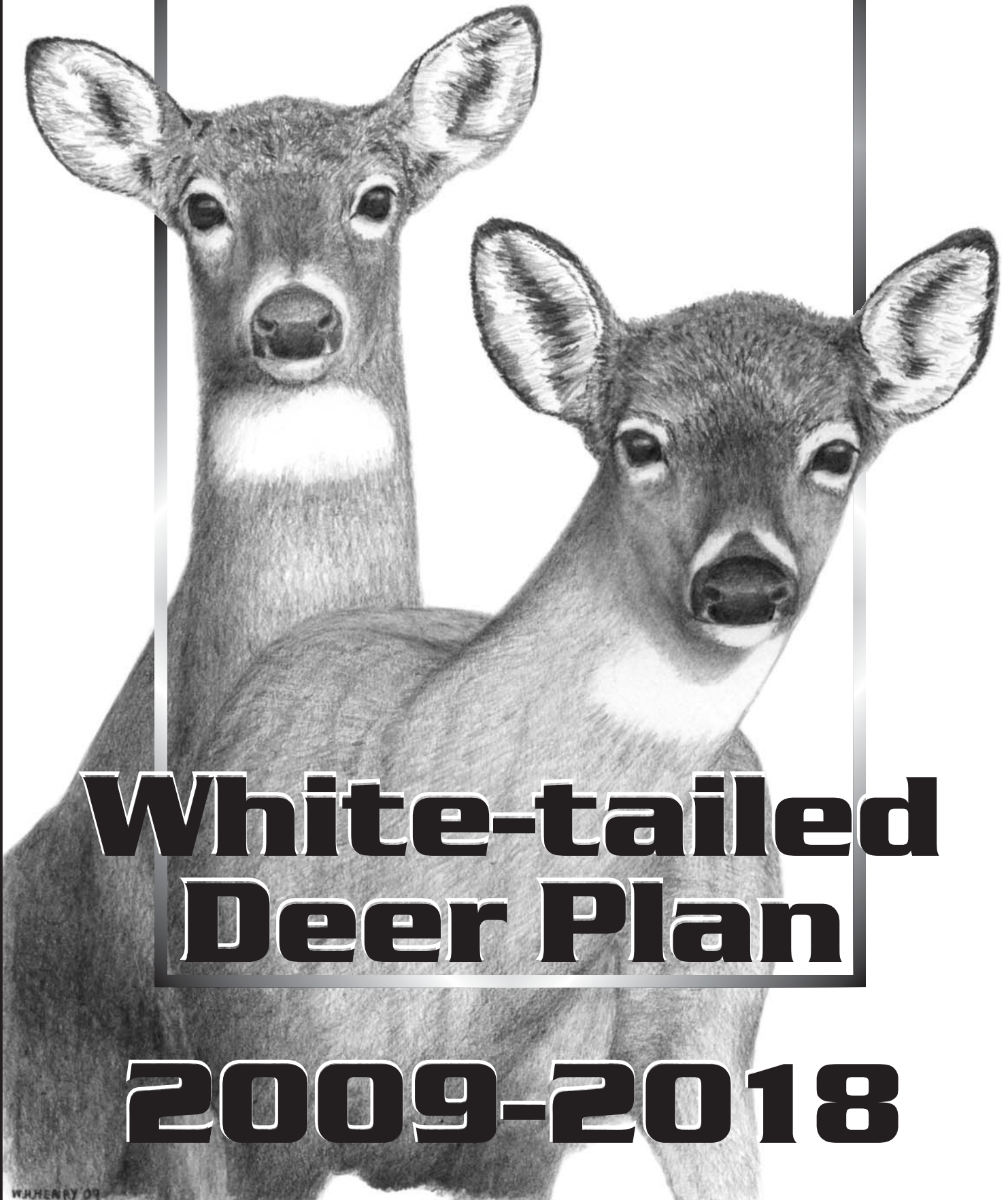


Maryland



White-tailed Deer Plan

2009-2018

EXECUTIVE SUMMARY

White-tailed deer (*Odocoileus virginianus*) currently garner more attention than any other wildlife species in Maryland. Wildlife-watchers, photographers and hunters contribute millions of dollars each year to the state's economy while pursuing deer. At the same time, deer are responsible for Maryland's farmers and other citizens sustaining millions of dollars worth of damage to crops, landscaping and vehicles. Managing the deer population to satisfy recreational interests, while at the same time reducing damage concerns, is a challenging and controversial process.

White-tailed deer were plentiful in Maryland at the time of settlement in the 1600s. However, market-hunting and habitat destruction nearly extirpated deer from the state by 1900. The early 1900s through the 1960s was a period of population restoration and deer proliferated due to ideal habitat conditions and the protection of female deer from harvest. By the 1980s, management philosophies across much of the state changed from restoring deer to stabilizing and reducing deer numbers.

Active management of deer is a necessity in Maryland today if we are to maintain population levels compatible with the varied interests of the citizens of the state. As an evolutionary prey species, deer exhibit a high fecundity rate, enabling them to rapidly increase in number. Presently, non-lethal management techniques (such as contraceptives) and non-hunting mortality (disease, injuries and predators) are not sufficient to maintain deer populations at satisfactory levels. The lethal control of deer via regulated hunting remains the most effective way to balance the deer population with environmental and cultural concerns on a landscape scale. However, lethal control of deer is not always feasible in the more densely populated urban areas of the state. As a result, the Maryland Deer Management Plan addresses non-lethal deer management concepts and promotes their investigation and use to complement hunting and other lethal strategies so that MDNR may implement a full suite of management options statewide.

Along with addressing the use of lethal and non-lethal practices for deer management, the revised Deer Management Plan documents the history of white-tailed deer and white-tailed deer management in Maryland. It describes the current population status of white-tailed deer and white-tailed deer hunters in the state and covers some positive and negative impacts of deer. Finally, the Plan documents the responsibilities of the MDNR deer management program and outlines five major goals (Population, Education, Recreation, Damage and Operational Resources) and the underlying strategies and objectives for achieving those goals.

The revised Deer Management Plan is intended to represent the interests of all Marylanders and non-resident stakeholders who have an interest in Maryland's deer population. Therefore, the revised plan was created with extensive input from the public. Outreach efforts included a 25-member stakeholder group, a public phone survey, comments solicited at seven public meetings, and input from letters, email, the Internet and phone calls. Deer experts external to MDNR provided a technical review of the draft plan. The 2009 – 2018 Maryland Deer Management Plan will provide the foundation for all deer management activities and decisions for the coming 10 years.

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INTRODUCTION

White-tailed deer (*Odocoileus virginianus*) are one of the most recognizable and controversial wildlife species in Maryland. They are admired by wildlife watchers who enjoy their gracefulness and by hunters who enjoy their wariness. At the same time, they negatively impact the economic livelihood of Maryland farmers, arborists and motorists. Although white-tailed deer represent the preeminent example of bringing a species back from the brink of extinction, their abundance now poses threats to natural forest ecosystems and to other wildlife species.

Divergent citizen opinions and interests concerning white-tailed deer pose significant management challenges to the Maryland Department of Natural Resources (MDNR or ‘the Department’), the state agency responsible for managing Maryland’s wildlife. Establishing deer population goals to satisfy a myriad of MDNR constituents and finding a balance between lethal and non-lethal deer control methods are just two of the many challenging aspects of managing deer in Maryland today. This 10-year plan establishes goals and objectives to address these and other pertinent issues related to managing this charismatic species in Maryland over the next decade.

Purpose of the Maryland White-tailed Deer Management Plan

The Maryland White-tailed Deer Management Plan (‘the Plan’) documents the history of white-tailed deer and white-tailed deer management in Maryland (information on basic white-tailed deer biology can be found in Appendix 1). It also describes the current status of white-tailed deer in Maryland and the positive and negative impacts of the species. Finally, the Plan documents the responsibilities of the MDNR deer management program (i.e., Deer Project) and other MDNR staff as they relate to white-tailed deer management, and outlines the goals and objectives for Maryland white-tailed deer management through 2018. It is important to note that this plan is a strategic plan (e.g., use hunting as the primary tool for deer management) and not an operational plan (e.g., permit crossbow hunting statewide from September 15 – January 31).

Plan History and Development

Maryland’s first 10-year white-tailed deer management plan was instituted in 1998. This Plan is a revision of the first plan. The review process began in 2006. Like the original plan, the Department incorporated stakeholder and public input into the current plan. Comments, suggestions and opinions were collected from stakeholder meetings and seven public meetings, as well as telephone, Internet, email and USPS based communications. Likewise, a public survey of 1,200 Maryland residents (400 from the general public, 400 deer hunters and 400 landowners) was conducted by Responsive Management of Harrisonburg, Virginia to solicit opinions on current deer management issues. Finally, expert opinions from MDNR staff were vital in crafting the final plan.

Stakeholder Group Meetings - The stakeholder group was comprised of 25 individuals who represented various interests across Maryland. Representation was present from the farming community, forestry community, sportsmen groups, animal welfare groups, federal, state, county and local agencies with deer interests, universities and the media. A list of the stakeholders can be found in Appendix 2. Stakeholders were convened for two meetings and then given the opportunity to comment on the draft plan when it was completed. During the two meetings,

stakeholders aided in identifying major deer management issues that needed to be addressed in the plan and the group prioritized the major plan goals.

Public Meetings and Comments – Seven public meetings were held across the state in 2007 to obtain public feedback concerning deer and deer management in Maryland. Attendance ranged from four people in Salisbury to 48 people in Owings Mills. Attendees were given a short presentation regarding the status of deer and deer management in Maryland and then given the opportunity to provide comments/suggestions at work stations manned by MDNR employees. Each station represented a deer management category and attendees could visit each station to provide comments. Stations included the following categories: (1) Deer Population Management, (2) Suburban/Urban Deer Management, (3) Deer Hunting Seasons and Bag Limits, (4) Deer Diseases and Other Topics. The Department received over 200 comments via the public meetings, Internet, email, telephone and USPS mail regarding deer and deer management in the state.

Public Opinion Survey - “Opinions of Residents, Deer Hunters and Landowners on Deer Management in Maryland.” was conducted by Responsive Management in 2007. This survey provided valuable feedback about public perception regarding deer and deer management in Maryland. A total of 1,200 Maryland residents (400 from the general public, 400 deer hunters and 400 landowners) were surveyed. The equal allocation of surveys among the general public, deer hunters, and landowners mirrored the process used for the 1998 plan and permitted comparison of results between the 1998 and 2007 surveys. Sampling from the three major groups ensured the opinions of all Marylanders were equally represented. Also, Responsive Management provided additional analysis of the general public group by separating the hunters from the non-hunters to identify differences in opinions regarding deer management for these groups. Data from the survey were used extensively in the development of the Plan. The Executive Summary from the survey is available in Appendix 3. The entire report is available online at the MDNR website.

Accomplishments of the Previous Plan

Maryland’s first 10-year deer management plan was completed in 1998 and contained four broad, long-term goals, as follows:

- Ensure the present and future well being of white-tailed deer and their habitat;
- Maintain deer populations at levels necessary to ensure compatibility with human land uses and natural communities;
- Encourage and promote the recreational use and enjoyment of the deer resource; and
- Inform and educate Maryland citizens concerning deer biology, management options and the impact that deer have on landscapes and people.

The 1998 plan also listed specific objectives and strategies under five categories:

1. General deer population management.

2. Deer management on public lands.
3. Educational opportunities.
4. Human safety considerations.
5. Staffing, funding and legislative needs.

Appendix 4 lists each of the objectives under the five categories and documents the status of the objective. Also included is a brief explanation of actions taken toward each objective.

The Department's progress over the past decade has been significant. The most prominent accomplishments were: 1) The creation of a first-ever urban/suburban deer management program that leads the way in research, development and promotion of lethal and non-lethal methods for effective urban/suburban deer management; 2) shepherding a cultural shift in the hunting community resulting in increase in antlerless deer harvest and concomitant stabilization of the deer population in many areas; and 3) significantly increasing education and outreach to MDNR constituents regarding deer management. Throughout the tenure of this new role, the new urban/suburban deer project leader routinely met with homeowner associations and other community groups to discuss urban deer management. Likewise, numerous outreach materials (handouts, website material, presentations, etc.) were developed to explain effective urban deer management.

To encourage hunters to harvest more female deer, the Department significantly liberalized antlerless deer seasons, increased bag limits and eliminated the fees associated with antlerless harvest tags. Likewise, regulations were instituted that required hunters to take two antlerless deer before they could take a second antlered deer, thus encouraging additional antlerless harvest. The Department also conducted extensive outreach explaining the benefits of harvesting antlerless deer and achieving a more-balanced deer herd. In 1997, prior to the enactment of the 1998 plan, 32,867 antlerless deer were harvested, representing approximately 50% of the total harvest. At the close of the 1998 plan in 2007, hunters harvested 59,987 antlerless deer (an 82% increase), representing 65% of the total harvest. As a result, the deer population in many rural parts of the state was stabilized and was no longer increasing.

The rapidly increasing popularity of the Internet and email during the past 10 years has enabled the Department to significantly increase outreach to its constituents. All facets of deer management and deer biology were documented on the Department webpage and constituents could email questions and comments at their convenience. Likewise, the Deer Project regularly issued press releases concerning upcoming deer hunting seasons, harvest results, disease testing results and other deer management related issues. Deer Project staff routinely wrote popular articles for various magazines and gave oral presentations and seminars related to Maryland deer management. Lastly, the Department created a white-tailed deer education trunk for school teachers to use as a supplement to their biology curriculum. The trunk contained a Teacher's Guide explaining deer biology, history, habitat, sign and management techniques. The trunk also contained visual aids such as deer skulls, antlers, tracks, droppings, hide and buckskin. During a typical 12 month period, 3,000 students received instruction utilizing the deer education trunks.

