm that's leased to a hunting club. They want the corn I grow, but don't want

a depredation permit used. More deer doesn't mean better hunting. Quantity isn't quality. Just because you see 50 deer in a herd, doesn't mean you have 25 bucks. Some guys won't kill does.

I don't know of a butcher in the areas that's approved for Hunters Helping the Hungry venison donation. Some butchers aren't open during the summer when using a depredation permit.

I've farmed the land since the 1990s. I don't recall seeing bear damage back then or hearing guys talking about it. The year the state opened the early bear season bow hunt, saw damage go way down. Since the hunt closed on state land, saw bear damage getting worse since then. It's not on par with deer damage yet, but it's getting there. When the early season opened, I didn't see as many bears. There wasn't as much damage. There were not as many problems around homes.

Case Study #12

General Information

- Type of operation: Cash grains and oil seeds
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: >1,000 acres
- Gross sales: >\$500,000 to \$999,999

Crop Losses to Deer

- Crop losses caused by deer: \$2,100 to \$12,500
- Crops affected by deer: Field corn and soybeans

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: \$2,800 to \$18,000
- Wildlife causing damage: Resident and migratory Canada geese, groundhogs, and rabbits
- Crops affected by other wildlife: wheat (Canada geese) and soybeans (rabbits)

Hidden Costs

- Field abandonment: Entirely stopped farming 80 acres where corn and soybeans would be grown for an estimated loss of \$15,000.
- Crop abandonment: Stopped growing preferred crops of corn and soybeans on 200 acres for an estimated loss of \$5,000.
- Working late nights on the depredation permit, sometimes until 2:00 am and then getting up for work again at 5:00 am.
- Over 100 days each year are spent on deer management
- Emotional costs from livelihood impacts and concerns of being able to pay the bills

Management Options Implemented

- Hunting during regular seasons
- Deer depredation permits

Deer Density Estimates in the Area

- >60 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem and I did more to reduce the losses in 2020 below 2019 levels
- Crop losses to deer were "within acceptable limits" in 2010 and "unacceptably high" for the years 2011 to 2019
 - In the years leading up to 2010, deer in the area died from Bluetongue Virus (Epizootic Hemorrhagic Disease (EHD)).

Development/Surrounding Areas

- Residential neighborhoods
- Parkland
- Woodlands
- Agricultural

Overview

The farm has been a family operation for over 100 years. My Grandfather bought the original farm in the early 1900s. We added to it over time as other farmers in the area retired.

I would like the neighbors to know about the damage to the crops and the costs. It's emotional for the farmer. Things are looking good. I'll be able to pay my bills. Then you come across the deer damage. You see how much you're going to lose. Talk about taking the wind out of your sails. It's very emotional. It's a big letdown.

Damage estimates can be hard to estimate. In recent years the deer cause from \$2,000 to \$12,000 damage each year. If you add in damage from other wildlife, mostly Canada geese, that can be another \$2,000 to \$16,000 lost. Groundhogs cause damage, but not as much now because there are more coyotes. Rabbits will eat the edges of the soybeans. It's something you can live with, probably \$1,000 to \$2,000 a year.

There's been a lot of development in the area over the years. Deer damage absolutely got worse when neighborhoods started going up. The large-lot zoning are deer havens. They get smart and run to the lawns when we're trying to drive them. The deer stay in the neighborhoods during the day and feed in the fields at night. That's when damage is the worst. We're lucky the township has an aggressive deer management program.

We spend over 100 days each year on deer management. A lot of deer are taken through hunting and the depredation permit, but the crop damage can still be high. To try and decrease the deer damage in 2020, we got more aggressive with the depredation permit. We went out more nights and had more people on the permit. This also meant sometimes being out until 2:00 am when we had to be up for work again at 5:00 am. It also took time for the emails and paperwork for the permit. Talking with the county, state, and landowner for the leased land also took time.

From September through February, during regular hunting seasons, we would have 6 guys that would go out at least 2 times every week. We hunt as much of the land as we can. We're not allowed to hunt on some of the leased land. There are other lands in the area that can't be hunted including neighborhoods, parkland, woods, state and township properties.

It can be frustrating. People that may have no vested interest in growing crops are making the decisions and rules that affect your livelihood. State owned land leased to farmers don't allow the farmers to control hunting access. Everything is open to all hunters. There are only a few parking areas. Some hunters are even causing damage to the crops by dragging deer through the fields. Give farmers/tenants oversight so the hunting is focused on does. Properties leased to farmers, state, township or county owned lands, should have to have a wildlife management plan.

Case Study #13

General Information

- Type of operation: Cash grains and oil seeds
- Status: Full-time farmer
- Percentage of gross household income from farming: 51 to 75%
- Acres in production: <100 acres
- Gross sales: \$25,000 to \$49,000

Crop Losses to Deer

- Crop losses caused by deer: \$4,100 to \$7,500
- Crops affected by deer: Field corn, sweet corn, and mixed vegetables

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: \$200 to \$1,000
- Wildlife causing damage: Groundhogs, raccoons, blackbirds, and squirrels
- Crops affected by other wildlife: field corn (groundhogs, blackbirds, and squirrels), sweet corn (raccoons)

Hidden Costs

- Installation of 4-foot-tall plastic fencing at a cost of \$500.
- Time and supplies for fence maintenance.
- Hundreds, maybe 1000 hours per year on deer management.
- For leased land, not being allowed by the landowner to put up fencing, hunt or use a depredation permit.
- Opposition to the use of a depredation permit by adjacent landowners and local hunters.
- Depredations permits - It takes a physical toll after working in the field all day. Sometimes you have to go out at 1:00 am. Try doing that after working all day in 90 degree heat.
- Ammunition and fuel costs for people helping to implement depredation permits.

Management Options Implemented

- 4-foot tall plastic fencing
- Hunting during regular seasons
- Depredation permit

Deer Density Estimates in the Area

- >100 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem and I did more to reduce losses in 2020 below 2019 levels.
- Crop losses to deer were "within acceptable limits" from 2010 to 2012 and "unacceptably high" for 2013 to 2019.

