Chapter 2: White-tailed Deer

Introduction

It is difficult to overstate the importance of white-tailed deer to Vermont. There is a white-tailed buck atop the state seal, on the state flag and immortalized in stained glass at the Vermont state house. They are pursued by almost all (96%) of the state's hunters and the regular 16-day November deer season is synonymous with 'hunting', leading to scores of hunting breakfasts and hunting sales each November.

White-tailed deer, common throughout Vermont, are the most abundant large mammal in North America, and they may be the most studied large mammal in the world. They are highly adaptable and can thrive in a variety of habitats, including developed suburban and exurban areas.

Deer management remains an important issue for many Vermonters. Though not nearly as contentious as the "deer wars" of the 60s, 70s and 80s, when the department struggled to manage an often overabundant deer herd in the face of severe winters and a "buck-only" mindset, the well-attended deer regulation change hearings in 2019 proved that deer hunting is still a valued tradition in Vermont, and there are still as many opinions on deer management as there are deer hunters.

2010 - 2020 Plan Accomplishments

ISSUE 1. Habitat Loss and Assessment

1.1 Regularly updated the deer wintering area dataset through routine fieldwork associated with regulatory and chip harvest reviews, as well as a targeted effort surveilling all deer wintering areas in several central Vermont towns.

1.2 Conducted outreach to various segments of the public stressing the importance of habitat conservation.

1.3 Worked closely with foresters and entomologists to prevent, manage, and reduce the threat of the hemlock woolly adelgid.

ISSUE 2. Population Goals

2.1 Maintained and evaluated regional population goals, based on deer densities, that recognized a lower limit that was unsatisfactory to the public and an upper limit that was ecologically unsustainable.

2.2 Monitored deer herd health by collecting body condition data from hunter-harvested and road-killed deer.

2.3 Established habitat suitability criteria to define areas of suitable deer habitat within WMUs so that consistent and reliable density estimates could be made while allowing for habitat area estimate updates as new land-cover maps became available.

2.4 Evaluated bowhunter surveys to better estimate regional buck:doe and fawn:doe ratios.

2.5 Continued re-mapping and surveying deer wintering areas.

2.6 Worked with foresters to identify and address issues associated with locally overabundant deer. This included convening a working group on this topic during 2011-2012.

2.7 Provided outreach to landowners regarding methods that may minimize damage and encourage reduction in locally overabundant deer. Developed the Landowner-Hunter Connect program to connect hunters with landowners to address locally overabundant deer.

2.8 Maintained a consistent number of big game reporting stations to make big game reporting convenient for hunters.

2.9 Realigned WMU boundaries to better match habitat conditions and facilitate more effective management of deer and other big game species.

ISSUE 3. Hunter Satisfaction and Antler Point Restrictions

3.1 Collected biological data from yearling bucks harvested during the youth season to assess changes in the buck population resulting from the antler-point restriction and evaluate biologically acceptable alternatives.

3.2 Reviewed literature and developed a model to examine the likelihood of selective harvest altering the genetic diversity of the buck population via the current antler restriction.

2010 - 2020 Plan Accomplishments *(continued)*

3.3 Informed the hunting public about deer management issues and the effects of the antler point restriction, and gathered input concerning deer management and hunter satisfaction.

ISSUE 4. Bag Limits

4.1 Provided the public with ample opportunity to harvest white-tailed deer for food and other utilitarian purposes.

4.2 Advocated for an appropriate deer bag limit that would allow maximum hunter opportunity while achieving deer population management goals.

ISSUE 5. Muzzleloader and Archery Season Modifications

5.1 Evaluated options to expand antlerless deer-only hunting opportunities prior to the regular rifle season. Regulation changes for 2020 include an early, antlerless-only muzzleloader season, a longer archery season, and increased archery bag limits.

5.2 Surveyed public opinion on the various management options to achieve antlerless deer harvest objectives prior to the rifle season and developed a proposal of recommended hunting season changes for the Vermont Fish and Wildlife Board.

ISSUE 6. Captive Deer Hunting/ Deer Farming/ Cervid Importation

6.1 Both existing captive hunting facilities were closed.

6.2 Continued to work with the Agency of Agriculture, Food, and Markets and the deer farming industry to promote and enforce appropriate disease prevention practices.

ISSUE 7. Disease Surveillance and Management

7.1 Worked with associated branches of government (for example, Agency of Agriculture, Department of Health) to monitor disease agents and the deer population.

7.2 Monitored for CWD through targeted surveillance of suspect cervids.

7.3 Monitored the progress of Hemorrhagic Disease as it moves toward the Vermont border.

7.4 Worked with the Agency of Agriculture to ensure dairy farms and domestic deer farms maintain their tuberculosis-free status.

7.5 Prohibited the use of deer-urine-based scent lures and implemented a public informational effort on the justification.

7.6 Conducted outreach to Vermonters about the seriousness of CWD and the repercussions if it is found in Vermont.

ISSUE 8. Locally Overabundant Deer

8.1 Demonstrate the effectiveness of archery hunting to reduce locally overabundant deer in Vermont's suburban environments.

8.2 Provided communities with up-to-date and comprehensive information on deer overabundance and considered community views when deciding on how to best manage deer problems in developed areas.

8.3 Encouraged communication and cooperation between deer hunters and landowners seeking relief from locally overabundant deer. Developed the Landowner-Hunter Connect program to facilitate that connection.

ISSUE 9. Two-year Regulation Cycle

9.1 Provided outreach to legislators, Board members, and hunters to develop an understanding of the rationale behind deer management and proposed actions to improve management.

9.2 Evaluated the benefits and deficiencies of implementing a two-year regulation cycle for deer season recommendations. Unfortunately, simplification of the process by which the Board allocates antlerless permits negated many of the benefits of a two-year cycle.