Another accomplishment of the 1998 plan was the addition of a Deer Biometrician to oversee data management and statistics. The Deer Project developed deer management regions and

management units at the sub-county level so that deer population models and other metrics used to estimate deer numbers could be applied at varying scales. The Deer Project also created an urban/suburban deer population monitoring program using aerial FLIR (Forward Looking Infrared Radar) technology. However, the program was abandoned after September 11, 2001 due to airspace restrictions that effectively eliminated most of the survey area.

Finally, to better assist farmers suffering crop damage from deer, the Deer Management Permit process was streamlined during the previous plan cycle to maximize efficiency. Similarly, a Deer Cooperator program was developed to certify private individuals to do deer control work primarily in urban/suburban areas. Also during the past 10 years, the Department vigorously promoted opening additional public lands to deer hunting in an effort to improve habitat conditions on public and adjacent private lands.

The most prominent objective of the 1998 plan that was not met was establishing target deer population goals for predetermined management units. This objective was not met primarily because of the difficulty in determining what metric to use to set population goals. To maintain ecological integrity, deer populations often must be much lower than considered acceptable by some constituents, for example hunters. Culturally, opinions vary widely on satisfactory deer population levels based on constituent desires (farmers vs. hunters vs. animal welfare advocates). Finding a balance between biological and cultural requirements and building consensus among constituents is a difficult task. A similar objective is included in the current plan, and the Deer Project will strive to meet it in the coming 10 years.

Acknowledgements

Appreciation is extended to all members of the stakeholder group and public who took the time to provide comments, suggestions and guidance in development of the 2009 -2018 Maryland White-tailed Deer Management Plan. We also appreciate the many constructive comments received from MDNR staff, the Wildlife Advisory Commission, and the wildlife professionals who took the time to review this plan.

HISTORY OF WHITE-TAILED DEER AND THEIR MANAGEMENT IN MARYLAND

Colonial Era

When the European colonists arrived in the New World they found numerous white-tailed deer within the fertile North American landscape. Native Americans and large predators such as wolves and mountain lions hunted white-tailed deer throughout the year. White-tailed deer provided the eastern Native American tribes with food, clothing, shelter and tools.

Maryland's early colonists soon relied on white-tailed deer for food and clothing as well. The colonists recognized the importance of the white-tailed deer resource and passed a legislative act in 1729 that prohibited the killing of deer between January 15 and July 31. Violators of the law were fined 400 pounds of tobacco for each deer they took out of season.

Unfortunately, the legislative act wasn't enough to protect white-tailed deer. The demand for deer meat and buckskin increased substantially as Great Britain imported white-tailed deer hides

to support the thriving leather industry. The demand was magnified when the European cattle industry suffered an epidemic thought to be hoof and mouth disease.

At the same time that deer were being exploited for meat and hide, expansive tracts of woodlands continued to be cleared to supply Maryland's growing population with wood for shelter, heating and other products. Deer habitat was being destroyed at an astounding rate, and as towns sprouted across the colonial landscape, unregulated market deer hunting helped to supply the food requirements of the growing Maryland population.

Modern Era

Early deer conservation in Maryland and other eastern states proved inadequate because there was little effort to enforce the few conservation laws. By the beginning of the 20th century, Maryland's white-tailed deer survived only in remote sections of Garrett, Allegany, Washington and Frederick counties. Deer hunting season was eventually closed statewide in 1902. In 1916, the Maryland Legislature created a Conservation Commission to protect and propagate wildlife. The first Maryland hunting license requirement became law in 1918. These licenses provided funds to initiate wildlife conservation efforts for deer and other game species.

Deer conservation efforts during the 1920s focused on creating deer refuges. Relocated Maryland deer and deer purchased from nearby states served as breeding stock within these refuges. These deer soon reproduced and expanded their range into the surrounding habitat. An area near Gwynnbrook (Baltimore County) and the landscape near Libertytown (Worcester County) served as two of these refuges. Some deer naturally moved south from Pennsylvania into adjacent Maryland counties as well. These initial management efforts, coupled with effective law enforcement, resulted in an increase in deer numbers across the state by the late 1920s.

Maryland's deer habitat was improving at the same time that white-tailed deer populations were responding to initial wildlife management efforts. Lands that had been cleared of forests through the 1800s were returning to woodlands. During the Great Depression, modern forestry practices and soil conservation activities encouraged the planting of trees on marginal farmlands, creating more deer habitat.

Maryland reopened deer hunting in Allegany County in 1927. At least five bucks were taken that season. Garrett County opened two years later with a one-buck bag limit that resulted in nine deer being taken. In 1931, a total of 32 bucks were harvested in Allegany and Garrett counties. The Woodmont Rod and Gun Club in Washington County, a private 5,000-acre deer propagation enclosure, took 26 additional deer that same year.

With the opening of the 1931 deer season, Maryland initiated the first-ever check-in requirements for deer. Hunters were required to register all hunter-harvested deer at a designated check station within 24 hours of the kill. This system was used through the 2004 deer hunting season and provided valuable information for MDNR to use to manage Maryland deer populations. In 2005, MDNR implemented Internet and telephone check-in for deer hunters. This system continues to provide valuable data to deer managers with the added convenience for hunters and efficiency of electronic data management for MDNR.

During the 1930s, deer from a Pennsylvania game farm were released at Aberdeen Proving Ground (APG), a U. S. Army installation in Harford County. During World War II the APG deer population grew to levels that created a hazard to military operations. State wildlife personnel trapped over 2,000 deer on APG and released them in various locations across Maryland until the early 1960s.

By the mid 1950s, the deer relocation efforts and population monitoring using modern wildlife science began to show results. A total of 1,549 deer were taken within 17 Maryland counties during the 1954 firearm deer season.

The 1950s also spawned the earliest Maryland studies on white-tailed deer biology. State wildlife personnel examined deer that were brought to check stations, recorded weights and estimated ages by examining the teeth. Researchers used the data to monitor the health and density of the deer population across Maryland. That effort continues today at Maryland's statewide network of deer processors.

Based partially on the data that were now being collected, new deer management strategies began to emerge in the 1950s. Prior to that time, deer managers prohibited the taking of does in order to allow for continued herd growth and range expansion. This changed when the first either-sex archery season opened in 1951 in Baltimore and Harford counties. In 1957, antlerless deer were allowed to be taken during firearm season in Wicomico and Worcester counties. Antlerless deer hunting in firearm season was by special permit only and deer biologists limited the number of permits available by county in order to obtain a more controlled growth of the herd.

Through 1969, hunters picked up their antlerless deer permits from state wildlife staff at firehouses across Maryland. By 1972, computers allocated the predetermined number of antlerless permits for each county, and they were issued by mail. As the deer population grew, the requirement for these permits began to dissipate. By 1989, only deer populations in the far western counties required regulation through antlerless permits. Antlerless deer permits were eliminated in western Maryland during the late 1990s.

Excessive Deer

By the mid-1980s, an expanding deer population coupled with a rapidly growing human population lead to increasing conflicts between deer and their human neighbors. Deer began to damage ornamental landscaping planted by residents of Maryland's new housing developments. Deer bounded in front of commuters traveling between work and home. Deer were also associated, perhaps too strongly, with the increased prevalence of Lyme disease. Deer managers soon realized that the cultural carrying capacity of deer (the deer density that the general public can tolerate) often was lower than the biological carrying capacity (the deer density that the habitat can sustain) and that deer must be managed with consideration for both thresholds.

During this period, agricultural and forest lands were eliminated and residential housing grew in its place. Curiously, white-tailed deer seemed to thrive in their new surroundings. Developers created suburban communities out of dairy farms, woodlands and cropland. Homeowners planted trees and shrubs to landscape their new homes. White-tailed deer found the excellent

habitat created by backyard gardens and beautifully landscaped lawns just as desirable as the former ag-forest landscape and quickly created nuisance issues for homeowners.

While the Maryland landscape was being transformed, Maryland's farmers began employing modern farming practices on the remaining agricultural lands across the state. Crop yields climbed due to advances in improved crop varieties and fertilization methods. These superior plants containing added nutrients were highly attractive to Maryland's deer herd and the damage to agricultural crops increased.

Ecological impacts from high deer densities were beginning to become apparent on the landscape. Over-browsing of the forest understory was significantly impacting plant diversity and forest regeneration, damaging habitats for many other species of wildlife. Healthy forests are a critical part of a functioning watershed for the Chesapeake Bay so high deer densities can have negative impacts on the water quality of this important natural resource.

Along with creating prime deer habitat, increased development in the suburbs and new homes in the rural areas of the state resulted in reduced hunting opportunities for deer. White-tailed deer population growth accelerated as hunting was eliminated or became more difficult. In response to the perceived safety issues of neighbors and other outdoor recreationists, many local public land managers closed suburban natural areas to hunting. These natural areas began to function just like the deer refuges of the 1920s. Deer herds protected from regulated hunting grew at rapid rates and exacerbated the problems associated with a population exceeding its cultural carrying capacity.

Creation of the 1998 Maryland White-tailed Deer Plan

By the 1990s, Maryland's deer population had exceeded its cultural carrying capacity (or public acceptance level) in many parts of the state. The combination of a growing deer herd and a shift from an agricultural based society to an urban/suburban based society resulted in significant deer management issues and elevated the need for a comprehensive deer management plan. In 1996, the MDNR joined with the Wildlife Advisory Commission to develop a statewide deer management plan. MDNR recognized that a new and innovative approach was needed to manage white-tailed deer in the state. As a result, the citizens of Maryland were involved throughout the development process of Maryland's first white-tailed deer management plan.

C. Mason Ross Associates conducted a telephone public opinion survey during October 1996 to obtain attitudes and perceptions on various deer management issues from Maryland citizens. The results of this survey were used to further refine MDNR's deer management plan. In December 1996, MDNR invited a special group of interested citizens, known as the Deer Planning Committee, to a meeting in Annapolis. These citizens represented the forest industry, agribusiness, animal rights/welfare groups, hunters, conservation organizations and the general public. The purpose of the meeting was threefold: (1) Increase public awareness of the state's deer management efforts and to encourage citizen participation in a series of statewide public workshops to be held in January 1997; (2) review the results of the public opinion survey conducted in October 1996; (3) discuss deer management concerns and suggested management strategies.

During January and February 1997, MDNR sponsored a series of seven public workshops throughout the state to provide an opportunity for citizens to voice their concerns and suggestions before the statewide deer management plan was drafted. Meetings were held in Annapolis, Chestertown, Cumberland, Frederick, Salisbury, Timonium and Waldorf. These workshops were very successful with over 3,500 interested people attending to share their views and offer suggestions for future deer management.

After the public workshops, Department administrators and biologists reviewed the public's concerns and recommendations. Maryland's Comprehensive White-tailed Deer Management Plan was then created based upon the public feedback and tenets of current scientific deer management. As previously stated, the 1998 Maryland White-tailed Deer Plan contained four long-term management goals:

1. Ensure the present and future well being of white-tailed deer and their habitat;
2. Maintain deer populations at levels necessary to ensure compatibility with human land uses and natural communities;
3. Encourage and promote the recreational use and enjoyment of the deer resource;
4. Inform and educate Maryland citizens concerning deer biology, management options and the impacts that deer have on landscapes and people.

Cooperation Among Management Entities

After being closed to hunting for many years, deer populations proliferated on many of the public lands in the state. Native vegetation on many of the natural areas suffered from significant deer damage. These impacts negatively affected the forests and other wildlife dependent on the habitat. Homeowners surrounding these areas also suffered deer impacts in the form of browse damage and vehicle collisions and they began petitioning land managers to provide relief to their problems. Restoring deer hunting on many of these areas was an effective choice to restore balance to the system.

During the same time period that MDNR was creating the 1998 statewide deer management plan, two suburban Maryland counties embarked on deer management planning processes focused on public land deer problems. Montgomery County developed a county deer management plan through a planning process that involved stakeholder groups (farmers, conservationists, animal rights groups, animal welfare groups and the forest industry) and the general public (Montgomery County Deer Management Work Group 1995). Howard County followed with a county deer management plan using similar public participation methods (Howard County Deer Management Task Force 2002).

As a result of these planning processes, MDNR increased assistance to public land managers and communities that chose to address deer population issues. Public lands such as military bases, agricultural research facilities, federal wildlife refuges, and county/municipal parks that developed deer hunting programs in conjunction with MDNR were authorized to conduct hunts outside of the regular deer hunting season framework. Through this cooperative effort, facilities

could plan managed deer hunts to address local deer population issues while still fulfilling their primary mission.

Alternative Management Tools

In accordance with the 1998 deer plan, MDNR has recommended and used other deer management techniques in addition to hunting. Some communities incur deer problems within landscapes that are not conducive to hunting or other lethal management. Likewise, non-lethal deer management options can be effective in small areas or where deer numbers are not overly abundant, but they often are ineffective for managing larger landscapes or reducing a local deer population sufficiently to mitigate conflicts. For example, fencing can be effective for backyard gardens, and repellents may provide effective deterrents when applied to ornamental shrubs in a regular manner, but logistics and costs may limit their application on a large scale and neither will remove deer from the landscape.