Development/Surrounding Areas

- Residential neighborhoods
- Woodlands
- Agricultural

Overview

There's residential neighborhoods and woodlands in the area that act as deer refuges. The deer damage was acceptable between 2010 to 2012. Then the population just got too high. There were too many deer eating in the fields. Damage wasn't acceptable anymore. I can accept some damage, but this is too much! There's a point where I have to do something.

For deer management, there is hunting about 4 hours per day most days from mid-October through January. There is a couple of days of cutting wood for the fence and repairs. I put up 4-foot-tall plastic fence around a half-acre and had some of the biggest cantaloupes I've seen in years. I never add it all up. It's just something that you do. It's definitely 100s, maybe 1,000 hours per year. That's a lot of hours, especially in the summer.

On the acres that farming was stopped because of excessive deer damage, the landowner wouldn't let me put up a fence, hunt or use a depredation permit. I've encounter opposition to the use of a depredation permit by adjacent landowners and local hunters. I've been harassed by people.

I had an incident one time. A fawn was eating green grass on the side of the road. There was a girl trying to catch the fawn. I asked her to leave the fawn alone. She accused me of killing its mother. I didn't even respond. I went home. Then the mother deer came out of the woods and the fawn came running.

It takes a physical toll after working in the field all day [depredation permits]. Sometimes you have to go out at 1:00 am. Try doing that after working all day in 90 degree heat. Some parcels are too close to houses to use a depredation permit. There is also the ammunition and fuel costs for people helping to implement the depredation permit. There's a lot of hidden costs. Some hunters don't like the depredation permits. I started showing them the damage the deer can cause. Just about every property in the area is hunted. Some people just want to shoot bucks.

Case Study #14

General Information

- Type of operation: Cash grains and oilseeds
- Status: Full-time farmer
- Percentage of gross household income from farming: 26 to 50%
- Acres in production: 100 to 499 acres
- Gross sales: \$25,000 to \$49,999

Crop Losses to Deer

- Crop losses caused by deer: At least \$650
- Crops affected by deer: Field corn

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: \$1,950
- Wildlife causing damage: Black bear, turkey, and squirrels
- Crops affected by other wildlife: Field corn

Hidden Costs

- Crop abandonment: Preferred crops of corn and oats are not grown on 28 acres. Estimated loss is \$7,800 per year.
- Field abandonment: Starting next year there will be fields that I stop farming because of the deer damage. That will be a loss of another \$7,800.
- Spend about 90 days per year on deer management.
- Replanting crops.
- Emotional costs from deer eating the crops.

Management Options Implemented

- Hunting during regular seasons
- Depredation permits: will consider in the future

Deer Density Estimates in the Area

- >100 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, I have been trying to reduce the losses, but did not increase my efforts 2020.
- Crop losses to deer were "unacceptably high" for at least 10-years between 2010 to 2019.

Development/Surrounding Areas

- Residential neighborhoods
- Parkland
- Woodlands
- Agricultural

Overview

I've always enjoyed hunting, been doing it since I was 10 years old. I've hunted on this property for over 50-years. The deer population has increased over time. I really noticed an increase around 2000.

I always enjoyed seeing deer. Now that I own a farm it's tough. The deer just eat everything. Nothing can even grow in some places. Nothing comes up, even after replanting. We're trying to make a living. I don't mind if they eat some of it, but they eat too much. The deer eat off the top of the corn and kill it. I love seeing them, but you get mad when 6-rows of corn are gone on the edge of the field.

There are 28 acres where I would grow corn and oats, but I won't plant there anymore except for hay because of the deer pressure. If I plant corn down there I don't make any money at all. The financial loss is \$7,800 per year. Starting next year there will be fields that I stop farming because of the deer damage. That will be a loss of another \$7,800.

I spend about 90 day per year on hunting and deer management. I would love to do more management, but can't. The family hunts the main property. I lease land to a hunting club. The same people have hunted every year for about 20 years. I haven't used depredation permits. I don't like to kill them and not use them. I will consider depredation permits in the future.

I think the property that the state owns should be for everyone. Everyone should be allowed to hunt on all state properties. We need to kill more does. There should be some kind of incentive program to kill more does. There should also be more advertising for venison donation programs like Hunters Helping the Hungry and more butchers.

There's other wildlife around. I'm seeing more and more coyotes. There's a lot of turkey. The turkey pull up the corn when it's a few inches. They also eat the kernels. The black bears roll around in the corn and eat it.

Case Study #15

General Information

- Type of operation: Vegetables
- Status: Full-time farmer
- Percentage of gross household income from farming: 51 to 75%
- Acres in production: 100 to 499 acres
- Gross sales: \$100,000 to \$499,999

Crop Losses to Deer

- Crop losses caused by deer: at least \$11,800
- Crops affected by deer: Sweet corn, pumpkins, soybeans, field corn, rye, and hay

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: Unknown
- Wildlife causing damage: Canada geese and red-winged blackbirds
- Crops affected by other wildlife: Rye

Hidden Costs

- Field abandonment: Entirely stopped farming 16 acres where field corn and soybeans would be grown for an estimated loss of \$6,000 to \$8,000.
- Problems with opposition to the use of deer depredation permits for adjacent homeowners.
- Spent 25 days implementing deer depredation permits.

Management Options Implemented

- Hunting during regular seasons
- Deer depredation permits

Deer Density Estimates in the Area

- >60 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, I have been trying to reduce the losses, but did not increase my efforts in 2020.
- Crop losses to deer were "unacceptably high" for at least the previous 10 years from 2010 to 2019

Development/Surrounding Areas

- Residential neighborhoods
- Woodlands
- Agricultural

Overview

I have a hard time with deer. Back in 2009 and 2011 were eaten alive by deer. I don't know how I'd handle bear. Deer are bad on our sweet corn. Soybeans is probably the worst crop for us with the deer. There are fields we stopped planting because of the deer damage. We would be growing corn and soybeans. That's a loss of \$6,000 to \$10,000 per year.

I've been using depredation permits for years. In the summer, the last thing we want to think about after working in the 90 degree heat all day is shooting deer. We take deer about 25 days per year. We're not allowed to use depredation permits on the land we don't own. There has been opposition to the depredation permits from adjacent landowners.