ISSUE 1. Disease

GOAL: Maintain an abundant and healthy deer population

Chronic Wasting Disease

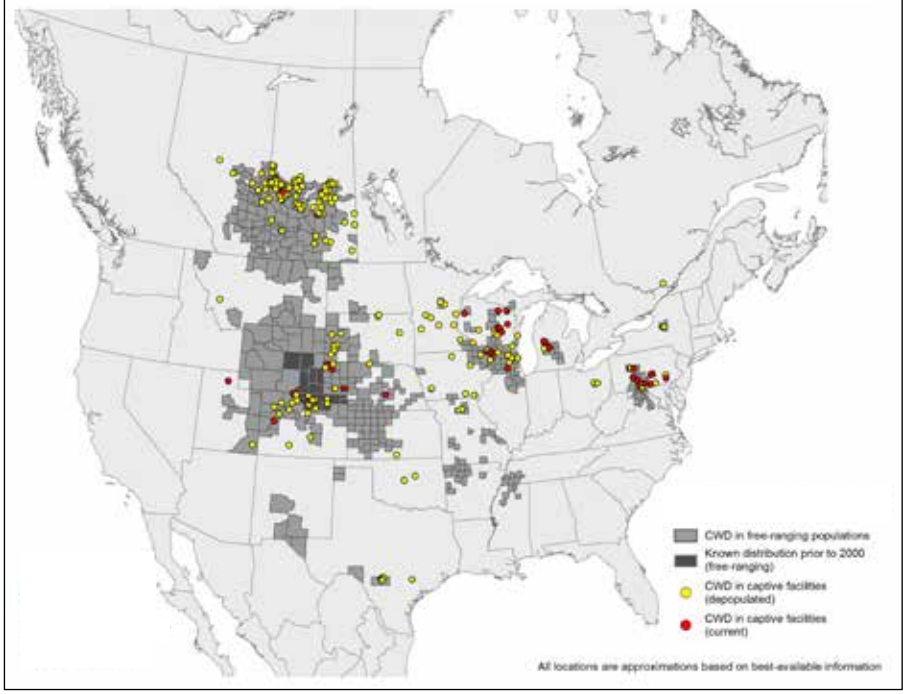
White-tailed deer are susceptible to many diseases, ranging from common but unsightly skin growths (fibromas) to very rare, but always fatal viruses (rabies). However, until chronic wasting disease (CWD), no disease had ever included the specter of widespread and permanent population decline.

CWD is an incurable, always fatal disease of the brain and nervous system that affects most members of the cervid (deer) family, including white-tailed deer and moose. It causes significant and persistent population declines, reduces life expectancy and disproportionately impacts mature males. At worst, some models suggest eventual extinction. CWD is an unprecedented threat to deer and deer hunting in Vermont, and it's getting closer to Vermont's borders. Since the last Big Game Plan in 2010, an additional twelve states and provinces have been added to the CWD positive list, including Eastern states and provinces such as West Virginia, Virginia, Pennsylvania, and Quebec.

CWD belongs to the family of diseases called "transmissible spongiform encephalopathies" (TSEs). Other TSEs include scrapie in goats and sheep, bovine spongiform encephalopathy ("mad cow disease") in cattle and Creutzfeldt-Jacob disease in humans. While CWD is related to these diseases, it has a uniquely shaped prion that, under natural conditions, is only known to infect members of the deer family. Unlike mad cow disease, there are no known cases of CWD in humans. However, prion diseases are difficult to diagnose, and it is possible that CWD prions could eventually transform or evolve into a shape that is transmissible to humans. Currently, both the Centers for Disease Control and World Health Organization recommend that animals infected with any prion disease not be consumed.

Keeping CWD out of Vermont is Vermont's best chance of avoiding the impacts of this disease. That's because the abnormally shaped proteins called prions that cause the disease are virtually indestructible and can persist in the environment for at least 16 years (Georgsson et al. 2006). Infected animals shed CWD prions through saliva, urine and feces and healthy animals can pick up the disease by direct contact with the infected body fluids or consuming contaminated food or water. The prions invade the animal, and, over time, convert existing healthy cellular proteins into diseased mis-folded proteins. This process can take as little as a few months to as long as few years, but the results are the same: emaciation, disorientation, loss of bodily functions, and finally death.

Distribution of Chronic Wasting Disease in North America



A significant vector of the spread of CWD has been the importation and transportation of live captive cervids and certain parts of infected animal carcasses. The current, scattered distribution of CWD across North America clearly demonstrates this. CWD could potentially be brought into Vermont by deer farmers importing live animals or even an unsuspecting hunter bringing home a legally harvested deer or elk carcass from a CWD-infected area. As a result, the State has established laws and regulations governing the transportation and importation of live deer, the importation of deer and other cervid carcasses from states and provinces where CWD is known to occur, and the use of lures containing deer urine or other bodily fluids. The department must continue to work with the Agency of Agriculture to ensure the regulations and testing requirements related to captive cervids (the most likely means of CWD introduction) are being followed and pursue additional regulations, if necessary.

Educating the public on the risks of CWD is also a priority. The Vermont Big Game Survey found that only a third of hunters thought there was a high or medium risk of CWD in Vermont, while almost half thought there was only low risk or no risk at all. In addition, a fairly large percentage simply did not know about it and 16% thought urine-based lures were still legal. There is clearly room for improvement in communicating the risks of CWD.

If CWD were found in Vermont, it would require an enormous amount of time and money to control, if it is even possible. A diseased herd would result in exorbitant financial and intrinsic losses of over time, potentially devastating the herd and a way of life enjoyed by Vermonters for generations. Prevention is the only option.

Hemorrhagic Disease

Hemorrhagic Disease (HD) in white-tailed deer also deserves attention. Common in the Southeast, Midwest and some western states, HD is spread by tiny biting flies and caused by two closely related viruses, epizootic hemorrhagic disease (EHD) and bluetongue virus. Because the signs and symptoms produced by these two viruses are indistinguishable, the general term, hemorrhagic disease, is usually used. Many infected deer appear normal or show only mild signs of illness. However, the symptoms change as the disease progresses. Initially, animals may be depressed, feverish, have difficulty breathing or have a swollen head, neck, tongue, or eyelids. With highly virulent strains of the virus, deer may die within 1 to 3 days. More often, deer survive longer and become lame, inactive and/or lose their appetite. Dead or dying deer found near water in late summer or early fall are classic signs (Howerth et al. 2001).

HD is well-understood, but not readily managed. Although deer often survive, it can cause localized, periodic and sometimes heavy mortality. Recently, its geographic range has been expanding northward, presumably related to climate change. Deer in northerly states experience HD more sporadically than in southern areas, but outbreaks tend to be more severe. The department will continue monitoring for this disease as climate change will likely result in continued northward expansion.