As mentioned, MDNR employs a deer biologist who specializes in deer damage issues in suburban and urban landscapes. The urban/suburban deer biologist meets with organized community groups to explain white-tailed deer biology and offer management options that are viable for the local area. The community comes to consensus on the management strategies that the residents believe will meet their interests and needs. The biologist then provides technical assistance to the community so they can employ the management approach they selected.

The Deer Project continues to investigate new and experimental deer management options for all Maryland landscapes. MDNR is closely monitoring deer contraception and other experimental methods of deer management that may show promise. MDNR has approved two contraceptive deer studies in Montgomery County and one on the upper Eastern Shore. Many experts in the field of deer contraception currently feel that the best chance for effective deer management through contraception lies in small, closed populations such as fenced areas or island situations. Larger and less-insular deer populations will likely remain best-managed by regulated hunting.

Although hunting is a traditional deer management tool, Maryland's deer hunting regulations have effectively shifted the traditional "bucks-only" paradigm to encouraging the take of antlerless deer. This model ultimately limits the taking of antlered bucks while removing the reproducing component of the population to stabilize and/or reduce deer populations. As a result of these new regulations, Maryland deer hunters now take more antlerless than antlered deer; a previously unattainable objective and one that represents a monumental and significant shift of traditional harvest models.

Finally, MDNR anticipates future success and improvement in deer management across Maryland's diverse landscapes by partnering with other government agencies and communities to develop deer management plans that will be implemented across public and private lands in those local areas. MDNR deer biologists will work in conjunction with these agencies and organizations to provide the best deer management regimen possible.

CURRENT STATUS OF WHITE-TAILED DEER AND WHITE-TAILED DEER HUNTERS IN MARYLAND

White-tailed Deer Population Status

Maryland's deer population has been reduced overall since 1998. MDNR relies on a scientifically and statistically sound computer model to analyze the data collected by MDNR staff. The population reconstruction models indicate that Maryland's statewide deer population has declined since the previous deer plan was enacted a decade ago (Fig. 1). The population increased from an estimated 246,000 deer in 1998 to a high of nearly 295,000 individuals in 2002 before declining to 229,000 in 2008. Liberal seasons and bag limits enacted for antlerless deer, as prescribed in the 1998 plan, have successfully stabilized and/or reduced deer populations in many areas. It is expected that a continuation of the current liberal seasons and bag limits for antlerless deer will result in further stabilization and/or reduction in the overall deer population.

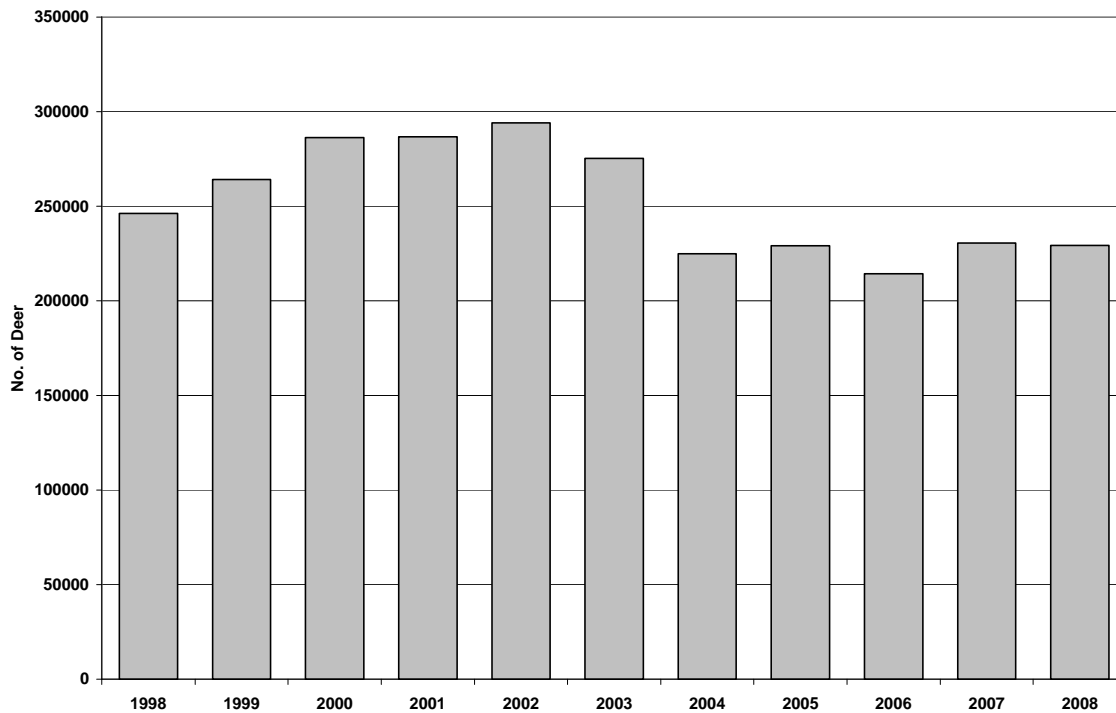


Figure 1. Maryland statewide white-tailed deer estimated population, 1998 – 2008.

Since 2003, the Maryland deer population has been managed under a two-region system. Region A is comprised of Garrett and Allegany counties while Region B makes up the rest of the state (Fig. 2). The Region A deer population has traditionally been more easily affected by hunting season and bag limit changes due to more hunting pressure and poorer quality deer habitat when compared to Region B.

The Region A deer population has followed the same trend, although more pronounced, as the statewide trend for the last 10 years. The population increased from approximately 40,000 deer at the start of the last plan in 1998 to a high of 77,000 deer in 2002 before declining to less than 30,000 deer in 2004 (Fig. 3). In recent years, the population has ranged from 30,000 – 50,000

deer. The rapid decline of the population in 2004 to a level below those in 1997-1998 resulted in season and bag limit changes for Region A to stabilize the population. One objective of this 10-year plan is to set new target population goals for both Region A and Region B.

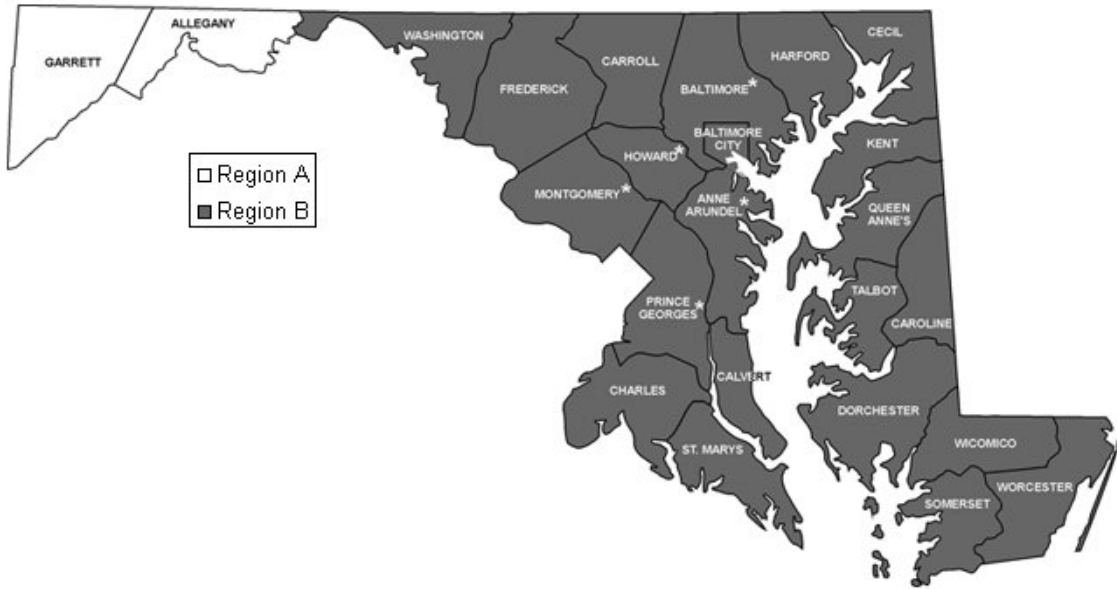


Figure 2. Maryland deer management regions, 2008.

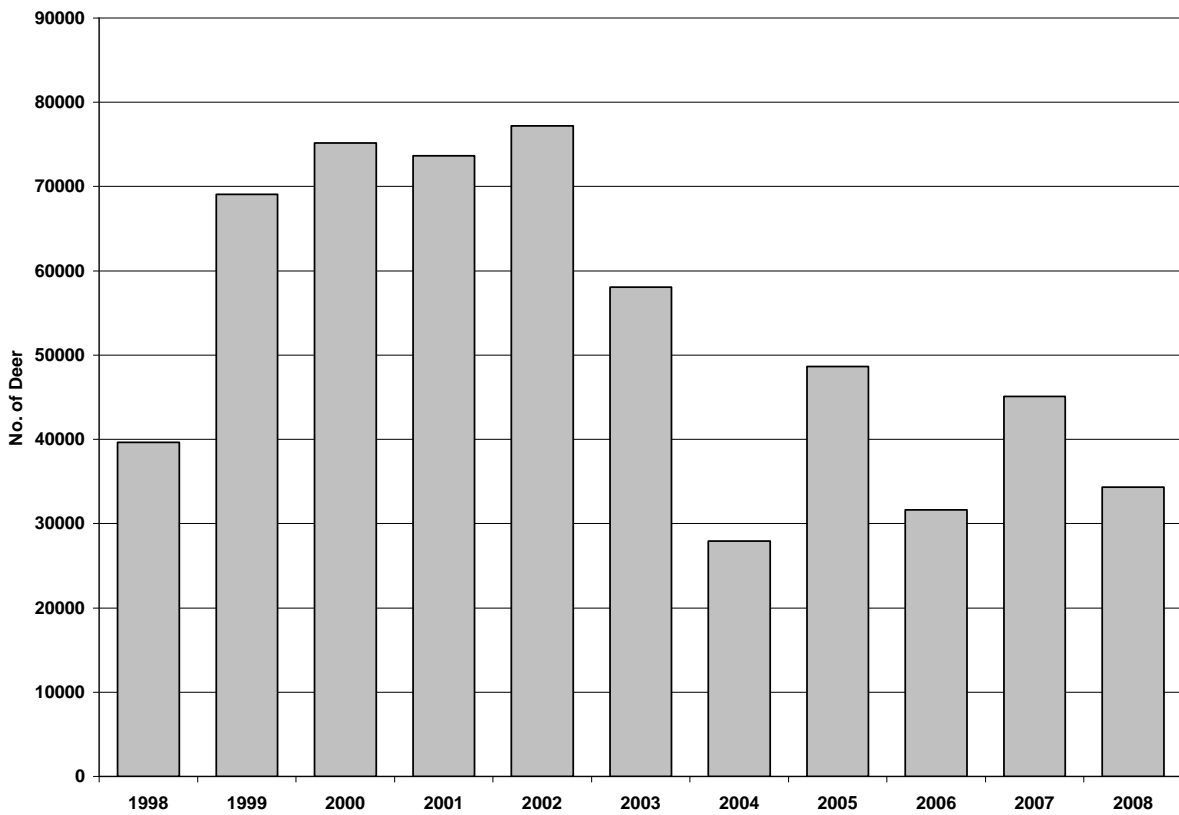


Figure 3. Maryland Region A white-tailed deer estimated population, 1998 – 2008.

The Region B deer population has also declined over the past decade (Fig. 4). At the start of the 1998 plan, the Region B population was estimated at about 205,000 deer. The population increased slightly to approximately 238,000 deer in 2002 before the implementation of liberal antlerless seasons and bag limits reduced the population to 195,000 in 2008.

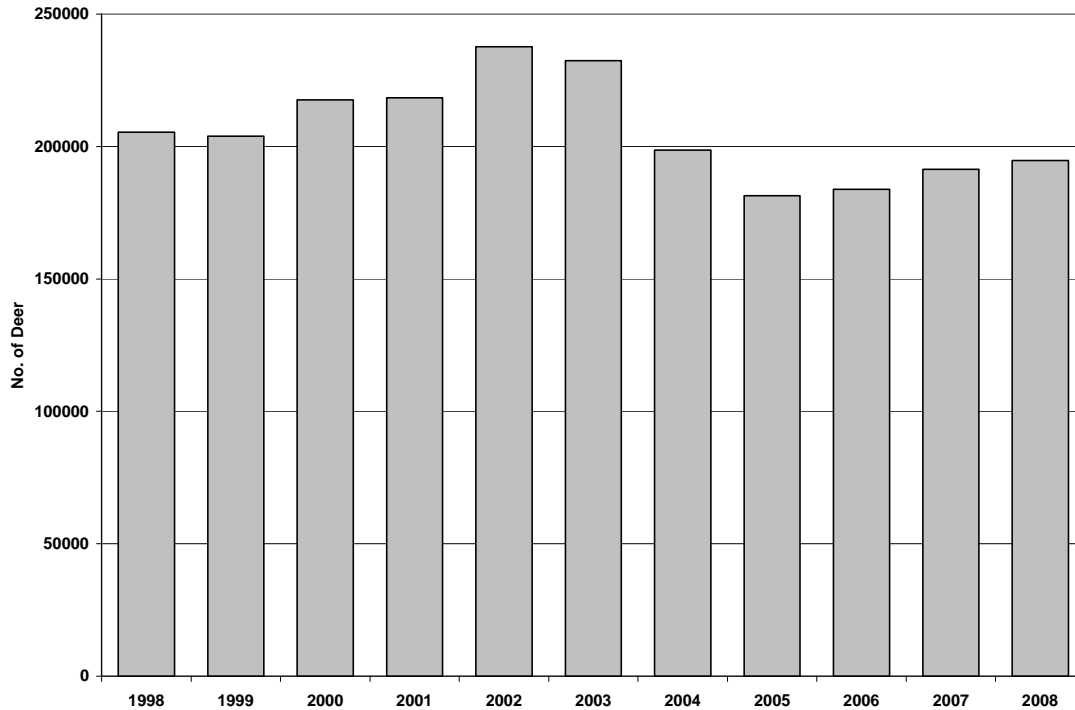


Figure 4. Maryland Region B white-tailed deer estimated population, 1998 – 2008.