Hunting is allowed on all of the owned land. There are other properties in the area that can't be hunted including neighborhoods and a farm owner that likes the deer.

Red-winged blackbirds cause a lot of damage. We tried repellents. They haven't worked. We've used cannons. They just fly from one end of the field to the other. You have to be there in the field to keep them out. We see wild turkey in groups of 10 to 12 at a time, but can't pick out any substantial damage. From 2000 to 2005 we used to see a lot of groundhogs. I don't know if it's the coyotes, but we only have 2 to 3 spots now where we see them and there doesn't seem to be as many holes in the field. We farmers need the coyotes.

Case Study #16

General Information

- Type of operation: Hay/Rye
- Status: Full-time farmer
- Percentage of gross household income from farming: 26 to 50%
- Acres in production: 100 to 499 acres
- Gross sales: \$100,000 to \$499,999

Crop Losses to Deer

- Crop losses caused by deer: Unknown (It's hard to know, but damage is occurring)
- Crops affected by deer: Hay

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: \$1,000 to \$3,000
- Wildlife causing damage: Black bear and Canada geese
- Crops affected by other wildlife: Beehives (black bear) and rye (Canada geese)

Hidden Costs

- Crop abandonment: Stopped growing preferred crops of Christmas trees and pumpkins for an estimated loss of \$55,000.
- Installation of deer fencing \$4,000.
- At least 16 hours per year on deer fence maintenance.
- At least \$1,000 on deer management options.

Management Options Implemented

- 8-foot tall plastic deer fencing
- Hunting during regular seasons
- Deer depredation permits

Deer Density Estimates in the Area

- >60 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, I have been trying to reduce losses, but did not increase my efforts in 2020.
- Crop losses to deer were "within acceptable limits" from 2010 to 2014 and "unacceptably high" for the years 2015 to 2019.

Development/Surrounding Areas

- Residential neighborhoods
- Parkland
- Woodlands
- Agricultural

Overview

The family has been farming for several hundred years. Deer started becoming a problem for me back in the 1980s when I got into higher value crops like vegetables and Christmas trees. The bulk of my farm is hay and rye. I'm not going to fence all of it. It's not cost effective. I can't put a number on the damage, but there is definitely an impact.

They're beautiful, majestic animals. There are just too many of them. They're not wild anymore. I can walk out in my front yard and almost walk up to the deer. They're not afraid of people. They stand by the side of the road. I've had 7 deer collisions over the last 30 years and a lot of near misses. They're being domesticated by our inability to control them. People don't realize why a deer population explosion has been happening. The does are having twins and triplets and there are less people hunting.

Many homeowners in the area have lost landscaping and are understanding of the need to manage the deer. People understand that the deer go after vegetables, melons, and squash, but don't realize they damage other crops.

Many people have no idea that deer destroy Christmas trees. I'm going to stop growing Christmas trees entirely. That's a loss of \$35,000 per year. They destroy them by rubbing their antlers on them. I lose half my crop to drought or deer. I can't use lethal management in that area because it's too close to residences.

I stopped growing pumpkins because if I don't fence it's a total loss. When I grew 10 acres of pumpkins I was making an additional \$20,000 just on the weekends. Now I buy them from other farmers to sell to customers. I don't have an estimate for the other crops, damage is occurring, but hard to know how much.

For deer management there is hunting on the property. I have a gun club working the farm. A depredation permit was also used. It's a challenge to implement after working all day.

I installed an 8-foot high plastic mesh fence about 5 years ago when the deer damage became unacceptably high. It cost \$4,000 to install and costs about \$1,000 each year to maintain. The plastic fence can be easily moved while rotating crops and is easy to put up. The last few years the deer are not as aggressive on the fence. They're not breaking it or getting under it. They used to break through it and get under it more.

There are other wildlife around. A bear tore up the beehives on at my place last year. It happened while I was in the process of having electric fencing installed around them. The Canada geese damage to rye is at least \$1,000 to \$3,000 each year. The fall and winter are the worst time of year.

Case Study #17

General Information

- Type of operation: Cash grains and oilseeds
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: 100 to 499 acres
- Gross sales: \$100,000 to \$499,999

Crop Losses to Deer

- Crop losses caused by deer: \$17,000
- Crops affected by deer: Field corn and soybeans

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: Estimate unknown
- Wildlife causing damage: Black bear
- Crops affected by other wildlife: 20 to 25 bear rolls in field corn (the bear rolls around an area, knocks down the corn, and then eats it)

Hidden Costs

- Field abandonment: Entirely stopped farming 50 acres where field corn, wheat, and hay would be grown. Estimated loss unknown.
- Crop abandonment: Preferred crops of soybeans and alfalfa hay are not grown on 350 acres. Estimated loss unknown.
- At least 40 hours spent implementing depredation permit.
- At least \$3,600 per year to implement deer management options.
- Bear rolls, 20 to 25 in field corn. Estimated loss unknown.

Management Options Implemented

- Hunting during regular seasons
- Depredation permits

Deer Density Estimates in the Area

- >100 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, I have been trying to reduce the losses, but did not increase my efforts 2020.
- Crop losses to deer were "unacceptably high" for at least 10 years between 2010 to 2019.

Development/Surrounding Areas

- Residential neighborhoods
- Woodlands
- Agricultural

Overview

I've been farming the property for almost 40 years. Back in 1985, ever since we started planting corn, the deer have been a problem. They were eating all the corn. I usually lose the first row of corn around every field. The deer have always caused a lot of damage to the corn.

Some fields I stopped farming because of deer damage. Soybeans are worse. The deer come in and eat all the soybeans. I don't even grow alfalfa on the farm anymore. It's hard to tell the cost.

Deer management includes hunting and implementing a depredation permit. It's hard to get out. I don't have any employees. I hunt on the land I own. I don't hunt on leased land.

People own land. They want Farmland Assessment. If you want Farmland Assessment, you should have to control the deer. But I don't know how you can force people to control deer.

The bear damage is a lot worse than it's been in the past. They roll around in the corn. There used to be just a couple spots. Now it's 20 to 25 spots. It's hard to tell how much it's worth. What about public safety? That's my big concern.