Management Objectives and Strategies

1.1 Enhance the department's disease surveillance, particularly for CWD.

1.2 Continue to emphasize, improve, and monitor CWD prevention efforts.

1.3 Consider improving restrictions on importation of cervids.

1.4 Develop a CWD response plan, including all necessary approvals and authorities.

1.5 Increase public outreach regarding CWD.

1.6 Continue monitoring other diseases with potential to impact deer the population.

ISSUE 2. Deer Wintering Areas

GOAL: Maintain adequate quantity and quality of deer wintering areas (DWAs) to sustain regionally established population objectives.

Vermont is near the northern limit of white-tail deer range. Deer regularly cope with severe winter conditions including extended periods of low temperatures, deep snow and limited mobility. Consequently, winter is often identified as the primary limiting factor determining the size of northern deer populations, with survival primarily influenced by winter severity and the availability of winter habitat. The disproportionate importance of deer wintering areas (DWAs) is underscored by the fact that they typically account for just 5-15% of total deer range yet are often used for more than 25% of the year. Further, deer often migrate long distances from summer range to DWAs and demonstrate strong fidelity to DWAs that may be used by generations of offspring (Verme 1973, Tierson et al. 1985).

While winter severity is generally declining over time, severe winters remain relatively common, particularly in the Northeast Kingdom. Even in areas that only occasionally experience severe winter conditions, quality winter habitat remains critical to deer survival during those periods. Even a relatively mild Vermont winter is challenging for deer. As a result, DWAs remain vital to the long-term viability of Vermont's deer population. The department, like many state and provincial agencies, has taken measures to protect DWAs, including the development of specific regulatory guidelines backed, under some circumstances, by enforcement actions.

Despite attentive management, pressures from development, logging and natural ecological processes continue to affect the amount and condition of DWAs. While some traditional DWAs have been used for many decades, many others have been abandoned or experienced reduced use within a relatively short timeframe (one to two decades). This impermanence, coupled with increasing human encroachment, makes identification of active DWAs, as well as potential new areas, a management priority.

DWAs were last mapped statewide in the early 1980s. This mapping dataset is sporadically updated, and recent work indicates that many active DWAs have not been identified. Efforts to improve the accuracy of this dataset must continue so DWAs can be protected from development and managers can better understand the availability of these habitats when setting population objectives. New technologies also allow potential wintering habitat to be identified remotely from available GIS datasets. While potentially less accurate than mapping based on field observations, it would facilitate more frequent updates as new datasets become available and may capture more ephemeral DWAs than field observations. This may be particularly useful in areas that experience infrequent severe winter conditions, as the sporadic use of these areas by concentrations of deer can complicate interpretation of field observations.

Valuable DWAs are lost each year to development and timber harvesting. Unfortunately, the department is only able to review larger developments which fall under Act 250 (Vermont's land use and development control law) or Section 248 (utility development), and a small subset of timber harvests that sell chips to Burlington Electric Department and Ryegate Power Station. This means most development and timber harvest in DWAs are unregulated. It may be necessary to pursue additional means of protecting DWAs, including increased outreach and working with landowners through the Use Value Appraisal (Current Use) program.

Another important consideration regarding DWAs and winter survival of deer is the growing interest in various forms of winter recreation. As Vermont continues to experience growth in both the level of public participation as well as the diversity of winter activities Vermonters engage in, it will be important to understand how to balance the needs of wintering deer and other wildlife with the interests and desires of the public. Human activities affect deer behavior which is particularly important during winter months when deer are most vulnerable to stress. Winter is an inherently stressful and challenging time for deer, and it is imperative that deer have access to functional winter habitat with limited additive stress. It will be increasingly important over the next 10 years to continue to educate the public, partners, and the spectrum of outdoor recreation interests on the effects of human activities on deer winter survival.

In addition to other pressures, DWAs in southern Vermont may also be threatened by the advance of hemlock woolly adelgid (HWA; *Adelges tsugae*), an exotic insect that defoliates and kills eastern hemlock. HWA-related mortality of hemlock and associated salvage logging could pose a major threat to DWAs in central and southern Vermont where hemlock comprises a majority of softwood cover. Moreover, studies have found that, following the decline of hemlock, canopy dominance shifts to hardwoods, suggesting no long-term replacement in cover appropriate for deer wintering. So far, HWA has been located primarily in Windham County, with small populations in Bennington and southern Windsor Counties.

Management Objectives and Strategies

2.1 Continue to protect DWAs through regulatory review.

2.2 Continue to update the department's inventory of DWAs opportunistically.

2.3 Develop a remote sensing approach to aid in identification of unknown or unmapped DWAs.

2.4 Conduct outreach to landowners, land managers and partner state and federal agencies / organizations about the importance of DWA conservation.

2.5 Continue to work with the Vermont Department of Forest Park and Recreation (FPR) and foresters to ensure that habitat is adequately managed under the UVA program.

2.6 Work with FPR to develop guidelines for the management of hemlock DWAs given the potential impacts of hemlock wooly adelgid.

2.7 Continue to work with conservation partners that own or manage conserved land to ensure that DWAs and other habitats are properly managed.

ISSUE 3. Population Objectives

GOAL: Maintain the deer population at levels that are socially acceptable and ecologically sustainable.

The foremost charge of deer management is codified by Vermont statute: *"An abundant, healthy deer herd is a primary goal of fish and wildlife management."* Keeping a deer herd healthy means preventing overabundance. Keeping a deer herd abundant is complicated and subjective. It requires keeping the deer population at levels that are ecologically sustainable and minimizes human conflict.

Public Satisfaction

Different stakeholders want different deer densities for different reasons. These reasons range from individual preferences and recreation to economic and environmental concerns. Some people want more deer for hunting or viewing, but too many deer can cause conflicts such as damage to landscaping, agricultural and forestry losses, deer-vehicle collisions, and an increased incidence of tick-borne diseases. Deer management attempts to maintain deer densities at a level that most of the public feels is neither too few nor too many.

The Big Game Survey assessed deer abundance preferences. A majority of Vermonters were generally satisfied with the number of deer in their county, while 20% wanted the population increased and 10% wanted it decreased. This suggests Vermonters are generally content with current deer densities. While more people wanted the population increased than wanted it decreased, there was a notable shift from the similar survey conducted in 2007 (Figure 1). Interestingly, the number of deer in Vermont in 2018 was very similar to the number in 2007, suggesting the shift may be due to increasing deer numbers in developed areas where they have more interaction with people and cause more conflicts.