White-tailed Deer Hunter Population Status

White-tailed deer are the most popular game species and one of the most recognizable wildlife species in Maryland. Nearly 80% of all Maryland hunters pursue deer, and hunters spend more days afield each year hunting deer than all other game species combined.

According to the 2007-2008 MDNR Hunter Mail Survey, approximately 67,000 licensed hunters (resident and non-resident) spent 800,000 hunter-days hunting deer in Maryland during one or more of the 2007-2008 deer seasons. An estimated 58,000 licensed hunters pursued deer for 298,000 hunter-days with a firearm, 37,000 hunted deer with a muzzleloader for 177,000 hunter-days, 24,000 hunters used vertical bows for 275,000 hunter-days and 7,000 hunters spent 51,000 hunter-days hunting deer with crossbows.

Like numerous other states, the number of hunters in Maryland has declined as the hunter population ages, youth are not recruited into the sport, and other activities demand or attract more of the public's time. The sale of resident hunting licenses peaked in 1968 at about 183,000 licenses sold and has steadily declined to approximately 85,000 resident licenses sold in 2007. Total license sales (including non-resident) have followed a similar pattern, although increasing sales of non-resident licenses has buffered the decline somewhat. Total license sales peaked in 1975 at 194,000 licenses sold and have declined to about 122,000 in 2007 (Fig. 5).

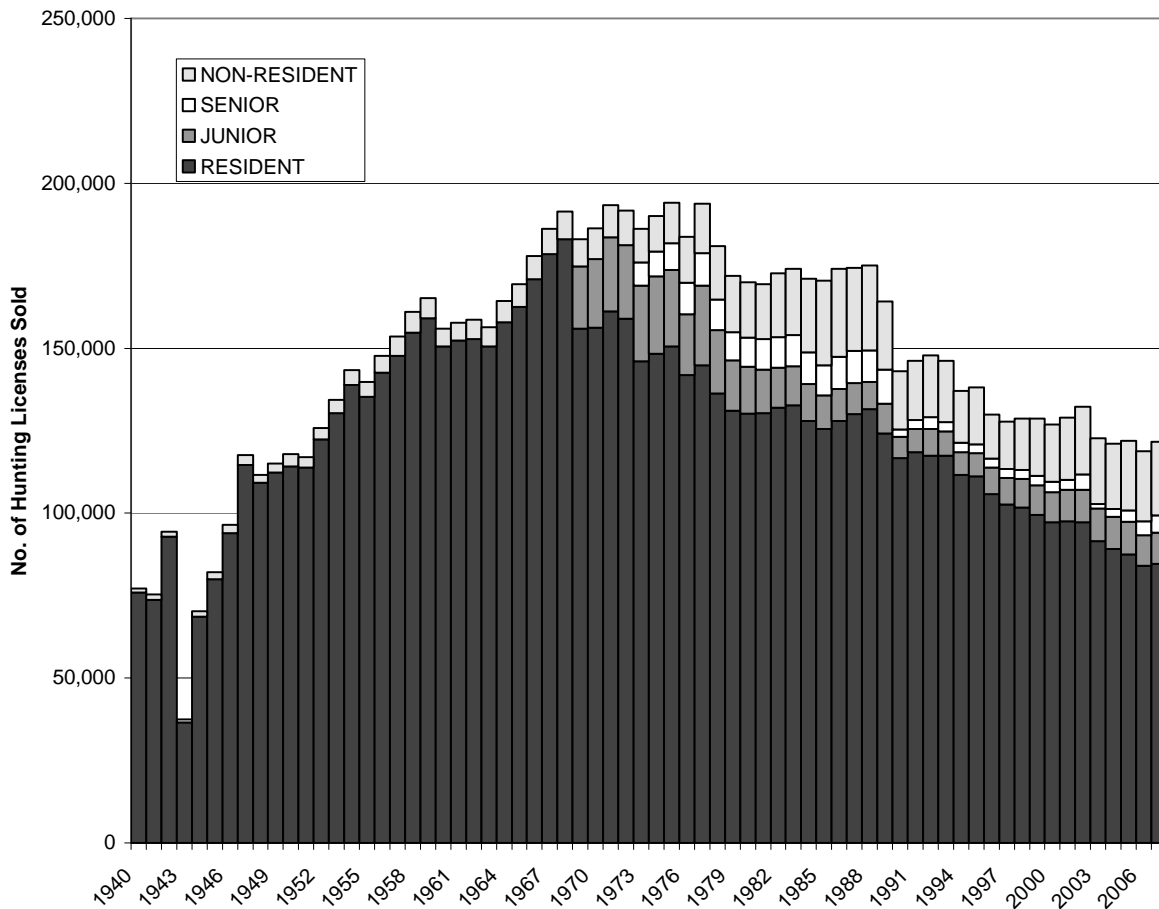


Figure 5. Maryland hunting license sales, 1940 – 2007.

A telephone survey conducted by Responsive Management (2007) found that 23% of the general Maryland population had hunted deer sometime during their lifetime. Of those that had hunted deer, only 38% had hunted deer in the past 2 years. The same survey found that 48% of Maryland landowners (owners of 20 or more acres used for commercial agriculture) had hunted deer in their lifetime. Of those landowners who had hunted deer, 55% had hunted deer in the past 2 years. The remaining 45% of landowners (those who had hunted deer but not in the last 2 years) were asked why they did not hunt deer during the last 2 years. The 3 most common answers were: (1) not interested in hunting; (2) no time/ work obligations; (3) health/age.

Hunter recruitment is a serious concern for deer managers in all states. Deer hunting is the primary tool for effective deer management (i.e., population control) and as hunter numbers decline, hunting seasons and bag limits must be manipulated to encourage the remaining hunters to take more deer. However, deer hunters can reach a saturation point and are unable or unwilling to fill their allotted bag limit. As hunter numbers continue to decline, deer managers across the country continue to pursue alternative population control measures.

RELATIONSHIP BETWEEN WHITE-TAILED DEER AND HUMANS

White-tailed deer are one of the most popular wildlife species in Maryland. In 1996, 86% of the general Maryland public agreed or strongly agreed that deer were an important part of the balance of nature and 87% agreed or strongly agreed that deer were an important natural resource in Maryland (C. Mason Ross Associates, Inc. 1996). Little has changed in 10 years. A survey conducted by Responsive Management (2007) found that 87% of Maryland citizens agreed or strongly agreed that deer are an important part of the balance of nature.

Positive Impacts of White-tailed Deer

Maryland's diverse wildlife populations, including white-tailed deer, are popular among non-hunters and hunters alike. Wildlife watchers enjoy the solace found in observing deer and other wildlife in their natural settings and hunters enjoy the camaraderie and sport of pursuing game animals like deer during the annual hunting seasons. In a 2006 survey by the U.S. Fish & Wildlife Service and U.S. Census Bureau (U.S. Department of the Interior et al. 2006), it was estimated that 1.5 million people aged 16 and older participated in non-consumptive wildlife watching activities such as observing, feeding, or photographing wildlife in Maryland. Total expenditures in Maryland for wildlife watching were estimated at over \$636 million in 2006. The same survey estimated that Maryland deer hunters spent \$113 million in 2006 on hunting-related expenditures; with a total multiplier effect to the economy of over \$190 million (Southwick Associates 2007).

Deer are a major resource in the Maryland and national recreational economy. In addition to direct expenditures on hunting licenses, equipment, transportation and gear, there are many collateral economic benefits to individuals and businesses in Maryland derived from both hunting and non-hunting related deer activities.

There are two primary funding sources for most of Maryland's wildlife management programs: (1) The sale of hunting licenses and associated stamps; and (2) reimbursements to the state from the Federal Aid to Wildlife Restoration Act, more commonly known as the Pittman-Robertson Act. Pittman-Robertson funds are generated by an 11% excise tax on sporting arms and ammunition, including handguns and archery equipment. Approximately $\frac{3}{4}$ of Maryland's annual budget for wildlife programs (game and non-game) comes from these two sources. During some fiscal cycles when the economy is slow, more than 90% of the wildlife management budget may be limited to these special and federal fund sources. On average, approximately 12% of funding for Maryland wildlife programs comes from Maryland's general tax fund. Hunter dollars (many of whom are deer hunters) are eligible for hunter education programs, enforcement of wildlife regulations, wildlife-related education programs and conservation programs.

While there are good estimates for the economic value of deer hunting and non-hunting activities, the monetary value of deer hunting's role in preventing deer-related damage has not been estimated. Without hunting, deer populations would be much higher and losses to the agricultural, forest products and automobile insurance industries would be far greater. The Association of Fish and Wildlife Agencies (AFWA) reported in 2005 that an estimated \$934.2 million to \$9.3 billion of taxpayer's money would be required to accomplish the same amount of

deer management that hunters currently provide. The AFWA report also mentioned that more money would be needed to control habitat damage by deer not relocated or removed.

Negative Impacts of White-tailed Deer

While there are numerous positive impacts related to white-tailed deer, there are also many negative impacts, including agricultural damage, native habitat degradation/destruction and deer-vehicle collisions. AFWA (2005) reported that the General Accounting Office estimated that deer-vehicle collisions totaled over \$1 billion in damage across the nation in 2001. Drake et al. (2005) estimated the 2001 economic impact of Maryland deer-vehicle collisions at \$28 million. In a recent survey, nearly one in ten Maryland citizens reported striking a deer with a vehicle during the prior 12 months (Responsive Management, 2007).

White-tailed deer also cause significant damage to agricultural crops. A 2009 U.S. Department of Agriculture (USDA) National Agricultural Statistics Service survey of farmers estimated that Maryland growers suffered approximately \$9.6 million in wildlife-related crop damage during 2008 and spent over \$600,000 on crop damage preventative measures (U.S. Department of Agriculture 2009). Deer were responsible for an estimated 80% (\$7.6 million) of the damage. Damaged crops included common agricultural crops such as corn and soybeans, but also included trees and landscaping plants at nurseries and plantations. Farmers took a reported 6,723 deer in 2008 via MDNR-issued Deer Management Permits.

Along with agricultural crop damage, excessively high white-tailed deer densities also damage the native flora and fauna of Maryland. A 2005 National Park Service study compared Catoctin Mountain Park, which does not permit deer hunting, to the adjacent Frederick City Watershed, which is open during Maryland's statewide hunting seasons. It was estimated that Catoctin had deer densities seven to nine times higher than the nearby Frederick City parcel (Bates et al. 2005). The Frederick City location also contained higher seedling and sapling regeneration and higher densities of ground-nesting birds than Catoctin.

Studies also indicate that intensive deer browsing resulting from high deer densities can change the forest species composition and the associated wildlife (Alverson and Waller 1997). Researchers at the Manassas National Battlefield Park in nearby Virginia concluded, "white-tailed deer may be modifying the structure of the forest interior to the extent that it adversely affects wildlife species dependent on a dense understory to thrive." Researchers predicted that the future composition of forests in the park would shift towards stands with fewer species and a greater dominance of ash, black cherry and hackberry, particularly in the oak-hickory and bottomland hardwood forests (Rossell et al. 2005).

High deer populations can also increase the density of exotic and invasive plants in many natural areas. Exotics are those plants that have been imported (purposefully or by accident) from places other than Maryland. Maryland's natural ecosystems are often threatened by exotic plants that find the habitat and climatic conditions favorable. Excessive deer browsing on native plants reduces the production and distribution of native species and allows exotic species to thrive. In addition, deer may spread exotic plants through their feces (Williams and Ward 2006; Myers et al. 2004).

Lyme Disease and White-tailed Deer

Lyme disease is caused by the spirochete *Borrelia burgdorferi* that is carried by the black-legged tick (*Ixodes scapularis*). Lyme disease has affected thousands of people in the United States and is a serious human health concern. Because white-tailed deer serve as a host for the black-legged tick, there is public concern regarding white-tailed deer and their relationship to the incidence of Lyme disease. Deer and other mammals such as raccoons and foxes serve as hosts for the adult stage of the tick while small rodents such as mice serve as hosts for the immature stages.

A direct relationship between numbers of deer and the incidence of Lyme disease remains unresolved. A June 2003 publication in *The New England Journal of Medicine* recommends the following strategies for decreasing the risk of Lyme disease and other tick borne illnesses: (1) Area wide application of acaricides (mite and tick pesticides), (2) landscaping to provide desiccating barriers between tick-infested areas and lawns, (3) in some settings, the exclusion or removal of deer (Hayes and Piesman 2003).

However, other recent studies regarding Lyme disease and the relationship to deer suggest that controlling deer populations may not effectively control Lyme disease. Ostfeld et al. (2006) concluded the risk of exposure to Lyme disease was correlated positively with the abundance of key hosts of the immature stages of the tick and with critical food resources for those hosts. They suggested that once deer abundance exceeded a low threshold value, further increases in deer density had little if any effect on tick densities. Current best estimates suggest that deer densities must be maintained at <10/sq.mi. to observe a reduction in tick densities and associated Lyme disease cases.