There's other wildlife around. I see more coyotes around the farm, right next to the buildings. There's a lot of them. I can hear them all night long. There's small black birds, crows maybe, eating the corn. It causes bad or moldy kernels. Stink bud damage causes discolored and moldy kernels. Spotted lanternfly were in the cornfield. They didn't really do any damage, but the combine was all black after we went through the field. I'm keeping an eye on them. I don't really know what to do for them.

Case Study #18

General Information

- Type of operation: Nursery, Christmas trees, ornamentals
- Status: Part-time farmer
- Percentage of gross household income from farming: 26 to 50%
- Acres in production: <100 acres
- Gross sales: \$25,000 to \$49,999

Crop Losses to Deer

- Crop losses caused by deer: At least \$1,000
- Crops affected by deer: Christmas trees (buck rubs)

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: At least \$1,000
- Wildlife causing damage: Canada geese
- Crops affected by other wildlife: Straw

Hidden Costs

- Crop abandonment: Preferred crops of vegetables are not grown on 12 acres. Estimated loss is \$15,000 to \$20,000 per year.
- Approximately \$1,000 to install electric deer fencing.
- At least 20 hour and \$1,000 per year on deer management when all fields are in production.
- Time to move the fence every 3 to 4 years when the fields are rotated.
- Emotional costs of deer damage – wondering if it's still worth the effort.

Management Options Implemented

- Electric deer fencing 4.5-feet tall
- Hunting during regular seasons
- Depredation permits not available because too close to homes
- Repellents: gave that up years ago

Deer Density Estimates in the Area

- >60 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, but I did not do anything special to reduce losses in 2020 (still utilize electric fence).
- Crop losses to deer were "within acceptable limits" for at least 10 years between 2010 to 2019. (Only because I use fencing).

Development/Surrounding Areas

- Residential neighborhoods
- Parkland
- School
- Woodlands
- Agricultural

Overview

When I was young growing up here you didn't really see deer. The late 1980s and early 1990s, that's when it started being a problem and we started using fencing. As development went up, pressure started getting worse over the years. I see as many as 25 to 30 deer at night on the farm. I've seen does with 3 fawns this spring.

It's something that strikes home around here. I really feel for the guys with large operations. It's a financial loss to not only me, but a lot of the farmers in the industry. If I tried to farm the entire area, I would have a hard time keeping them out.

I have been farming the family property for the last 35 years part-time (if you ever want to call farming "part time"). I recently retired from my full-time job earlier this year to maybe spend more time with the farm. Unfortunately, with age, we tend to lose our patience and energy. The expanding deer population has tested that patience left, making you wonder if it's still worth the effort.

Deer don't mess too much with the Christmas trees other than buck rubs. It causes about \$1,000 per year in damage. There's 12 acres where I would be growing vegetables if not for the deer damage. That costs \$15,000 to \$20,000 per year. Installing the electric fence cost about \$1,000. There's at least 20 hours and \$1,000 per year spent on deer management when all the fields are in production. I have to move the fencing every 3 to 4 years when I rotate the fields.

Deer come in to feed on the tender grass when the parkland nearby has larger vegetation because they only mow once per year. The park in the area implements a controlled hunt. Unfortunately, not all of the park. The deer were removing the understory of the forest.

The deer around here are concentrated in the wooded areas and neighborhoods. That's what pushed the park to do managed hunts. The deer know where to find refuge. When the hunting season starts the deer all leave the park and move into the patches around the neighborhoods. Residential areas are absolutely acting as a refuge area for the deer. I don't know what the solution is to that.

There are homes in the area that cost over a million dollars. Neighborhoods are too close for depredation permits. The township has a no discharge of firearms ordinance.

I had a conversation with a neighbor once who saw a deer stand on the property. Their little girls said – you're a hunter? You murderer! I said, no girls, I'm just trying to protect my crops. Their mother said, that makes sense. She said they were dealing with landscaping being devoured and the deer were eating her flowers.

For management, repellents were pretty effective until it rained. I stopped using them at least 20 years ago. Fencing was more effective. I use electric fencing on the property. Although not 100%, still effective.

The damage has been acceptable the last 10 years, but only because I use fencing. It's just getting to the point where putting the fences up, moving them, time and labor, it's just too much.

This year I got into strawberries. Deer are getting into the fence. They were getting in every night. The fence goes about four and a half feet straight up. They break the strands and I have to repair them. It's usually young deer in the latter part of the summer or early fall. Fall is the busiest season on the farm. Once they get hit they respect it.

The family hunts the property. I have 15 guys on a list to hunt to help with the deer problem. We need to get more people in the woods hunting. Look at increasing the length of the seasons. Make it easier for hunters to get out there. How many Deer Management Zones do we have now? I realize different areas need to be treated differently, but it's too many permits. It can get expensive. It's why a lot of guys are getting out of it now.

Case Study #19

General Information

- Type of operation: Vegetables
- Status: Part-time farmer
- Percentage of gross household income from farming: 0 to 25%
- Acres in production: <100 acres
- Gross sales: <\$2,500

Crop Losses to Deer

- Crop losses caused by deer: \$4,000
- Crops affected by deer: Field corn

Crop Losses to Other Wildlife

- Some damage from groundhogs and skunks to vegetables.

Hidden Costs

- There are emotional costs from the deer.
- Crop rotation is a big issue.
- Replanting and losing entire fields prior to fencing.
- We spend a lot of money on fertilizers to replenish the soil so we can grow vegetables again (\$3,000 to \$4,000 each year for a few acres).
- Deer fence installation \$3,000.
- At least 80 hours and \$3,000 per year spent on deer management.

Management Options Implemented

- Installed deer fencing on a few acres at a cost of \$3,000
- Hunting during regular seasons

Deer Density Estimates in the Area

- >60 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: right number deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem and I did more to reduce the losses in 2020 below 2019 levels (fenced in all areas)
- Crop losses to deer were "unacceptably high" for the years 2015 to 2019 (can't recall prior years)

Development/Surrounding Areas

- Residential neighborhoods
- Parkland
- Woodlands
- Agricultural

Overview

I've been farming for over 20 years. In 2019, I walked out and saw 75 deer standing in one of my fields. Prior to fencing the deer ate everything. We would replant all the time. I would lose entire fields.