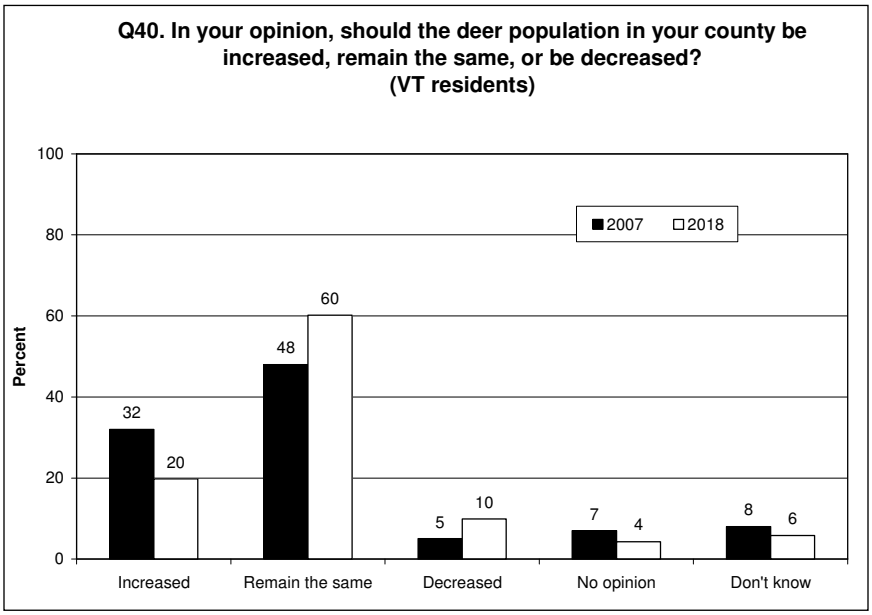


Figure 1. Deer Abundance Preferences Comparison

Ecologically Sustainable

Deer require a specific amount of food and cover to survive and reproduce. The available habitat provides a limited amount of these resources. At low numbers, each deer has access to quality food and cover, but as numbers increase so too does competition for these resources. Insufficient quality or quantity of food results in lower body weights, smaller antlers and fewer fawns. Additionally, poor physical condition predisposes deer to disease and starvation. At the same time, as deer compete for available forage, preferred browse species can be reduced or eliminated, and forest regeneration is negatively affected. This, in turn, impacts the ecosystem and reduces the number of deer and other wildlife that the habitat can support.

Habitat and the number of deer it can support varies across the landscape and over time. Different age forests can support different numbers of deer. Young forests support the most, middle-aged (poletimber) stands support very few, and older forests support moderate numbers of deer. In addition to the variability related to different forest ages, mast crops (acorns and beechnuts) can provide a valuable but sporadic food source. Alternative food sources, such

Big Game Survey Deer Population Preferences

The Big Game Survey suggests the upper limit of social acceptance has not been reached in most areas. However, in many areas, the deer population has exceeded the ecological carrying capacity. This means the number of deer desired by the public, or that they are willing to tolerate, is greater than the habitat can currently support. Responsible deer management dictates that the deer herd's relation to its habitat must be considered before the public preferences. If not, it would be impossible to achieve the statutory requirement of a healthy deer herd.

as agricultural lands, also contribute. As forests age, new areas of young forest are created by timber harvests or natural disturbance, their composition is altered by pests, disease, and proliferation of invasive species, and parcels are lost to development. Some of these events increase habitat quality for deer, while others have the opposite effect. Deer themselves can be the primary driver of the change when overabundance degrades habitat.

In northern climates, like Vermont, the onset of snow and colder temperatures force deer to vacate their larger summer and fall ranges and concentrate in higher densities in DWAs. As a result, quantity and quality of winter habitat has a disproportionate effect on the number of deer a region can sustain and the impact those deer have on forest ecosystems. Areas that regularly experience severe winters support fewer deer, regardless of the quantity or quality of habitat available during other seasons.

Estimating the maximum number of animals an environment can support requires an enormous amount of time and monetary resources, and, because estimates look at a small area at a single point in time, they have limited utility for statewide management planning. Fortunately, research on the impact deer have on forest ecosystems is extensive and shows some general patterns. In most cases, long-term deer densities exceeding 20 deer per square mile are capable of altering forest plant communities, threatening endangered plant species, reducing ground-level hiding cover and forage for other wildlife species and reducing abundance of nesting birds (McShea and Rappole 2000, McGraw and Furedi 2005, Côté et al., 2006, deCalesta 1994). In some cases, negative impacts were observed at densities as low as 13 deer per square mile (deCalesta 1994, Marquis et al. 1992). In degraded habitats with limited available forage, negative impacts may occur at even lower densities.

Setting specific deer density objectives helps guide antlerless harvest recommendations and makes them more transparent for public discussion. These objectives, however, are based on estimates. It is also important to continually monitor metrics on both deer and forest ecosystem health. The department tracks deer body weights, antler size and fawn production, and it also utilizes observations from foresters, ecologists, state game wardens, and biologists for forest health indices. Forest ecosystems are variable and complex, which complicates interpretation of any simple measurement. To improve understanding, the department should pursue empirical data on deer impacts to forests with its partners to develop specific measurements of forest health that could inform deer management at the WMU level.

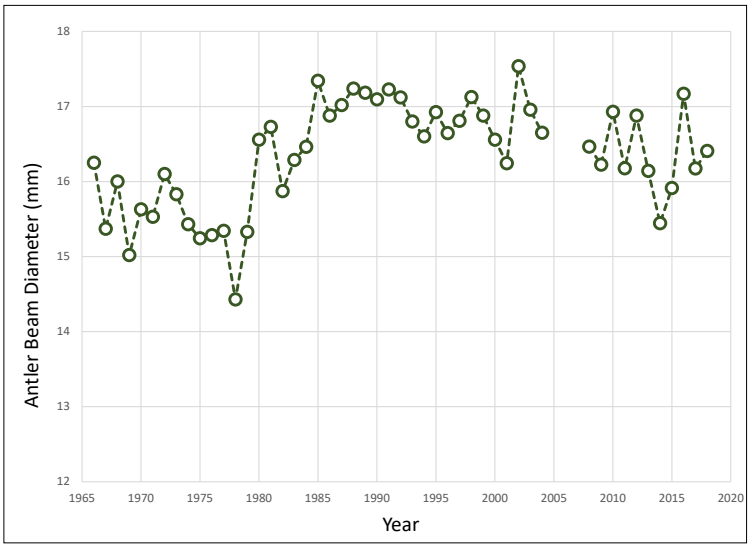


Figure 2. Antler Beam Diameters

Current Status

As a result of historical land use practices, many of Vermont's forests are of similar age. Importantly, the amount of young forest habitat (less than 20 years old), which provides substantial forage for deer, has declined substantially in recent decades. The lack of young forest habitat combined with the proliferation of invasive plants and impacts of historically overabundant deer in some areas means Vermont's forest habitat can support fewer deer today than it could in the past.