The Deer Project will continue to monitor further research and developments concerning Lyme disease. However, given the numerous negative impacts associated with high deer densities, deer populations must be controlled whether or not there is a direct relationship between deer and Lyme disease. Currently the best prevention of Lyme disease is through education that encourages people to use repellents, check themselves for ticks, and avoid favorable tick habitat (U.S. Department of Health and Human Services 2005).

Biological and Cultural Carrying Capacities

The number of individuals of a given species that a specific parcel of habitat can support in good physical condition over an extended period of time is defined as the Biological Carrying Capacity (BCC). White-tailed deer have high productivity due to their evolution as large prey for humans, wolves and mountain lions. Deer reproduction causes populations to exceed the BCC unless productivity is balanced by mortality. When the BCC is exceeded, habitat quality decreases and herd health and physical condition decline (McCullough 1979, McShea et al. 1997). Biologists use herd health indices and population density indices to assess the status of a herd relative to the BCC.

The importance of compatibility between land-use practices and deer populations in Maryland justifies the consideration of another aspect of carrying capacity. Cultural Carrying Capacity (CCC) is the maximum number of deer that can coexist compatibly with the local human population. CCC is a function of the sensitivity of the local human population to the presence of deer and may be higher or lower than BCC. This sensitivity is dependent on local land-use

practices, local deer density and the attitudes and priorities of the local human population. Numerous deer-vehicle collisions, agricultural damage, home garden complaints, and over-browsed forests that reduce recreational opportunities for bird watchers and naturalists due to overabundant deer all are indicators that the CCC has been exceeded. It is important to note that even low densities can exceed the CCC; a single deer residing in an airport-landing zone is too many deer for that situation.

Effective deer management aims for a deer population level that will maintain a healthy environment and strike an acceptable balance between people and deer. It's a complex challenge that requires balancing biological, political and social demands.

MARYLAND WHITE-TAILED DEER MANAGEMENT PROGRAM

Just a century ago, the basics of deer management entailed restocking and protecting deer and creating and protecting deer habitat. As deer populations rebounded through the middle part of the 20th century, management became more complex. Deer managers found themselves trying to reconcile increasing sociological concerns with the fundamentals of biology. Deer-vehicle collisions, agricultural crop depredation, disease concerns and forest regeneration impacts are just a few of the current issues associated with overabundant deer populations. Balancing deer populations with the desires of various constituent groups is a challenging and often controversial process. Appendix 5 lists traditional management practices and the advantages and disadvantages of each. The Maryland deer management program (i.e., 'Deer Project') uses many of these options depending on the situation and the desired outcome. Today, the primary responsibilities of the Deer Project can be grouped into five main categories: (1) deer population regulation; (2) deer population monitoring; (3) information and education; (4) addressing constituent demands; and (5) other management activities.

White-tailed Deer Population Regulation

White-tailed Deer Harvest – The annual deer harvest, particularly of antlerless deer, is a major cornerstone of the Maryland deer management program. No other management strategy for regulating deer populations is as effective or as economical as deer hunting, and hunting is necessary to keep deer populations from growing beyond their biological carrying capacity (McCullough 1979). Maryland enjoys a rich hunting heritage and a majority of the public supports deer hunting and recognizes its importance as an efficient and cost-effective management strategy. In a telephone survey conducted by Responsive Management (2007), 76% of the general Maryland population agreed or strongly agreed that deer should be hunted to maintain a healthy deer population.

In 1927, Maryland deer hunters harvested five deer in the State's first regulated deer hunt. Today, deer hunters annually remove approximately 100,000 deer from the Maryland landscape at little or no financial burden to the general public (Fig. 6). Based on the 2007-2008 MDNR Hunter Mail Survey, approximately 55% of Maryland deer hunters are successful in bagging a deer each year. Approximately 72% of the successful deer hunters harvest two or less deer each year.

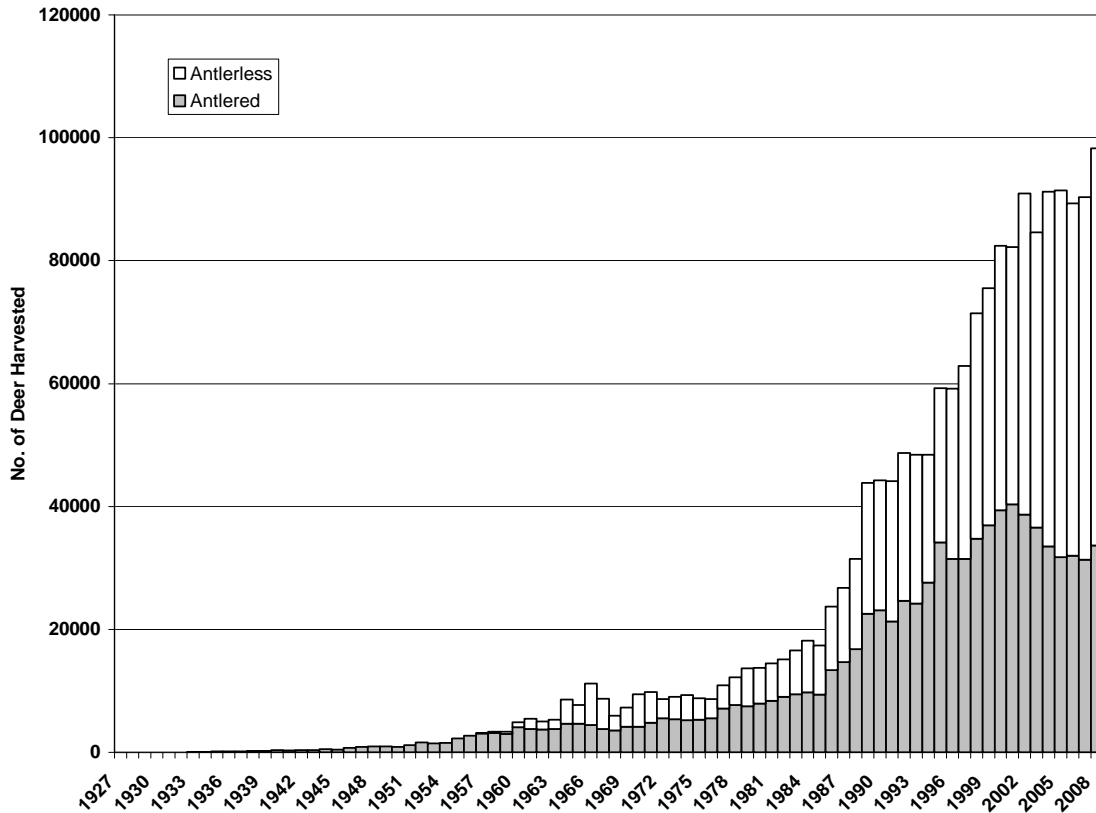


Figure 6. Maryland white-tailed deer harvest, 1931 – 2008.

Traditionally, deer hunting focused on antlered deer and antlerless deer were protected to promote population growth. However, as deer populations increased, it was recognized that antlerless harvest was needed to regulate population growth. Removing antlerless deer (predominantly female) from the population removes the female deer and the multiple offspring that could have been produced in future years. Removing antlered deer is not as effective for population control because one male deer can breed numerous females.

Maryland first recognized the need to harvest antlerless deer for population regulation in 1951 when bowhunters were permitted to harvest antlerless deer in Baltimore and Harford Counties. Antlerless deer hunting was first permitted with firearms in 1957 and 47 antlerless deer were harvested statewide. Today nearly 60,000 antlerless deer are harvested annually and comprise over 60% of the total harvest (Fig. 6).

Persuading hunters who were indoctrinated to take only bucks to begin harvesting antlerless deer has been a challenge for all states, including Maryland. However, the majority of Maryland deer hunters now recognize the need for deer population control and have demonstrated their willingness to harvest antlerless deer. Responsive Management (2007) found that 75% of Maryland deer hunters had hunted for antlerless deer during the past year. On the same survey, 72% of deer hunters in Region B moderately or strongly supported the liberal antlerless bag limits enacted to stabilize the deer population.

Firearm hunting remains the most effective method for harvesting deer in Maryland. The firearm harvest has comprised approximately 50 - 60% of the total harvest since 1994 when the modern muzzleloader season was expanded to include dates in October (Fig. 7). The muzzleloader harvest is routinely 20 – 25% of the total annual harvest while the archery harvest comprises the remaining 20 - 25%.

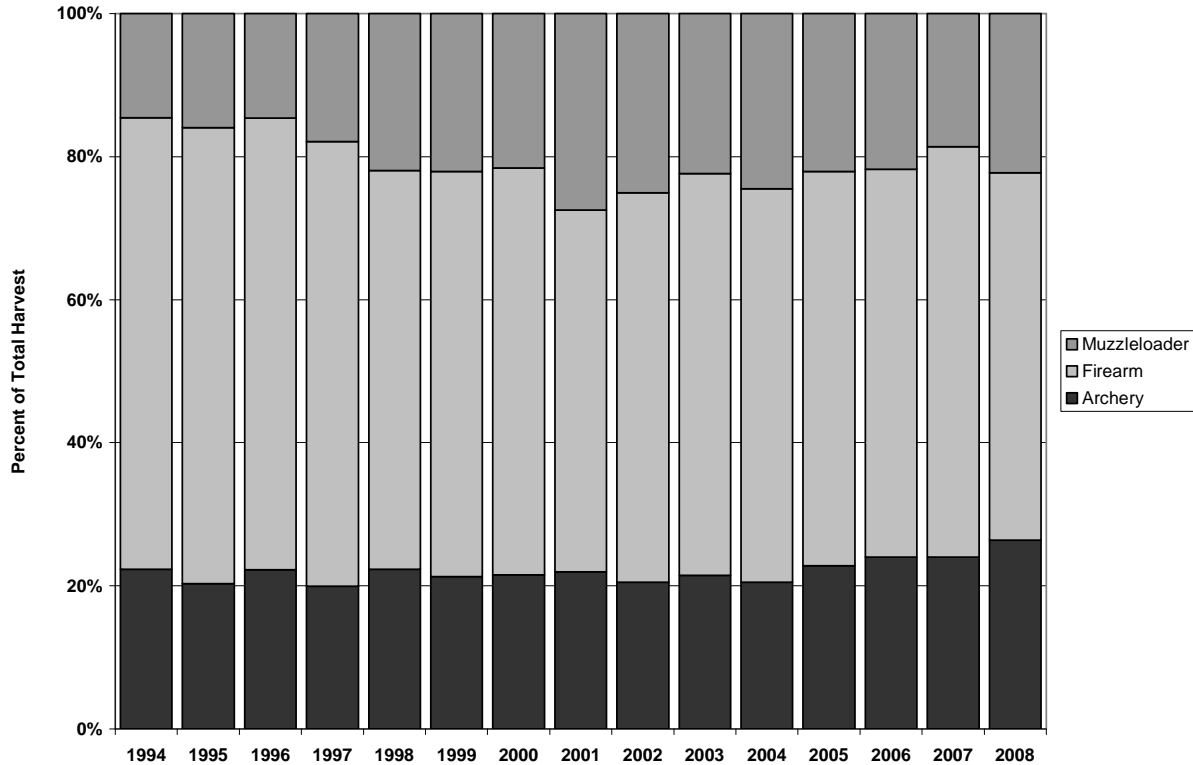


Figure 7. Maryland white-tailed deer harvest (%) by season, 1994 – 2008.

While the percentage of deer taken with archery equipment remains significantly lower than that of firearms, archery hunting is very popular in Maryland. Responsive Management (2007) found that 34% of hunters surveyed indicated archery season was their favorite season while 38% indicated firearm season was their favorite season, 20% said muzzleloader season was their favorite season and 3% indicated crossbow season was their preferred season. A total of 6% had no preference.

White-tailed Deer Harvest Regulations – Deer harvest regulations provide the framework for the Deer Project to accomplish its objectives. Additions and modifications to deer hunting regulations most often are spurred by: 1) the need to alter deer population trends via season and bag limit changes; 2) the need to accommodate new recreational opportunities for hunters and wildlife-watchers; or 3) the need to minimize risks of disease introduction/transmission into the Maryland deer herd.

Altering seasons and bag limits via regulation changes is the primary method used by the Deer Project to manage the Maryland deer population. Lengthening or shortening antlerless seasons

and increasing or decreasing antlerless bag limits to increase or decrease harvest opportunities enables deer managers to regulate how many antlerless deer are taken each year (generally, reducing the antlerless harvest results in population growth while increasing the antlerless harvest results in population decline). Previous years' deer harvest data (mandatory hunter harvest check-in data and deer age data collected at processors) weigh heavily in determining future season and bag limit regulation changes.

Deer harvest regulations are typically evaluated and amended biennially. The process to change and/or add regulations represents a major investment of staff time. Staff, the general public, the Wildlife Advisory Commission (WAC) and political officials can submit regulation requests throughout the year. Suggested regulation additions/modifications deemed appropriate by the Game Management Program and the Director of the Wildlife & Heritage Service (WHS) are then taken before WAC and to a stakeholder group for comment in February. Comments are also solicited at public meetings held across the state, via the Internet and by telephone, fax, or letters. Final decisions are made after all comments have been summarized, considered and incorporated into the decision-making process. Final regulations become effective prior to the following hunting season.