Farmers can't grow a lot of crops because of all the deer. A lot of farmers that farm large tracts of land can't really afford to fence them. The state needs to subsidize a program. If you want farmers to be able to grow crops, hunting has to be done.

In previous years, during the hunting seasons deer would go into wooded areas and parks where they couldn't be hunted. Interactions with local land managers that prohibited hunting used to be very contentious. There's just so many anti-hunters it makes it hard sometimes. In more recent years hunting programs have started up in woodlands between the housing developments that used to be refuge areas for the deer.

I've been hunting the property for close to 20 years. We used to harvest around 40 deer per year. I haven't applied for a depredation permit. If you can eat them, I wouldn't mind. I don't like the idea of not eating the deer. I'd like to see more programs for donating deer to people in need.

There are emotional costs, frustration from the deer. That's just farming. If it's not the deer it's the weather.

Case Study #20

General Information

- Type of operation: Cash grains as oil seeds
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: 500 to 999 acres
- Gross sales: >\$100,000 to \$499,999

Crop Losses to Deer

- Crop losses caused by deer: at least \$11,000
- Crops affected by deer: Soybeans and wheat

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: At least \$1,000
- Wildlife causing damage: Canada geese
- Crops affected by other wildlife: wheat

Hidden Costs

- Field abandonment: I never entirely stopped farming a field because of deer damage, but I should have.
- At least \$1,000 per year on deer management
- Emotional costs from deer damage and loss of income.

Management Options Implemented

- Hunting during regular seasons
- Harassment techniques: flare guns

Deer Density Estimates in the Area

- Closest known estimate is >60 deer per square mile within 10 miles of the farm

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, but I did not do anything special to reduce losses in 2020.
- Crop losses to deer were "within acceptable limits" from 2010 to 2013 and "unacceptably high" for 2014 to 2018.

Development/Surrounding Areas

- Residential neighborhoods
- Agricultural

Overview

I was born and raised here. I've been farming my whole life. You're not going to make a lot of money farming. Buying and selling properties over time has helped me to get by. When I was young it was exciting to see a deer. You'd call everyone out to see them. Now it's common to see 25 deer at a time running across the field. For years we've been talking about - what we are we going to do about the deer? Nothing has been enough. They're getting bad.

Back in 2014 the deer damage became unacceptably high. I don't know what happened. They're just more of them. Things would look good at the beginning of the season and by the end it wouldn't even be worth harvesting. They're ruining my income. I never entirely stopped farming a field because of deer damage, but I should have.

There's damage to farmers and dangers to lives with car accidents. There are just too many. The insurance payouts must be huge. People on the neighboring lands are getting damage to their landscaping. Developments have been built up a lot over the years. The deer hide out there during the day and come out to eat in the fields at night. They're acting as deer refuges.

I have a pretty good gun club hunting the property. I haven't run into much opposition from neighbors because they're experiencing damage to residential plantings. Some of the ground that's been preserved won't allow hunting. The deer know where to go.

I've used depredation permits years ago. The deer were terrible and at that point they weren't near as bad as they are now. I just didn't get one this year. It's just one more thing you have to do and there just isn't enough time. A lot of hunters won't shoot on a depredation permit. It's hard to get enough hunters to kill enough deer.

The geese, there's just too many of them. They pollute all the ponds, eat all the crops. They're getting out of control. You know what they're doing all over the fields and the kids go play in it. It's terrible. I shoot flare guns every day to scare the geese. It's just another thing you have to do. They just keep flying from field to field.

Bears up in north Jersey are getting bad in the cornfields. They roll around and knock down all the corn and eat it.

Case Study #21

General Information

- Type of operation: Hay
- Status: Full-time farmer
- Percentage of gross household income from farming: No response
- Acres in production: 100 to 499 acres
- Gross sales: No response

Crop Losses to Deer

- Crop losses caused by deer: \$2,000 to \$10,000
- Crops affected by deer: Hay

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife:
- Wildlife causing damage:
- Crops affected by other wildlife:

Hidden Costs

- Crop abandonment: Preferred crops of corn, and alfalfa are not grown on 30-acres. No estimate for financial loss.
- Opposition to hunting from wildlife advocates.

Management Options Implemented

- Hunting during regular seasons
- Repellents for landscape plants

Deer Density Estimates in the Area

- >100 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, but I did not do anything special to reduce losses in 2020.
- Crop losses to deer were "within acceptable limits" from 2010 to 2017 and "unacceptably high" for 2018 to 2019.

Development/Surrounding Areas

- Residential neighborhoods
- Parkland
- Woodlands
- Agricultural

Overview

I just love the wildlife. When I was a kid all we had was small game hunting. Now you don't really see small game anymore. There's not much left for them. The deer eat it all. There's a 6-foot browse line out in the forest.

The deer are out grazing every day. I can't grow any corn or soybeans because of the deer. I can't grow alfalfa. It looked like a sheep pasture. All I can grow is hay. I had rhododendrons about 40 years. The deer just eat them right up, especially if there's a lot of snow. Deer eat the hostas right down to the ground.

I don't know what happened in 2018. It seems like there were more does. It's not just affecting the farmers. It's affecting the neighborhoods too. They're eating all the plants. Everybody in the neighborhood is affected. We need to educate everyone.

There has been opposition to hunting by special interest groups. People don't understand the impact of these animals on the property and our lives. They want to be able to eat the products made with corn and soybeans. They're not making the connection with where the food comes from. People need to work together to come up with some type of solution that is productive for everybody.

If there are people out there that don't have food on the table, that should be a priority. The meat is healthy and good. There needs to be a comprehensive program to facilitate shooting, transport, processing and giving meat to people that need something to eat. There should be some coordination that provides jobs for people. It needs to facilitate butchers to do it on a larger scale. It could be a year-round thing. We don't need hunting year-round. You can process the deer taken under the depredation permit.

Maybe more could be done to recruit new hunters and promote eating wild meat. Several hunting clubs are good managers of the deer, but not all. Some just want to shoot bucks. That's the problem. We need to educate people that come in from the city that don't live here. The people that come and go, some in gun clubs. They need to see the whole picture, not just shoot a buck.