This conclusion is supported by observations of deer impacts on forests and trends in the physical condition of deer over time. Antler beam diameters of yearling bucks have been steadily declining for the past 20-30 years (Figure 2), and it appears that fawn weights may also be declining (Figure 3).

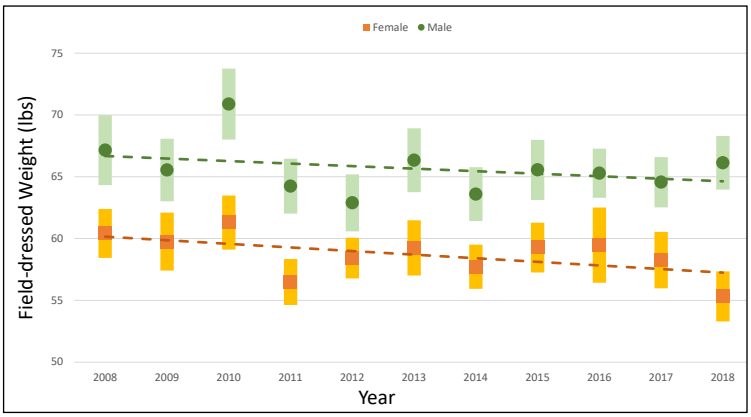


Figure 3. Fawn Weights

While annual antlerless harvest recommendations will be based on deer density objectives for each WMU,

Table 1 Population Objectives by WMU

WMU	Deer Habitat (mi2)	Density Objective (deer/mi2)	Population Objective	2014-2018 Average Density	Forested Habitat (mi2)	Deer/mi2 Forest at Objective
A	71	18	1,300	30	15	84
B	616	18	11,100	25	352	32
C	386	15	5,800	15	339	17
D1	570	15	8,500	21	410	21
D2	387	12	4,600	14	332	14
E1	315	<10	2,500	6	284	9
E2	334	<10	2,700	7	302	9
F1	316	15	4,700	14	84	56
F2	268	18	4,800	16	124	39
G	388	12	4,700	14	354	13
H	518	15	7,800	15	447	17
I	424	12	5,100	11	396	13
J1	528	15	7,900	19	454	17
J2	705	15	10,600	20	613	17
K	438	18	7,900	23	324	24
L	365	12	4,400	13	323	14
M	451	12	5,400	10	418	13
N	323	18	5,800	25	261	22
O	548	15	8,200	16	464	18
P	455	12	5,500	10	418	13
Q	233	12	2,800	12	214	13
STATE	**8,638**		**122,100**		**6,930**	

physical condition thresholds will serve as the primary indicator that a population is in balance with its habitat. These metrics include the following: 1) yearling male body weight; 2) antler beam diameter; 3) fawn weight; and 4) adult doe reproductive rate. Many states monitor these characteristics to track population health. Tracking changes in the body condition of deer provides a way of recognizing when there is a need to reduce a deer population, but it is usually after damage to habitat has already occurred. Changes in body condition also do not indicate how many deer should be harvested.

In the long run, if deer harvests are tailored to ensure that body condition remains good, deer will weigh more and winterkill will be reduced during severe winters. Maintaining Vermont's deer population at ecologically sustainable levels is the only way to ensure the health of the deer and their forest habitats.

Achieving Population Objectives

Harvesting adequate numbers of antlerless deer is critical to effectively managing the deer population. Managers must also be able to tailor antlerless harvest to specific areas and adjust harvest in response to extrinsic factors (i.e. winter mortality, disease). Lessons from deer managers throughout the northeast and decades of managing deer in Vermont show that around 20% of does may need to be removed when winters are mild just to

Table 2. Physical Condition Thresholds by WMU

WMU	Yearling ABD (mm)	Yearling Male Weight (lbs)	Fawn Weight (lbs)	Birth Rate (fawns/ doe)
A	17	120	60	1.60
B	17	120	60	1.60
C	17	120	60	1.60
D1	17	120	60	1.60
D2	17	120	60	1.60
E1	17	120	60	1.60
E2	17	120	60	1.60
F1	17	120	60	1.60
F2	17	120	60	1.60
G	16.5	115	60	1.60
H	16	115	60	1.60
I	16.5	115	60	1.60
J1	16	115	60	1.60
J2	16	115	60	1.60
K	16.5	115	60	1.60
L	16.5	110	60	1.60
M	16.5	110	60	1.60
N	16.5	110	60	1.60
O	16	110	60	1.60
P	16.5	110	60	1.60
Q	16.5	110	60	1.60

stabilize population growth. Conversely, severe winters have resulted in population declines of 20% or more in some areas. Because deer have such high potential population growth rates, yet are subject to substantial and variable winter mortality, efforts to manage deer numbers, whether to increase them or decrease, must be gradual.

Currently, antlerless deer can be harvested during the archery, youth, antlerless, and muzzleloader seasons. The archery and youth season antlerless harvest is not limited (except by individual bag limits), but is predictable, relatively consistent and generally concentrated in areas of higher deer density. Antlerless harvest during the antlerless and muzzleloader seasons is controlled through a limited permit system and is the department's primary means of adjusting the total antlerless harvest in each WMU.

Previously (prior to 2020 regulation changes), this approach was an effective means of controlling antlerless harvest in most WMUs and the department was able to accurately predict antlerless harvests. However, in the last decade, low permit fill rates during the muzzleloader season resulted in the department not being able to distribute all available permits, and therefore, not achieving harvest objectives in some WMUs. Low fill rates allow more permits to be available and provide more hunters with an opportunity to harvest an antlerless deer, but the number of permits required to achieve harvest objectives exceeded the number of muzzleloader hunters in some areas.