Deer Management Permits - Producers (i.e., farmers, arborists, etc.) can apply for Deer Management Permits (DMPs) in situations where established deer hunting seasons do not provide adequate deer population regulation for commercial farming operations. DMPs allow farmers to take deer outside of the hunting season frameworks without regard for deer season bag limits and provide another mechanism for the Deer Project to regulate deer numbers. The vast majority of deer taken under DMPs are antlerless. On rare occasion a nursery owner may receive permission to take individual antlered deer doing damage to nursery stock with their antlers during the breeding season. On average, less than two dozen antlered deer are taken on DMPs each year and all antlers must be turned over to the MDNR.

Most DMPs are issued for a 12-month period. Landowners, agricultural lessees or designated farm employees can apply for DMPs through the local MDNR office. Operations with severe deer damage and economic loss to commercial agricultural crops, orchards or nursery stock qualify for DMPs. In addition, DMPs may be acquired for deer browse damage to natural woodland areas that have a forest management plan written by a MDNR forester or a licensed private consulting forester.

Deer taken under the authority of DMPs are reported through the MDNR telephone/Internet reporting system. Farmers reported taking 6,723 deer in 2008. Forty years ago farmers took 36 deer using the DMP process. The number of deer reported taken under the authority of DMPs peaked in 2003 and has dropped substantially since then (Fig. 8). The drop can be attributed to reduced deer populations and increased efforts by MDNR to encourage the taking of deer by hunters during the regular hunting season (via liberal seasons and bag limits) instead of through DMPs.

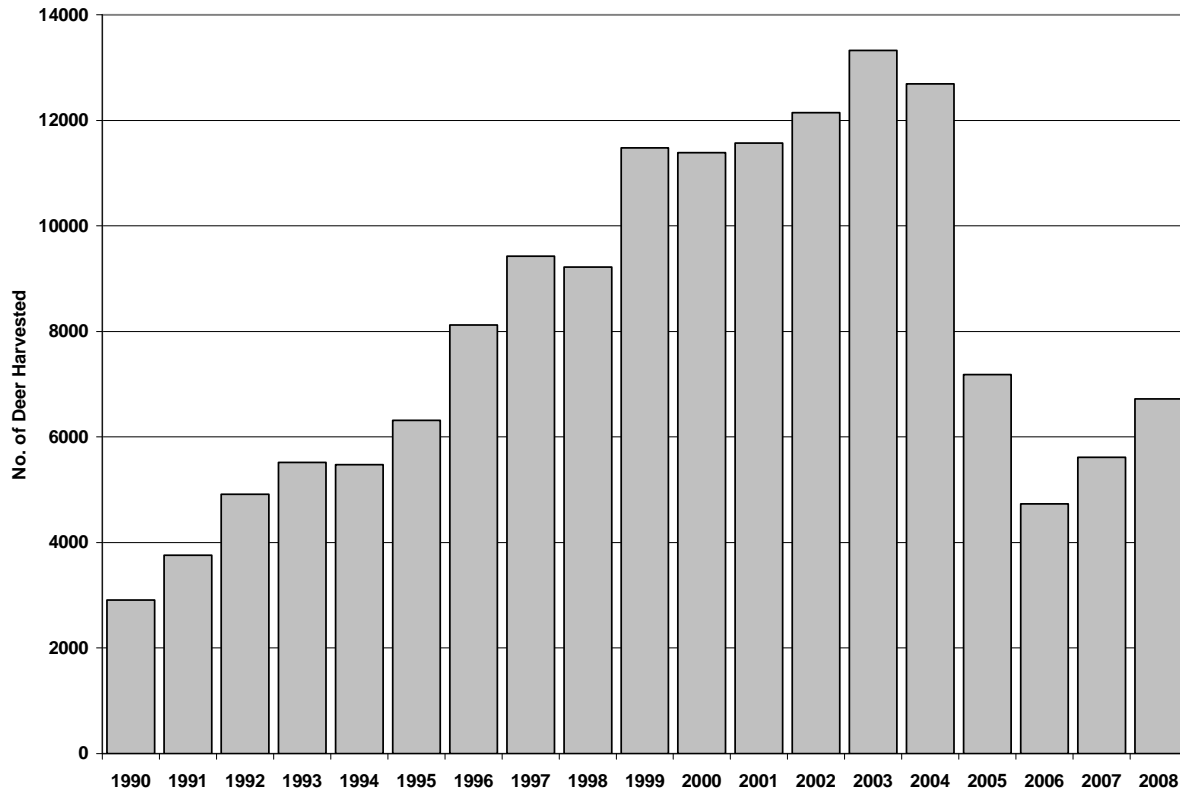


Figure 8. Maryland Deer Management Permit (DMP) deer harvest, 1990 – 2008.

Deer Cooperators - The Maryland Deer Cooperator Program certifies private individuals and animal control businesses to lethally remove deer for a profit from areas where hunting is not feasible. Sharpshooting and capture-and-euthanize are the methods permitted to remove deer under a Maryland Deer Cooperator Permit. The vast majority of deer taken by Deer Cooperators are antlerless. Also, the useable meat of deer taken under a Deer Cooperator Permit must be donated to charity and antlers of any antlered deer must be turned over to the Department.

To become a deer cooperator, applicants must take a written test about deer biology and management and pass a shooting qualification test. Cooperators are required to submit a Project Plan to MDNR for approval for each deer removal project they undertake. Cooperators must also submit annual and final project reports. Site visits by the Deer Project may also be warranted.

The Deer Cooperator Program has been operational since 2003. As of 2008, the approximately 10 individuals/businesses that have become Deer Cooperators have lethally removed over 2,700 deer from airports, federal facilities, county parklands, private properties and one state park. Costs for deer removal using sharpshooting include venison donation costs and range from \$150 to \$450 per deer.

Letters of Authority – The Deer Project annually issues Letters of Authority (LOAs) to lethally remove deer from airports and high-speed driver training facilities where striking a deer poses a significant danger to people. These installations do not meet the requirements to obtain DMPs

since agricultural crop damage is not involved, but they must remove deer due to human safety concerns. Currently there are approximately 20 LOAs issued each year.

Managed Hunts – The Deer Project authorizes various managed deer hunting programs in Maryland. Managed deer hunts are highly regulated and are designed to be primarily used in populated areas. Hunters must undergo shooting proficiency tests and often have specified treestand locations and shooting directions. Managed hunts often occur outside the regular hunting seasons and on some occasions, deer taken do not count against the hunter's regular bag limit.

Managed hunts have been successfully used on county and local government properties, military bases, federal wildlife refuges, other federal properties, and on numerous state-owned park and natural resource areas. State lands including Fair Hill Natural Resource Management Area and Patapsco, Gunpowder, and Seneca Creek State Parks have used managed hunts to control deer numbers for over a decade.

At Seneca Creek State Park in Montgomery County, MDNR botanists documented deer browse damage to the forest understory vegetation. Motorists traveling adjacent to the state park reported numerous deer-vehicle collisions. MDNR aerial FLIR (Forward Looking Infrared Radar) deer surveys documented five times more deer within the non-hunted portions of the park compared to the hunted portions of the park and nearby private lands. A deer management plan that included public input resulted in a three-day managed deer hunt beginning in 1997. After the first year of the hunt, deer-vehicle collisions decreased by 50%. Current data illustrate that more deer were killed by vehicle collisions in the year prior to the hunt (1996) than are now killed by hunting and vehicles combined. This deer population is now in better balance with the habitat.

The 2,600-acre Smithsonian Environmental Research Center (SERC) located in Anne Arundel County began a managed deer hunt in 1993. SERC initiated a deer management planning process in the early 1990s after deer numbers had reached levels that caused crop damage on the site and on adjacent private properties. Smithsonian biologists also observed natural vegetation damage to the forest understory due to excessive browsing. An extensive fencing effort failed to provide any relief. After an environmental assessment and a public information process, a managed deer hunt was instituted. After several years of deer hunting, deer damage issues decreased (Corell 1994). Farmers who had suspended farm leases on the site returned to the grounds and resumed farming operations. Deer hunting continues today as a deer management tool on this site.

The U.S. Department of Agriculture Beltsville Agricultural Research Center (BARC) in Prince George's County had struggled for years with deer damage to valuable experimental crops. This prominent agricultural research center lies adjacent to the outer loop of the Capital Beltway, I-495. After failing to curb deer damage using various non-lethal techniques, a managed deer hunting program was implemented in 1995. Since initiating hunting, deer-vehicle collisions on roads adjacent to the property have diminished. BARC staff maintain that without the managed deer hunting program the experimental crop research program would have been discontinued.

At the county level, Montgomery County Department of Parks, Howard County Department of Recreation and Parks, and the Washington Suburban Sanitary Commission (WSSC) of Montgomery and Prince George's counties have extensive managed deer hunting programs. These organizations annually offer managed hunting opportunities on many of the parks and reservoir properties they oversee. The hunts are a valuable tool for managing high-density deer populations in an urban/suburban setting.

White-tailed Deer Contraceptive Studies – Contraception has been experimentally tested in white-tailed deer for several decades with mixed results. MDNR has cooperated on three white-tailed deer contraception studies in Maryland in an effort to develop new technology that will make contraception a viable alternative in areas where other control methods are not feasible. A telephone survey conducted by Responsive Management (2007) found that a majority of the general Maryland population would support the use of deer contraception.

The longest running Maryland contraception study has been at the National Institute of Standards and Technology (NIST) where the deer contraceptive agent porcine zona pellucida (PZP) has been used since 1995. At the beginning of the study, the deer population on NIST was estimated at 211 deer. The population increased to an estimated 291 deer in 1997 before declining to 196 deer in 2007 (Rutberg and Naugle 2007). Researchers at NIST reported that annual deer population change at NIST was strongly correlated with population fertility; when population fertility at NIST dropped below 0.40 fawns per female, the population declined (Rutberg and Naugle 2008). While using PZP appears to have been successful at stabilizing the deer population on the 0.9 square mile, fenced NIST campus, the current deer population onsite remains at greater than 200 deer per square mile after 11 years of treatment; a density that is at least 10 times higher than the recommended density required to minimize habitat damage and human conflicts. Rutberg and Naugle (2008) report that the usefulness of PZP as a management tool will depend on the effectiveness of the vaccine, accessibility of deer for treatment, and site-specific birth, death, immigration, and emigration rates.

Two other studies in Maryland evaluated the contraceptive agent GonaCon™. However, unlike the NIST study, the GonaCon™ studies lethally removed deer by sharpshooting prior to contraceptive treatment to achieve a desired population density. The studies were conducted to determine if the desired deer densities could be maintained using contraception. Fagerstone et al. (2008) reported that a single shot of GonaCon™ could render female white-tailed deer infertile for one to four years. Both studies in Maryland found that approximately 50% of the treated females became fertile again after one year and would require retreatment to remain infertile. It is unknown at this point how long retreated females would remain infertile.

When the 2009-2018 White-tailed Deer Plan went to print in October 2009, GonaCon™ had just been approved by the Environmental Protection Agency as a restricted use pesticide for use in free-ranging white-tailed deer. While it is approved for free-ranging deer, it is unlikely GonaCon™ will be effective for treating a wide spread, free-ranging deer population. To be effective, the contraceptive must provide a one-shot treatment that renders female deer infertile for multiple years (not just a single year) and it must be capable of being administered to a large enough proportion of the female deer population to alter population size. Based on current deer population estimates and contraceptive technology, approximately 80,000 female deer would

need to be captured and administered GonaCon™ in Maryland for effective statewide population control. Most of these deer would need to be recaptured and retreated in subsequent years. It is impossible to meet these requirements. Instead, GonaCon™ will most likely find its niche in treating deer that have a restricted range and where there is adequate access to the majority of the deer so treatments can be administered. MDNR currently is developing policy and guidelines, which will include application guidelines and a certification program, regarding the use of GonaCon™ in Maryland. Likewise, the Department will continue to monitor the development of deer contraceptives and will cooperate on future studies as they are proposed and funding is identified.

Venison Donation Programs – Venison donation programs indirectly contribute to deer population regulation by providing a way for hunters to make use of more deer than they normally would in a given year, thus encouraging them to harvest more deer. Hunters can donate legally taken deer to local food banks through a network of participating deer processors. Donation programs have been available to Maryland deer hunters for decades. In its infancy, hunters were required to pay the processing cost and designate that the venison be donated to local food banks. Participating processors were scattered across the state with some counties having several participating processors while other counties had none. Several organizations stepped forward in the ensuing years to raise sufficient funds to pay the processing costs and recruit more processors, but none proved successful in the long term.

In 2002, Maryland's General Assembly increased hunting license fees. As part of that hunting license fee increase, the General Assembly directed MDNR to set aside \$1 from every Regular Resident and Nonresident Hunting License sold in Maryland to help fund a venison donation program. The hope was that a steady funding source would provide the necessary funds to process large numbers of deer.

After funding was established for the venison donation program, MDNR contracted with Farmers and Hunters Feeding the Hungry (FHFH), a Washington County based organization, to administer a venison donation program throughout Maryland. FHFH contacted processors, negotiated processing fees and worked with local food banks to ensure donated venison reached the needy. Since the inception of this program, FHFH has coordinated the donation of 1,842-2,513 deer per year (average of 2,333). FHFH estimates that 292 tons of venison has been donated since 2002, resulting in approximately 2.33 million meals. Total funding provided by MDNR has been \$490,000. FHFH has raised additional funding for this program, but funding is still insufficient to pay all processing fees as more hunters want to donate deer than the funding can support.

Annually, there are several deer herd reduction programs that result in large numbers of deer being donated to food banks. Many of these deer are processed through the network of processors established by FHFH. Unlike the FHFH program, payment for processing is borne by the administrator of the herd reduction program.