Other wildlife are not really causing damage now. We have bears here, but not doing me a lot of damage to hay. We saw more bears before they started the season. Squirrels used to cause damage on the corn. Black birds used to cause damage on the corn too, in the whole field, not just the edges like some other species.

Case Study #22

General Information

- Type of operation: Nursery/Ornamental
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: <100 acres
- Gross sales: \$10,000 to \$24,999

Crop Losses to Deer

- Crop losses caused by deer: At least \$2,500 (much more severe prior to deer fence installation)
- Crops affected by deer: Christmas trees (buck rubs damaging trees)

Crop Losses to Other Wildlife

- No crop losses
- Groundhogs a nuisance by making holes

Hidden Costs

- Installation of 8-feet tall high-tensile woven wire deer fencing at a cost of \$30,000.
- At least 10 hours per year and \$1,000 for fence maintenance.
- Cost of chemical repellents.
- Emotional costs, frustration and depression from the deer causing a lot of damage.
- Recovery period for tree damage after buck rubs.
- It takes 5 to 7 years for trees to recover after buck rubs and extra time pruning to try and make the tree look nice in hopes you can sell it.

Management Options Implemented

- 8-feet tall high-tensile woven wire deer fencing
- Electric fencing
- Hunting during regular seasons
- Chemical repellents

Deer Density Estimates in the Area

- >60 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: Not a problem (after fencing)
- Crop losses to deer were "unacceptably high" for the years 2010 to 2016 and "within acceptable limits" from 2017 to 2019 (after deer fence installation)

Development/Surrounding Areas

- Residential neighborhoods
- Parkland
- Woodlands
- Agricultural

Overview

Mom and Dad bought the farm in the 1940s. They started out with turkeys and then started growing Christmas trees. The deer started becoming a problem in the 1990s. It was never really a problem before that. It didn't seem like there were that many deer around.

We grew Fraser Fir about 10 years ago. The deer liked them because of the softer leaves I guess. Then we started growing Norway and blue spruce. The deer don't touch them because of the spines. The bucks can damage the trees by rubbing on them.

It used to get kind of depressing. A few weeks before Christmas bucks would come in rubbing right before you were about to sell the trees. The recovery period for the tree can be 5 to 7 years after rubbing. It takes longer than replacing the tree. You spend a lot of extra time pruning to try and make it look nice in hopes you can sell it.

We all need to make a living. I'm not against wildlife. I love it. There needs to be some type of program so the deer are not overwhelming to farming and nature. It gets frustrating at times. The deer do a lot of damage.

Electric fence worked at first. After about a year the deer learned they could jump it. I had to start moving to the 8-foot wire fence. We fenced in the property about 5 years ago. It was either stop the deer or stop farming. You can live with some of the damage, but it just got to be too much. It's 8-foot tall woven wire fence with a single strand of wire above to take the overall height up to 9-feet. The deer walk the perimeter of the fence, but can't get in.

Deer management now is mostly maintenance on the fence. I've never used depredation permits. I've hunted the property. I'm not a big hunter anymore. There were problems in the past with opposition to hunting. Chemical repellents never worked for me, not even on landscape jobs. It just doesn't work.

Case Study #23

General Information

- Type of operation: Cash grains as oil seeds
- Status: Full-time farmer
- Percentage of gross household income from farming: 51 to 75%
- Acres in production: 500 to 999 acres
- Gross sales: >\$100,000 to \$499,999

Crop Losses to Deer

- Crop losses caused by deer: \$38,000 to \$53,000
- Crops affected by deer: Field corn and soybeans

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: estimate unknown
- Wildlife causing damage: Canada geese
- Crops affected by other wildlife: wheat

Hidden Costs

- Field abandonment: Entirely stopped farming 90 acres where soybeans and corn would be grown. Financial loss is unknown
- Crop abandonment: Stopped growing preferred crops of soybeans and corn on 90 acres. Financial loss is unknown
- At least 50 hours implementing deer management options at a minimum cost of \$2,500.
- Crop rotation impacted by deer.
- Soil erosion cause by Canada geese.

Management Options Implemented

- Hunting during regular seasons

Deer Density Estimates in the Area

- Closest known estimate is >60 deer per square mile within 10 miles of the farm

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, I have been trying to reduce the losses, but did not increase my efforts in 2020.
- Crop losses to deer were "within acceptable limits" from 2011 to 2014 and "unacceptably high" for 2015 to 2019.

Development/Surrounding Areas

- Residential neighborhoods
- Parklands
- Schools
- Corporate park/commercial
- Woodlands
- Agricultural

Overview

When I was a kid there was no development. In the early 1990s deer were just as bad a problem as now. Something happened that about 15 years ago they weren't as bad. I don't know what, but no it's bad again.

Deer funnel to us in the summer and go to the neighborhoods in winter where people are feeding them. I can go take pictures of beautiful bucks laying right in the backyard under a feeder. By people in the neighborhoods harboring these deer, it costs me about 25% of my paycheck every year. It's also costing them in their landscape plants.

There's been harassment from people in suburban neighborhoods. They call the game commission when you're within legal limits. Some chase deer out of the area when people are hunting. The suburban neighborhoods are definitely acting as refuges.

I believe the root of the problem begins with all the nature preserve land parcels in the area. All during the growing season the wildlife is out in full force but when hunting season begins the deer disappear. Converting viable farmland into bird habitat is another problem. Weed patches for birds to live in is a breeding ground for deer, not a feeding ground. Deer live in these weed patches that are closed to hunting and feed on the viable farmland. I could go on and on, but it won't do any good.

Crop rotation is an imperative part of any operation and is impacted by the deer. If you can't rotate crops through you end up with severely limited production for crops that have been grown on the land too long. I grow alfalfa on the edge of certain fields. The deer stop there. The other crops don't get hit as bad.

I grow a lot of hay where I can't grow anything else. Hay pays the bills, but it takes more time and people, and you don't make as much money. To farm in New Jersey costs a lot of money. If I was able to actively grow without the deer problem, I wouldn't have to grow as much hay. It takes all summer long to do it. If I could grow row crops I could do it cheaper and by myself, but I'd be out of business in about 15 minutes.