Recent changes to hunting regulations, particularly the increased length of the archery season, liberalization of crossbow use for all archery hunters, and the new, four-day antlerless season should improve the department's ability to increase the antlerless harvest when and where necessary, while maintaining the ability to limit antlerless harvest where appropriate.

Archery hunters tend to hunt in areas with higher deer densities, therefore, antlerless harvest during this season comes from the areas where it is most needed. Archers are also more effective at harvesting deer in more developed landscapes where firearm hunting may be prohibited by local ordinances, less tolerated by the public, or simply not the experience most hunters are looking for. Thus, maintaining and promoting the harvest of antlerless deer during the archery season is, and will continue to be, a key component of deer management in Vermont.

The new antlerless season in late October will result in higher fill rates for antlerless permits. The weather will be more favorable to most hunters, which should increase hunter effort and encourage more hunters to participate. Holding this season prior to the rifle season also means that deer will be less pressured, they will not have adjusted their behavior to avoid hunters, and they will be less concentrated in areas hunters don't have access to. Additionally, many firearm hunters will be able to harvest an antlerless deer for meat before the buck-only rifle season, effectively shifting some hunting pressure from bucks to antlerless deer.

Locally Overabundant Deer

Deer densities may be considerably higher or lower in smaller local areas than in larger WMU's, particularly where legal harvest is unable to control populations or where the effects of legal hunting or other mortality exceeds averages. These local variations in deer density have significant influence on hunter and public opinion but can be very difficult to address from a deer management perspective.

As the quality of Vermont's forest habitat has declined, an increasing proportion of the deer population is now found in areas with more agriculture or human development. This increases the potential for conflicts and makes hunting access more challenging. In these areas, hunting can be limited by local ordinances, less tolerated by landowners and may simply not provide the experience many hunters are looking for. Winters are typically milder in these valley areas too. Thus, the deer population in these areas is prone to grow quickly and become overabundant.

There are a variety of lethal and non-lethal options for managing overabundant deer in developed areas. Non-lethal options include actions designed to reduce vulnerability to the impacts of overabundant deer (e.g., fencing to protect plants, outreach and education to reduce deer vehicle collisions or the risk of tick-borne diseases), and direct methods to reduce the deer population through fertility control (e.g. sterilization and birth control).

To date, fertility control has failed to achieve population-wide reductions except on small, isolated populations in enclosures or on islands. Furthermore, current methods remain costly and require direct contact with each individual animal. Even if more effective and efficient fertility control is developed, it would still be a poor way to reduce the immediate impacts of an over-abundant deer population. It just keeps the current population from growing. As deer can live to be 20 years old, population reduction would happen slowly, if at all, and most deaths would be from vehicle collisions.

Lethal options include the use of professional sharpshooters and a variety of hunting strategies. Hunting is the lowest cost option and is effective if implemented proactively. Recent regulation changes will improve the department's ability to target antlerless harvests to specific areas. Archery hunters have proven to be effective in this regard, as they tend to hunt in areas with higher deer densities. As a result, the antlerless harvest during this season comes from the areas where it is most needed and has little impact on lower density areas. Archers are also more effective at harvesting deer in more developed landscapes where firearm hunting is prohibited by local ordinances or less tolerated by the public. The longer archery season and liberalized use of crossbows should facilitate additional archery antlerless harvest. Additionally, the department now has the authority to designate expanded archery zones where two additional weeks of antlerless-only archery hunting would be allowed prior to the regular archery season. The department will need to work with affected communities prior to establishing these zones but hopes to make full use of this new tool as soon as possible.

The department will continue to promote hunting as a critical deer management tool and for the myriad other benefits it provides. This will become increasingly important as hunter numbers decline and fewer people have a connection to hunting. Outreach to landowners and land managers will be integral in communicating how hunting is, and will continue to be, a key part of deer management.

The department developed the *Landowner-Hunter Connection* program to help match landowners seeking help controlling deer damage with hunters. To date, participation by landowners has been limited. Increased promotion of this program targeted specifically to landowners and land managers may help improve management of locally overabundant deer.

Future Considerations

The first half of this 10-year planning period will focus on evaluating the effects of the recent regulation changes on the antlerless harvest and the department's ability to achieve deer population objectives. However, declining hunter numbers, changing demographics and the effects of climate change may necessitate additional substantial changes to deer management approaches by 2030. Any new approach will be more effective if implemented proactively, and it makes sense to continuously consider and evaluate potential future tools over the course of this planning period.

If the new regulations are unable to achieve adequate antlerless harvests, the simplest means of increasing the antlerless harvest would be to allow the use of modern firearms (i.e., rifles, shotguns) during the antlerless season. Not only are these implements more effective than muzzleloaders, but this change would open this season to the substantial portion of hunters who currently only hunt during the regular firearm (rifle) season. This creates a larger pool of hunters and allows more permits to be distributed. This would likely allow for effective management of deer at the WMU level well into the future, but it would do little to address locally overabundant deer, particularly in developed areas or where hunter access is limited.

Many states use Deer Management Assistance Programs (DMAP) to help landowners address deer impacts on their properties. These site-specific programs increase options for landowners by allowing more liberal antlerless kills than could be obtained under the standard hunting regulations. A DMAP program can help manage locally overabundant deer, but it also has the potential to encourage privatization of access to deer. Nonetheless, this tool is relatively simple to develop and implement, and if needed, it should be pursued in appropriate circumstances.

It may also become necessary to encourage individual hunters to harvest more deer. This will be particularly true in developed areas, where fewer hunters are interested in hunting yet more deer often need to be harvested. Venison donation

programs allow hunters to provide wild game to charities or food banks. While the department encourages these programs, opportunities for hunters to easily donate harvested venison is currently limited. New regulations could help, but without the extreme deer densities found in parts of other states, these programs must draw from a large area and are difficult to sustain. Allowing hunters to sell their harvested deer has the potential to create an incentive to harvest additional animals, and a market for local venison could create a connection between many non-hunters and the deer population. Vermont hunters can already sell their legally harvested deer during the season and for 20 days thereafter, but only by private sale (i.e. to a neighbor) and that meat cannot be resold. There are many hurdles (including philosophical and historical) to developing a market for wild-harvested venison, but, if necessary, to meeting population goals, this warrants investigation.

Management Objectives and Strategies

3.1 Manage deer densities using WMU-specific density and physical condition objectives.

3.2 Monitor characteristics of deer and habitat that can change in response to deer abundance.

3.3 Continue to collect physical condition data including yearling antler beam diameter, fawn and yearling body weight and reproductive data.