Maryland has had liberal deer bag limits for many years. The implementation of a venison donation program allows hunters to take advantage of the liberal bag limits and donate deer to

local food banks. Hopefully, the availability of such a program will further encourage hunters to kill more deer, resulting in reduced deer populations and more food for the needy.

White-tailed Deer Population Monitoring

Mandatory Deer Harvest Check-in – The mandatory check-in of harvested white-tailed deer in Maryland provides the primary data the Deer Project uses to monitor the white-tailed deer population. Deer check-in has been required in Maryland since the 1931 season, and the long-term harvest trends of antlered and antlerless deer serve as indices that are invaluable for determining overall population trends for the species (Fig. 6).

Data collected at check-in include: species, sex, antler points, weapon, date, county, management unit and hunter license number. Data are used to monitor harvest rates by location and season for each of the sex classes (antlered and antlerless). The data are also used in the deer population model currently employed by the Deer Project to provide an annual population estimate.

From 1931 through the 2004-2005 deer season, deer check-in was accomplished at official check stations throughout the state. Check stations commonly were butcher shops, convenience stores and sporting good stores that were compensated for their service (\$1 per deer checked in 2004). However, the check-in system changed to a telephone/Internet based system in 2005-2006 due to increasingly large deer harvests and the difficulty of locating check stations in urban and suburban areas of the state. The check station system was designed when less than 1,000 deer were harvested statewide. At the end of the check station era, over 90,000 deer were being checked.

Telephone/Internet check-in has provided the same quality data as the previous check station system. However, unlike the past when much of the data from check stations had to be hand-entered into a computer, telephone/Internet data are already in digital format when the Deer Project receives it. Data are typically available two days after the check-in occurs, enabling managers to summarize harvest results in a more timely fashion in preparation for public dissemination and regulation updates and to better enforce check-in requirements.

Biological Data Collection (Butcher Shop Surveys) – Along with mandatory deer check-in, collecting biological data each year is critical for monitoring Maryland's deer population. MDNR personnel and volunteers annually examine over 4,000 deer during early muzzleloader season and firearm season at deer processors (butcher shops) across the state. Species, sex, age, antler measurements, county of kill and signs of disease or illness are recorded for each deer brought to the processors. Agency personnel are charged with a goal of examining 75 antlered deer and 75 antlerless deer per county each year (with a portion of the quota collected during early muzzleloader season and the remainder collected during the two-week firearm season). The current sample size represents about 4% of the annual harvest and provides a statistically sound measure of standard error.

Deer age and sex data are used directly in the population reconstruction model used by the Deer Project and antler measurements are indicative of herd health and habitat quality. Collecting biological data statewide also is an important outreach effort and gives MDNR the opportunity to meet one-on-one with its constituents.

Deer Population Modeling – The Deer Project uses a combination of two models to estimate the yearly size of Maryland’s deer population. The annual deer harvest data from mandatory deer check-in and biological data collected at deer processors are used in a reconstruction model (Downing 1980) to estimate antlered male population size. Adult sex ratio and female productivity rate is estimated using a model by Lang and Wood (1976) and then combined with the antlered male estimate to generate a total population estimate. Reconstruction models have been shown to be robust for white-tailed deer (Davis et al. 2007) and provide a valuable tool to track trends in deer population size. However, the estimates generated are a minimum population size and true abundance could be much higher. Likewise, significantly altering harvest rate (i.e., changing the season length or bag limit) can affect the population estimate. The Deer Project uses the population trend from the reconstruction model versus the actual yearly estimate for management decisions. The Deer Project also relies heavily on the annual antlered buck harvest as an index to determine population trends.

Annual Hunter Mail Survey – MDNR has conducted the annual Hunter Mail Survey (HMS) since 1975. Approximately 9,000 (7% of license buyers) surveys are mailed each year to randomly chosen hunters. The survey employs a three-mailing system (i.e., sending second and third reminder letters if surveys are not returned in allotted time). The survey typically has a 45% return rate. Along with specific questions concerning current hunting topics or issues, hunters are asked what species they hunted, how many days they hunted each species and how many of each species they harvested.

The annual HMS provides important trend data for how many hunters pursue deer each year in the various seasons, how many days they invest in deer hunting and how many deer they harvest. The Deer Project uses these data when making management and regulation decisions and as a comparison to data collected from other sources (i.e., hunter harvest data, license sales data, etc.). The annual survey also routinely asks questions pertaining to recent deer management issues.

Annual Bowhunter Survey – The Bowhunter Survey was established in 2002 primarily as a method to monitor furbearer populations. However, the survey provides excellent data on white-tailed deer as well.

Each year before the bow season begins, 10,000 licensed bowhunters are randomly selected and mailed a form to record what they observe during each of their bow hunts. Individuals are asked what county they were hunting in, how many hours they hunted, type and count of any wildlife species observed and other technical information about their hunts (lure use, cover scent use, public or private land, bait use, etc.). Bowhunters are asked to return the forms at the end of the season after which the data are analyzed and a report is generated. Participating bowhunters are then mailed a copy of the report for their efforts.

Approximately 400 – 500 bowhunters return useable survey forms each year. Not surprisingly, white-tailed deer are one of the most common wildlife species reported. Each year participating bowhunters report seeing over 20,000 white-tailed deer during their hunts. The survey has provided quality data on white-tailed deer populations in Maryland and provides another method to compare population trends between deer management regions, public and private lands and

physiographic provinces. The survey also provides useful data on adult deer sex ratios and female to fawn ratios.

FLIR Surveys – Forward Looking Infrared Radar (FLIR) has been used by MDNR to monitor and assess deer population levels in certain areas of the state. The technique involves using helicopters equipped with FLIR that fly a prescribed course over certain areas. Flights must occur at dusk or at night, during colder weather and when leaf cover is minimal. The FLIR detects the heat sources of deer and other animals and records the images on videotape. Trained observers review the tape and count the number of deer recorded during the flight. Deer populations can then be estimated in that particular area.

FLIR was used extensively in central Maryland in the late 1990s and early 2000s. Post-9/11 restricted flight zones in the metropolitan Washington, DC area have made it impossible to fly an adequate number of transects to continue the survey. However, FLIR, using private contractors, remains a viable population monitoring tool for discrete parcels.

Hunter Pressure Surveys – Maryland’s public hunting areas are utilized by many deer hunters. MDNR staff annually survey the larger public hunting areas in western Maryland in an effort to determine deer hunting pressure. MDNR staff count the number of vehicles in hunter parking lots to determine hunter pressure on peak hunting days. Some of these areas have been surveyed for over 30 years. Comparing hunting pressure over long periods identifies trends in hunter use that MDNR can utilize in future management decisions.

Scientific Research Studies – The Deer Project routinely contracts with local universities to conduct graduate research studies concerning white-tailed deer biology and management topics. The University of Delaware recently completed a radio-telemetry study at Fair Hill Natural Resource Management Area in Cecil County. The study examined white-tailed deer use of suburban developments around the natural area and their movements in response to the annual managed hunting program there. The study concluded that deer on Fair Hill NRMA did not always retreat to suburban residential sites as was anticipated; rather, some deer were effective in locating refuge areas on the hunting area while the managed hunt was occurring. Both graduate students on the study made important recommendations to MDNR staff on how to better manage white-tailed deer on the area.

Research projects such as the Fair Hill NRMA study are invaluable for providing insight into the dynamics of Maryland’s white-tailed deer population. Funding for the studies is relatively inexpensive when matching grants and graduate student labor costs are factored into the analysis. In the future, the Deer Project hopes to initiate studies that examine predator-prey relationships among white-tailed deer, black bears and coyotes; and a population study of white-tailed deer on public lands in western Maryland.

Disease Surveillance - White-tailed deer, like other wildlife, can carry diseases and parasites. Most of these are not fatal to deer or infectious to humans but are part of the deer’s natural life cycle. Two of the more prominent diseases currently associated with white-tailed deer, hemorrhagic disease (found in Maryland) and chronic wasting disease (not found in Maryland), are monitored closely by the Deer Project and other MDNR staff. Effective disease monitoring

is critical to ensure the well-being of white-tailed deer, other wildlife and Maryland's human population. Detailed information on these and other common diseases and ailments that afflict white-tailed deer can be found in Appendix 6.

Winter Mortality Surveys – Maryland's geography is such that many weather extremes occur as a normal part of the annual cycle. Deep snows in western Maryland occur frequently enough that MDNR staff has observed winter deer mortality due to starvation. In years when deep snow lasts for a substantial time period, deer will gather in large numbers in protected areas (i.e., "yard-up"). However, food is usually limited when this occurs and some starvation is typically evident.

MDNR staff has monitored these deer yards for more than 30 years. Field personnel routinely survey these areas after bad winters and document any mortality. Samples are collected from dead deer and the cause of death is determined. More often than not, the younger deer die first. They cannot reach as high as adult deer when browsing and usually perish first. In extreme years, even adult deer will starve.

Wildlife Response – MDNR staff often respond to calls from citizens regarding sick or injured deer. Timely response to these calls enables MDNR to track any potential disease outbreaks in Maryland deer. It also enables MDNR to monitor certain areas for repeated calls that may indicate an emerging disease issue on the landscape.

MDNR does not rehabilitate injured or sick deer. The standard policy of the Deer Project is to let nature take its course unless the animal is severely injured and appears to be suffering. In these cases, MDNR employs humane euthanasia methods.

Occasionally, MDNR receives calls from concerned citizens about unique deer situations. These have included deer trapped or confined in areas where they cannot extricate themselves, deer with large plastic containers stuck on their heads, deer caught in fences, etc. MDNR staff respond promptly to these calls and are often successful in resolving these issues.

Information and Education

Maintaining a current knowledge base concerning white-tailed deer biology and management and disseminating it to the public is another primary function of the Deer Project. The Deer Project is a member of the Northeast and Southeast Deer Technical Committees. Staff annually attend committee meetings with both organizations to become better-informed on relevant issues across the regions. Likewise, deer program staff participate in various technical working groups involving deer and are members of professional groups including The Wildlife Society. Information gleaned from these groups is helpful to both agency personnel and stakeholders who receive this information from MDNR staff.

Effective dissemination of deer information and data is critical to the success of the Deer Project. Deer program staff routinely communicate with the public through a variety of mechanisms and in myriad venues. An important means of written communication with the public is through press releases. Press releases are used to report deer harvest results, upcoming hunting seasons, disease prevalence and testing results and other current topics that arise. Likewise, staff

members provide updated information to the MDNR website and write popular articles for various media outlets including the Department's own "Natural Resource" magazine and the annual Maryland Deer and Deer Hunting magazine. Likewise, the Deer Project provides extensive information and education regarding urban deer management to a variety of audiences.

Addressing Constituent Demands

Provide Recreational Deer Opportunities - White-tailed deer are one of the most popular wildlife species in Maryland and the most popular game species. Wildlife watchers and hunters enjoy seeing deer. Hunters also appreciate a balanced deer population that supports adequate hunting opportunities. The Department recognizes the value of white-tailed deer to the Maryland public and is committed to maintaining white-tailed deer at levels that provide recreational experiences and opportunities for all.

The Department invests substantial funding in deer-related management activities to ensure Maryland's deer population remains healthy. The Department employs multiple staff members who are largely dedicated to deer management activities and invests heavily in public lands that can be used for deer watching and hunting. Likewise, the Department ensures the decision-making process related to deer management includes all facets of public participation including stakeholder groups, public meetings, public opinion surveys and extensive information and education outreach.

While the Department is committed to providing recreational opportunities related to deer, it is also committed to reducing the negative impacts associated with high deer numbers. Defining what population level is needed to reduce negative deer impacts but still provide adequate recreation is a challenging and controversial process. The Deer Project will address this subject extensively in the coming 10 years.

Reduce Deer Crop Damage - White-tailed deer feed on a wide variety of vegetation including many Maryland agricultural crops. Corn and soybeans are two favorites. Deer also browse on woody vegetation found in forests and in nurseries. Deer damage to crops and nurseries cause significant economic losses. Maryland farmers lost an estimated \$7.6 million in deer damage during 2008 (USDA, National Agricultural Statistic Service 2009) and 63% of Maryland landowners who have commercial agricultural operations indicated they experienced deer crop damage during the past year (Responsive Management, 2007). As a result, Maryland farmers commonly call for a reduction in the local deer population.

Farm operations without hunting programs often have high deer populations and increased crop damage. Recent studies on three Maryland National Park Service properties that had agricultural leases found deer densities from 115 to 138 per square mile (Stewart et al. 2007). Deer browsing on these leases reduced corn silage production between five and forty-three percent. The study concluded that non-lethal deer management options for cropland are limited and that "lethal deer management appears to be the only viable, cost-effective option at reducing deer damage at this time."

MDNR issues Deer Management Permits (DMPs) to commercial producers who are experiencing crop damage (see pp. 24). Likewise, the Department has liberalized antlerless

seasons and bag limits in an effort to reduce the deer population and aid commercial producers in controlling deer. The Department will continue to work with Maryland producers to minimize losses due to deer by providing them a variety of lethal and non-lethal management options that are effective, safe and culturally acceptable.

Reduce Deer-vehicle Collisions - Deer-vehicle collisions (DVCs) are hazardous to travelers of Maryland roadways and can cause personal injury and even death. Other problems that result from DVCs include damage to personal property, lost wages and car repair expenses. Not surprisingly, reducing the number of DVCs via deer population reduction is a common demand made to MDNR.