The farmland is leased. I hunt 25% of the land. About 10 years ago I was farming land I could consistently hunt. Losses from deer were acceptable. Around 2015 I started taking on more land that the landowners leased to gun clubs. I didn't have the ability to hunt. The gun clubs are going after bucks. Other hunters are not shooting enough does to make a dent in the population.

I never used depredation permits. I didn't want to have to bury the animals. It's different now. You can donate the meat.

Case Study #24

General Information

- Type of operation: Vegetables
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: <100 acres
- Gross sales: \$100,000 to \$499,999

Crop Losses to Deer

- Crop losses caused by deer: \$11,550 to \$16,750
- Crops affected by deer: Summer squash, okra, melons, snap beans, peppers, winter squash, pumpkins, and cucumbers

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: At least \$8,500 to \$10,000
- Wildlife causing damage: Crows
- Crops affected by other wildlife: Summer squash, winter squash

Hidden Costs

- Crop abandonment: Many years ago, but not after installing fencing.
- Installing 8-foot-tall deer fencing at a cost of \$40,000.
- More than 100 hours annually spent on deer management.
- At least \$7,000 spent in 2019 implementing deer management options.

Management Options Implemented

- Deer fencing at least 8-foot-tall
- Hunting during regular seasons
- Depredation permits

Deer Density Estimates in the Area

- >100 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, and I did more to reduce losses in 2020 from 2019 levels.
- Crop losses to deer were "unacceptably high" for at least 10 years from 2010 to 2019.

Development/Surrounding Areas

- Residential neighborhoods
- Parkland
- School
- Woodlands
- Agricultural
- State and county lands

Overview

I won't grow a crop now unless it's fenced. I abandoned growing pumpkins more than 15 years ago. I've had to fence in every field to make it profitable. Once I started fencing things in, I started harvesting a lot more crops. There's a very big difference of harvestable crops with and without fence. It's expensive. I've spent over \$40,000 on fencing.

Deer jumped the electric fence with no problem. If they nosed up to it and got zapped, you'd get some relief. I started with plastic fence. The plastic fence lasted about 15 years. Now, the deer can go right through it. I'm taking it down. Woven wire fence works much better than plastic. Only problem is deer still try to jump over it. I've seen a big doe jump over a 7-foot fence with no problem.

The deer population increases in late fall on the farm. The surrounding areas, easily hundreds of acres, are serving as a refuge for huge herds of deer. These deer know where to go. They know where they're safe.

Challenges in the area include trying to get public grounds open to bowhunting. Hunters have had issues with neighbors in the area against hunting; harassing hunters and making noise while people were hunting. I haven't experienced issues on my own property, but had a neighbor scream in my face while hunting with my son – how can you teach him that? Later they wanted me to kill coyotes that were eating their cats.

I grew up an avid hunter. We hunt for deer management. I do most of my management during the hunting season to use the meat. The freezer is full. Family and friends all eat venison. I'm looking into donating to Hunters Helping the Hungry.

I was delayed in getting a depredation permit in 2020. I didn't get it until I was very busy. It's kind of hard to be working sunup to sundown and shoot deer after for a depredation permit. I don't have the time. Sometimes landowners are reluctant to let someone shoot deer on the property. Next year I'm going to ask the owners of the land I don't own to use a depredation permit. I'm going to find people to help with the depredation permit.

There is \$8,500 to \$10,000 lost per year from crow damage to the crops. Cannons and scarecrows don't work for long. They get habituated. I plant in plastic mulch with drip lines. The crows walk right down the rows and take the seeds out of the holes. They were taking watermelon seeds right out of the ground. At first, I thought I had bad or old seed that didn't germinate. It's harder for them without plastic. They have to search. I've also had problems with raccoons getting into the chicken coop.

Case Study #25

General Information

- Type of operation: Cash grains and oil seeds
- Status: no response
- Percentage of gross household income from farming: no response
- Acres in production: no response
- Gross sales: no response

Crop Losses to Deer

- Crop losses caused by deer: at least \$16,000
- Crops affected by deer: soybeans and corn

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: no response
- Wildlife causing damage: no response
- Crops affected by other wildlife: no response

Hidden Costs

- Crop abandonment (not being able to grow preferred crops) is \$15,000 to \$20,000 per year, every year.
- Deer eating crops to the ground.
- Spending over 200 hours in the summer months replanting fields 3 to 4 times in a year because the deer keep eating the crop.
- Using more herbicide because of deer damage and having to replant fields.

Management Options Implemented

- Hunting

Deer Density Estimates in the Area

- No known estimate

Perceptions of Deer Pressure

- Farmed properties: no response
- Surrounding areas: no response
- 2019's total losses to deer: no response
- Crop losses to deer were "unacceptably high" for at least the previous 10 years from 2010 to 2019

Development/Surrounding Areas

- Residential neighborhoods
- Parkland
- Corporate park/commercial
- Woodlands
- Agricultural

Overview

I've been farming since I was a teenager. We're fourth generation on the farm. Deer started becoming a problem in the late 1980s and early 1990s. Years back we lost 60% of the deer herd when there was EHD [Epizootic Hemorrhagic Disease]. That was the only time losses were acceptable in many years. The deer bounced back in 3 years.

People need to know the facts on how deer are affecting the farmers. Most people, unless they are impacted themselves, don't care. They don't care if farmers go out of business. My wife and I used to say if we lose less than \$10,000 per year it would be a good year. We haven't had a good year in over 10 years.

In 2019 I lost 25 to 30 acres of soybeans. That's \$16,000 worth of beans. 2020 was the first year I bought crop insurance because we got hit so hard last year. It didn't really cover much, only about 25% of the loss.

In the summer months I easily spend over 200 hours replanting what the deer eat. I've replanted some fields 3 to 4 times in one season. That also means you're using a lot more herbicide than you want to use. It can also be a waste of time. If the deer eat the crop to the ground, it's not worth replanting. They're just going to do it again.

Two to three years ago we had a bad crop year. On 25 acres the deer ate every corn stalk right to a few inches off the ground. We didn't harvest one cob of corn. Sometimes I plant cover crops.