- Consider collecting data on fawn recruitment to better inform population models.
- Work with foresters to monitor deer impacts to forest health.

3.4 Work with landowners and land managers to encourage hunting and inform them about the need to manage deer abundance.

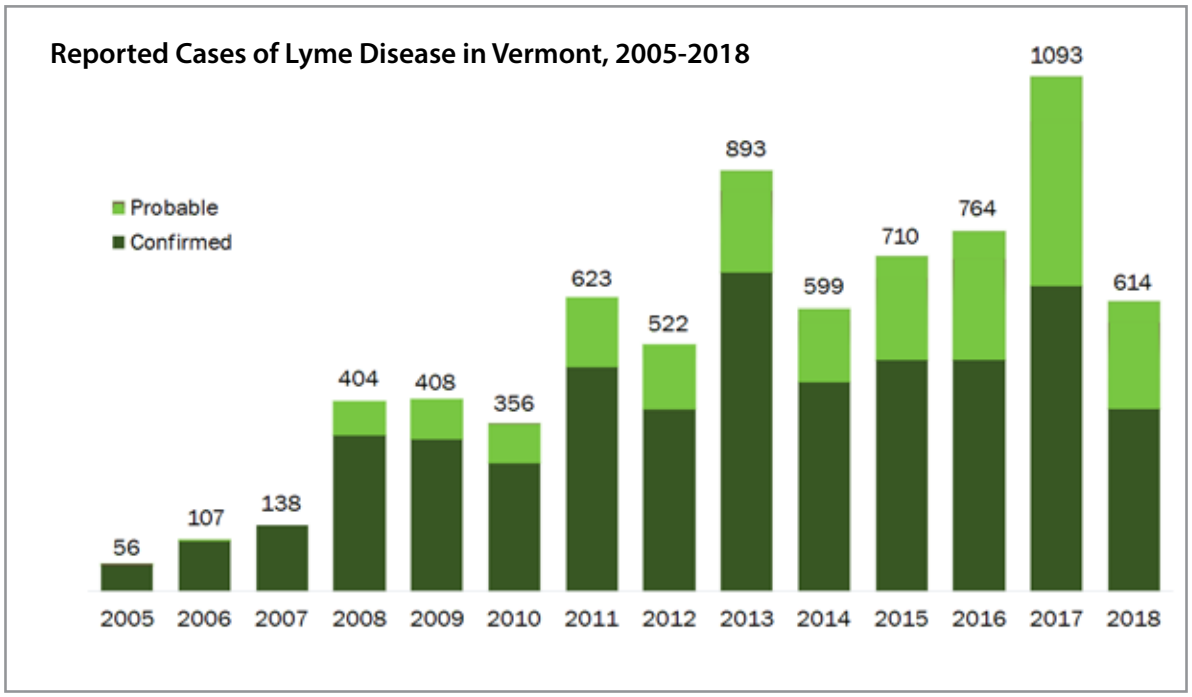
3.5 Adjust antlerless deer harvests as necessary to achieve density and physical condition objectives.

- Monitor the effects of recent changes to deer hunting regulations on the antlerless harvest.
- Consider additional liberalization of antlerless harvest, if necessary, to achieve annual harvest objectives.

ISSUE 4. Deer–Human Conflicts

GOAL: Minimize the number of deer-human conflicts.

Unlike most eastern states, significant deer-human conflicts are uncommon in Vermont. The state remains one of the most rural in the country and, as a result, much of the landscape is hunted. Unfortunately, conflicts are likely to increase, and damage to agricultural crops and residential plantings, over-browsing of forests, deer-vehicle collisions, and tick-borne diseases are already becoming more common.



There is no more dramatic example than Lyme disease. In 2007, the year the previous plan was drafted, there were just 138 confirmed cases of the Lyme disease in Vermont. A decade later, in 2017, that number had increased almost 10-fold to 1,092 confirmed and probable cases (Vermont Department of Health 2019). Only Maine has a higher incidence of the disease. In keeping with this, no problem associated with a high deer population generated more concern among residents in the Big Game Survey than an increased number of ticks, with 76% of respondents being very to somewhat concerned. The link between deer abundance and Lyme disease is not straightforward; however, studies have shown a relationship between deer density and the number of black-legged ticks (deer ticks), the disease vector, on the landscape (Kilpatrick et al. 2014). Milder winters are not just benefiting deer; they're also allowing black-legged ticks to expand their range northward and into higher elevations.

Additional evidence of an increase in deer-human conflicts may be indicated by the shift in the deer population preferences in the most recent Big Game Survey. In 2007, 32% of Vermonters wanted the deer population in their county to increase. In 2018, it had dropped to 20%. Similarly, 60% wanted the population to remain the same in 2018, which was up from 48% in 2007. Those who wanted the population decreased also increased from 5% in 2007 to 10% in 2018. Deer-vehicle collisions were, by far, the top reason people wanted the population to decrease. However, of the 35% of Vermonters who had experienced some form of wildlife damage in the last five years, almost half were related to deer damaging gardens, landscaping and ornamentals.

Locally abundant deer in urban and suburban environments present unique management challenges. Some urban cores simply cannot be hunted, some communities restrict hunting activities though firearm discharge ordinances, and some people in communities are opposed to lethal control of deer regardless of the circumstances. While these situations remain rare in Vermont, deer management issues are emerging in some developed areas around larger cities and towns, including Montpelier, Rutland and the greater Burlington area

For more on potential management options, see "Locally Overabundant Deer" in the Population Objectives section.

Management Objectives and Strategies

4.1 Maintain the deer population to meet hunter satisfaction and minimize landowner and human complaints.

4.2 Demonstrate the effectiveness of archery hunting to reduce locally overabundant deer in developed areas.

4.3 Work with communities to address locally overabundant deer in developed areas, including establishment of expanded archery zones.

4.4 Encourage communication and cooperation between antlerless deer hunters and landowners seeking relief from deer damage.

ISSUE 5. Hunter Satisfaction

GOAL: Provide a quality deer hunting experience for as many hunters as possible.

Hunting is an important tradition that provides an intimate connection to nature, a source of local food and an opportunity to get away from the hustle and bustle of everyday life. It also contributes greatly to rural economies, is the primary source of funding for wildlife conservation, and is the most effective tool the department has for managing deer. Maintaining high levels of satisfaction helps retain existing hunters, recruit new hunters and ensures that hunting continues to provide these benefits.