Managing for the deer takes a lot of time. I haven't used a depredation permit in 20 to 30 years. I really don't believe in killing them and throwing them away. I don't have time to be out there all night long after working all day. It's too much.

I hunt. I'm an avid sportsman. I don't kill anything I don't use and eat. The easiest way to control the deer herd is to hunt them. If you're not going to hunt, there's not a lot else you can do other than high-fence the field to keep the deer out. I never used fencing. It would cost about \$100,000. It's too expensive to fence the fields.

The problem for farmers in southern New Jersey is that you can't shoot enough does to reduce the damage. You can only shoot 1 deer per season, doe or buck, and you have to buy both tags to shoot 1 deer.

Liability is an issue. You can't just let anyone come hunt on your farm. The state should pay for it or make it a law that we can't be liable if people come on the farm and hunt. Pass legislation that the farmers aren't held liable.

You have to have doe hunting on leased land. You just can't have people only go and shoot bucks. They need to kill more does.

Landowners that lease should have to allow hunting or be required to create a wildlife management plan. Some don't allow any hunting and the land is a deer refuge. People that have properties that are refuges should have to develop a wildlife management plan or be assessed a fee or penalty if their land is a refuge for deer causing damage to farms.

Case Study #26

General Information

- Type of operation: Nursery, Christmas trees, ornamentals
- Status: Full-time farmer
- Percentage of gross household income from farming: 76 to 100%
- Acres in production: 100 to 499 acres
- Gross sales: \$500,000 to \$999,999

Crop Losses to Deer

- Crop losses caused by deer: \$5,000 to \$8,000
- Crops affected by deer: ornamentals

Crop Losses to Other Wildlife

- No losses reported

Hidden Costs

- 80 paid hours per year implementing deer management options.

Management Options Implemented

- Hunting during regular seasons (did not achieve desired result)
- Deer depredation permit (did not achieve desired result)
- Chemical repellents (did not achieve desired result)

Deer Density Estimates in the Area

- >100 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem and I did more to reduce the losses in 2020 below 2019 levels
- Crop losses to deer were "unacceptably high" for at least 10 years prior to 2020

Development/Surrounding Areas

- Residential neighborhoods
- Woodlands
- Agricultural

Overview

The primary sources of revenues for this farm are ornamental/nursery crops. Deer damage is not as high as farms producing other crops in the region, but are still significant and estimated between \$5,000 to \$8,000. Additional hidden costs include 80 paid hours per year to implement deer management options. These options include hunting, implementing depredation permits, and chemical repellents. None of these options achieved desired results in sufficiently reducing or eliminating crop damage caused by deer.

Development in the area consists of residential neighborhoods, woodlands and agricultural areas. Some of which are not open to deer hunting as a management tool. Like many farmers throughout the state, the operator of this farm feels there are too many deer on both the farmed properties and surrounding areas. Deer density estimates are over 100 deer per square mile. That's about 10 times the recommended deer density for this type of landscape. Deer-related crop damage has been unacceptably high for at least 10 years prior to 2020 requiring the farm to increase efforts over previous years to try and reduce losses.

Case Study #27

General Information

- Type of operation: Hay and grain
- Status: Part-time farmer
- Percentage of gross household income from farming: 25 to 50%
- Acres in production: 100 to 499 acres
- Gross sales: >\$50,000 to \$99,999

Crop Losses to Deer

- Crop losses caused by deer: \$1,500 to \$4,500
- Crops affected by deer: Field corn, oats and hay

Crop Losses to Other Wildlife

- Crop losses caused by other wildlife: \$1,000 to \$2,500
- Wildlife causing damage: Black bear
- Crops affected by other wildlife: field corn

Hidden Costs

- Crop abandonment: Preferred crops of soybeans and corn are no longer grown on 95 acres. The associated costs are unknown.

Management Options Implemented

- Hunting during regular seasons

Deer Density Estimates in the Area

- >100 deer per square mile

Perceptions of Deer Pressure

- Farmed properties: too many deer
- Surrounding areas: too many deer
- 2019's total losses to deer: A problem, but I did not do anything special to reduce losses in 2020.
- Crop losses to deer were "unacceptably high" for the years 2018 to 2019. No response was given for years 2010 to 2017.

Development/Surrounding Areas

- Residential neighborhoods
- Woodlands
- Agricultural

Overview

The farm has been a part-time, family run, operation for approximately 100 years. Crops include corn, oats, hay and wood products. The surrounding areas are a mixture of neighborhoods, agricultural, woodlands, and preserved land. Deer densities are greater than 10 times recommended numbers for this type of landscape.

Estimated crop losses from deer are between \$1,500 to \$4,500. However, this does not include estimates for all crops and the total financial loss is unknown. Additionally, losses do not include unknown estimates for the 95-acres where deer damage prevents the preferred crops of soybeans and corn from being grown. Black bears cause an additional \$1,000 to \$2,500 in corn damage.

Wildlife management on the farm includes hunting during regular seasons. This includes participation of a hunting club that leases some of the land.

APPENDIX III

Crops and Products Reported by Case Study Farmers Affected by Direct Deer Damage

Field Crops/Cash Grains and Oilseeds

- Alfalfa
- Field Corn
- Grain
- Hay (Grass Hay, Mixed Hay, Pasture)
- Oats
- Potatoes
- Rye (Rye Straw, Rye for Grain)
- Sorghum
- Soybeans
- Sweet Potatoes
- Wheat

Vegetables and Melons

- Asparagus
- Beans (Green Beans, Snap Beans)
- Broccoli
- Cabbage
- Cauliflower
- Cucumbers
- Eggplant
- Herbs
- Leafy Greens
- Lettuce
- Watermelon
- Okra
- Peppers
- Pumpkins
- Tomatoes
- Sweet Corn
- Specialty Corn
- Winter Squash
- Zucchini Squash

Fruits and Berries

- Raspberries
- Strawberries

Nursery/Christmas Trees/Ornamentals

- Christmas Tree
- Nursery
- Ornamentals
- Mums and Cut Flowers

Forest/Woodlands

- Forest (Preserved Habitat)
- Timber (Woodland)