Opinions and satisfaction will always vary widely among hunters, but their observations and views are important to deer management. The department collects this information through five annual public meetings held in the spring as well as through interactions with hunters at reporting stations, sporting shows, game clubs and various other venues. The department also conducts periodic surveys that provide both general and specific feedback on current issues.

The single greatest influence on hunter satisfaction is how many, and how often, deer are seen. The amount of time hunters can spend afield is important as is a growing interest in opportunities to see and harvest older, larger-antlered bucks. The Big Game Survey found that 74% of Vermont hunters are interested in managing for older, larger deer. Furthermore, the most important drivers of hunter satisfaction, after "just going deer hunting," were "harvesting an older, larger-antlered buck" and "the amount of buck sign in the woods." For these reasons, maintaining an appropriate buck age structure is an important management consideration.

Given trends in hunter interest, hunter numbers and recent changes to hunting regulations, buck age structure objectives have been established. These objectives will assist with the evaluation of the new regulations and provide a basis for any future regulation changes.

The overarching objective is to maintain at least the 2018 proportion of mature bucks (3+ years old) in the population in each WMU. Population age structure can be difficult to estimate in some WMUs due to small sample sizes and biases associated with the bucks that hunters can legally harvest. Therefore, the simplest way to ensure the proportion of mature bucks is maintained or improved upon is to ensure that yearling bucks don't exceed 50% of the total buck harvest.

Evaluating Recent Changes

The recent changes to deer hunting regulations that took effect in 2020 are intended to maximize hunter satisfaction by providing additional hunting opportunity, improving management of buck age structure and allowing additional deer harvest opportunities. It will take several years for hunters to adjust to these changes and for buck age structure to stabilize. As a result, much of the period covered by this plan will be focused on evaluating the effects of these changes. Ideally, no additional changes would be made for five years. After that, further changes will be considered if objectives are not being met or if new opportunities arise.

Management Objectives and Strategies

5.1 Maximize hunting opportunity by providing longer hunting seasons and opportunities to hunt multiple seasons.

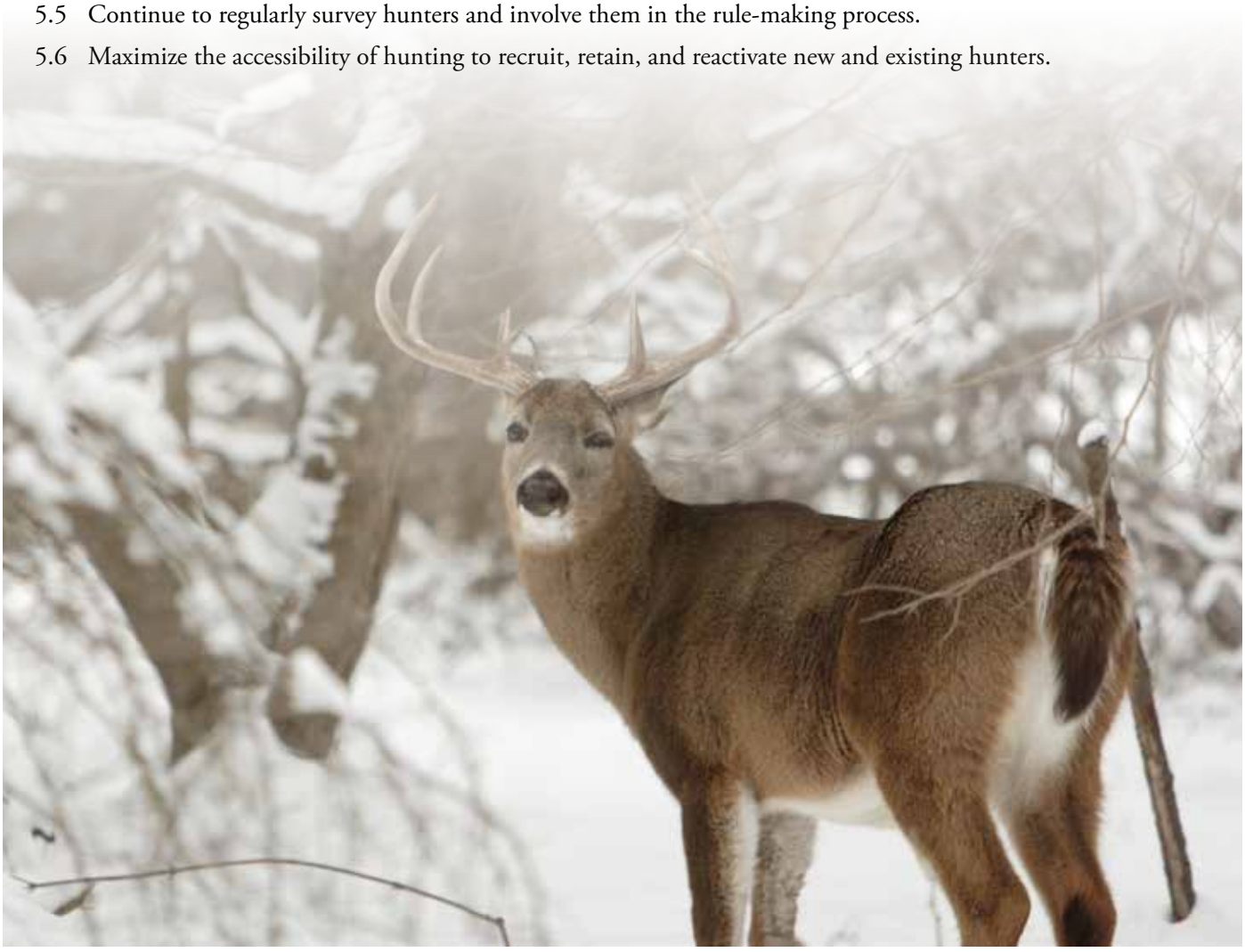
5.3 Maximize opportunity to harvest a deer.

5.3 Ensure there are enough older bucks on the landscape to provide hunters a reasonable chance of seeing one.

5.4 Ensure that the proportion of yearlings in the total buck harvest not exceed 50% in any WMU.

5.5 Continue to regularly survey hunters and involve them in the rule-making process.

5.6 Maximize the accessibility of hunting to recruit, retain, and reactivate new and existing hunters.



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