Responsive Management (2007) found that 8% of Maryland residents surveyed indicated they had a vehicular accident with a deer in the past year, while 40% indicated a family member or friend experienced a DVC. These numbers are similar to a 1996 survey by C. Mason Ross that found 9% of Maryland residents had experienced a DVC in the past year and 41% had a family member or friend who had experienced a DVC.

DVCs are reported to MDNR by a broad spectrum of agencies, including state, county and local law enforcement agencies, animal control officers, park rangers, roadway maintenance crews, private contractors and motorists. MDNR annually tabulates data on DVCs from each county jurisdiction via totals provided by roadway authorities and through the return of Maryland Non-Hunting Deer Tags issued by various agencies that recover deer carcasses or report DVCs on Maryland's roadways.

The exact number of DVCs that occur in Maryland is not known, although it is clear that thousands of them occur annually. Many DVCs go unreported by motorists and an unknown number of struck deer travel away from roadways and are not observed. Using data from claims, the insurance industry projects that an average of nearly 27,000 DVCs occur annually in Maryland. In 2008, 10,361 DVCs were reported to MDNR statewide. MDNR is currently expanding a cooperative program with county and state highway agencies in order to more accurately determine the number and location of deer/vehicle collisions on state roadways.

MDNR informs the public about DVCs and the methods that can be used to avoid DVCs through the print and television media, via press releases, online forums and the Department's website. MDNR also cooperates with local jurisdictions to provide DVC information.

Presently, roadside fencing, over/underpasses for animals and deer population reduction are the most productive strategies for reducing deer-vehicle collisions. Various wildlife reflectors have also been marketed in an effort to deter deer-vehicle collisions. Reflectors are most commonly mounted on posts along roadsides and redirect light from automobile headlights through colored lenses. The theory suggests that the redirected beams of light form a "fence" or optical barrier that deters deer from running into the path of the passing automobile.

A recent and convincing study by D'Angelo et al. (2007) used FLIR video to investigate the effects of wildlife reflectors on deer and found that the reflectors were ineffective in changing deer behavior such that deer-vehicle collisions would be prevented. Similarly, Reeve and

Anderson (1993) concluded that roadside reflectors were not effective in reducing vehicle collisions with mule deer in Wyoming. However, there was some question as to whether the reflectors were properly maintained. Schafer and Penland (1985) documented a decrease in deer-vehicle collisions with white-tailed deer and mule deer when reflectors were used along roadsides in Washington. Due to small sample sizes though, it is unclear whether the decrease in deer-vehicle collisions when using reflectors was a result of altered deer behavior or increased driver awareness due to the reflectors being present. The Deer Project will continue to monitor future developments of deterrents for deer-vehicle collisions and will actively promote any advances in technology.

Reduce Urban/Suburban Deer Conflicts – Urban and suburban deer management is a significant challenge to deer managers. Deer-human conflicts are one of the fastest growing deer management issues in Maryland and increased complaints from urban and suburban residents require increased attention by MDNR. In response to this demand, the Deer Project has created a program designed to assist Maryland residents with their deer conflicts.

The urban deer program is dedicated to assisting Marylanders with the resolution of human-deer conflicts. Staff regularly communicate with Maryland residents and provide them with written and verbal information on the methods that exist to reduce deer damage and the problems that deer can cause. Upon request, staff can meet with individual communities or local governments to present information on the various deer management options in more detail and to answer specific questions about deer management issues.

Informing and educating the concerned public and their elected officials on available deer management options is vital to proceeding with any deer management effort. To better provide that information to the public, the Department created a “Deer Management Options” webpage (<http://www.dnr.state.md.us/wildlife/ddmtintro.asp>). The webpage provides comprehensive information on the non-lethal and lethal deer management options that are available to assist Maryland’s residents with the resolution of deer issues. It lists the deer management options by category and each category provides links that contain suggestions on ways to handle the various problems that deer can cause.

In many cases, individual landowners or homeowners can utilize the various deer management methods on their own properties to reduce the problems caused by deer. In contrast, deer management at the community level often must be carried out with consensus from the members of the community.

Some Maryland county agencies have taken on the responsibility of assisting their residents with the resolution of deer management issues and have created their own deer management programs. They have dedicated staff and webpages that can assist with the resolution of deer management issues. Howard and Montgomery counties have their own webpages dedicated to resolving human-deer conflicts. MDNR encourages other counties to adopt similar deer management programs to assist their citizens with the resolution of local deer management issues and is willing to guide them in implementing their own deer plans.

The Deer Project stresses that no single deer management option can alleviate all deer problems. Land managers, homeowners and suburban residents experiencing deer problems should consider using a combination of options when managing deer and resolving deer problems.

Continue to Investigate Non-lethal Deer Control Methods – The Department will continue to investigate, promote and implement effective non-lethal deer control methods as they become available and are appropriate. It is the Department’s responsibility to provide the most accurate information available regarding deer management and provide professional guidance on deer control methods for specific settings. In some instances, non-lethal control methods may be the most effective measures available and will be promoted. The Department will continue to promote hunting as an effective management tool in controlling deer numbers in concert with non-lethal methods where they may be effective.

Other Management Activities

Captive Deer – MDNR has not issued permits to possess white-tailed deer or other cervids (members of the deer family) since 1984 due to potential disease threats to native free-ranging deer, livestock and humans. Currently there are approximately twelve individuals that hold a valid Maryland Game Husbandry permit to possess deer.

Because captive deer are often kept in confined areas at high densities, the risk of disease and disease transmission is increased. Likewise, the buying, selling and moving of deer can result in diseases being introduced into areas where they did not exist. Bovine tuberculosis (TB) and chronic wasting disease (CWD) are thought to have infected wild populations of deer and elk in several areas of the United States and Canada through the release/escape of diseased captive deer and/or through the contact of diseased captive deer with wild deer through perimeter fences.

To reduce the potential for disease threats from captive deer, MDNR has developed a Captive Deer Response Plan and has enacted regulations pertaining to the possession of captive deer. Current regulations prohibit the breeding of captive deer. Additionally, all captive deer must be ear-tagged and fencing must meet minimum standards. Permittees are not allowed to move deer to other permittees in the state, but may, upon permission from another state, move the deer out of Maryland. MDNR Deer Project staff, in cooperation with the Maryland Natural Resources Police (MNRP), perform annual inspections of captive deer facilities to check for compliance with permit requirements.

The possession of captive deer in Maryland without a permit is a violation of Maryland regulation and is enforced by MNRP. Similar to the Captive Deer Response Plan, MDNR has developed a response plan for illegally possessed deer. Owners of illegally held deer are given the opportunity to relocate their deer out of state. If owners do not comply, the deer are confiscated, euthanized and tested for disease.

Maryland citizens are informed on the reasons it is illegal to keep deer captive without a permit. MDNR also does outreach through periodic press releases and information on the MDNR website to inform the public about the problems that can result from keeping deer in captivity.

Fawn Rehabilitation - White-tailed deer fawns with their conspicuous spots and dainty features are probably the most recognized “baby” animals known to Marylanders. The Disney movie “Bambi” popularized deer, especially fawns, making them an instantly recognized wildlife species to countless people. The ‘cute and cuddly’ features coupled with a look of helplessness makes the white-tailed deer fawn one of the most awe-inspiring sights in nature.

Unfortunately, this sense of awe often triggers an inclination to help, where no help is required. Maryland residents occasionally find fawns that they believe have been abandoned or orphaned. In most cases, the fawns do not need human assistance as they have been intentionally left alone by the doe. A doe will leave its fawns alone while it forages or ruminates so it can produce the milk necessary to feed the fawns. The doe will return periodically to nurse and preen the fawns and to relocate them to new secluded habitat as is necessary.

MDNR issues seasonal press releases and provides website information to inform the public on what to do if they encounter a fawn. This outreach includes information on why it is illegal to remove deer and other native wild animals from the wild and keep them in captivity without the approval of MDNR. The unnatural conditions of life in captivity can cause malnutrition, injury and stress which could lead to sickness or death for the fawn. Wild animals, such as adult deer that become accustomed to humans, can also pose a threat to people.

Individuals who find injured or orphaned fawns are advised to contact their local Wildlife & Heritage Service office for advice. In cases where fawns are known to be orphaned, the person is advised to contact a qualified Maryland Wildlife Rehabilitator and arrange for the fawn to be transferred to them for care. Certain Maryland Wildlife Rehabilitators are permitted to rehabilitate and care for fawns until they are healthy enough to be released back to the wild.

Shooter Qualification Program – Many of the managed deer hunts held by governmental organizations in Maryland require all participants to first pass a shooting proficiency test. Consequently, MDNR facilitates a shooter qualification program using local sportsmen’s clubs, shooting ranges and other groups that avail their facilities and expertise to certify hunters. A standardized shooting certification has been established, allowing a hunter to satisfy the proficiency testing requirements by qualifying one time at a single location **each year**. The Shooter Qualification process ensures that hunters participating in managed deer hunts are safe and proficient with their weapons.

GOALS, OBJECTIVES AND STRATEGIES

This section identifies the broad, long-term goals for managing white-tailed deer in Maryland through 2018. The goals were developed with input from the white-tailed deer plan stakeholder group, WAC, general public comment, and MDNR expert opinion. These goals represent the values of a diverse citizenry and are general statements of how deer management in Maryland should proceed over the next 10 years.

Following each goal are objectives and strategies. The objectives describe how the goals will be achieved and some have measureable milestones. For those objectives that do not have a milestone, it is assumed the action will occur throughout the duration of the plan unless the objective should change. Under each objective, specific strategies are listed that further detail how the objectives and ultimate goal will be met.

While the broad goals for this plan should not change over the next 10 years, it is possible the objectives and strategies will change given the dynamic nature of deer management. Changing social, environmental, technical, administrative and political conditions can quickly alter deer management priorities and objectives. To be effective, a deer management program and its guiding plan must be adaptable to these potential changes. Therefore, objectives and strategies currently addressed in the white-tailed deer plan may not be accomplished or may be modified or replaced with other objectives and strategies in the future.

Population Goal: Use diverse and progressive methods to ensure the long-term viability of Maryland's white-tailed deer population through comprehensive research, efficient monitoring, public outreach, trained staff and effective management.

MDNR is legislatively mandated (§10-202) to conserve and manage the wildlife resources of the state. The management of white-tailed deer, one of Maryland's most prominent wildlife species, over the next 10 years will demand an increasingly refined approach based on sound science and public acceptance. Scrutiny of deer management techniques has become more intense from both the proponents and opponents of any given management option. This scrutiny requires the careful and thoughtful review of any new or existing program if it is to remain viable. A focus on lethal control is insufficient to comprehensively manage this resource. A publicly accepted deer program must necessarily remain current on lethal and non-lethal options, and use both judiciously.

Maryland is rapidly urbanizing, yet much of that development is focused in certain portions of the state, creating a mix of suburban and rural landscapes with very different deer management profiles. Deer management over the next decade must therefore shift into at least two increasingly diverse approaches, one for suburban settings and another for rural areas.

Objective 1: Identify or develop a metric (antlered deer harvest per square mile, population model estimate, etc.) to identify deer population trends (increasing population, stable population, or decreasing population) at the county level by February 1, 2010.

Strategy 1: Evaluate current data and model estimates already in place and determine if a satisfactory metric exists.

Strategy 2: Survey other states and scientific literature to determine available metrics for determining deer population trends.

Objective 2: Using the methodology developed in Objective 1, establish a deer population trend goal, (increase deer population, stabilize deer population, or decrease deer population) for each county by March, 2010. Update the population objective biennially.

Strategy 1: Determine the current deer population trend (increasing, stable, or decreasing) for each county and develop management proposals.

Strategy 2: Obtain public opinion on population trends from stakeholder groups, public meetings, comments, or surveys.

Strategy 3: Where necessary, use unique or experimental techniques to determine the deer population trend (for example, in suburban areas where traditional data collection methods may be inappropriate or inadequate).

Strategy 4: Evaluate requests to develop deer population trend objectives from municipalities and other areas as needed.

Objective 3: Use a diverse set of management tools to achieve or maintain the desired deer population trend objective for each county or other identified area.

Strategy 1: Use the regulatory process to adjust lethal control rates (i.e., deer hunting seasons and bag limits) up or down to achieve or maintain desired deer population trend objectives, with an emphasis on regulated hunting.

Strategy 2: Use non-lethal population control methods where feasible to meet desired deer population trend objectives.

Strategy 3: Use adaptive management to define management regions by grouping similar counties and/or municipalities in order to simplify hunting regulations and manage deer at a landscape scale.

Strategy 4: Foster the use of regulated hunting for deer population management while maximizing recreational opportunities for hunters.

Strategy 5: Maintain or increase the ability of deer hunters to access public and private land without prohibitive fees or other barriers.

Strategy 6: Recognize the special management needs of urban/suburban entities and facilitate any appropriate additional opportunities for deer population management.

Objective 4: Develop and maintain a current understanding of potential management techniques that can be used in populated and other unique areas where traditional lethal deer management techniques cannot be effectively employed.

Strategy 1: When available, use new techniques on a trial basis and monitor their effectiveness.

Strategy 2: Cooperate with non-traditional partners to identify feasible new techniques and apply them as appropriate.

Strategy 3: Continue to cooperate on research studies of non-lethal deer management techniques including contraceptives.

Strategy 4: Monitor the continual development of deer contraceptives and create an applicator certification program within one year of the certification of a deer contraceptive agent that MDNR determines is viable for use in Maryland.

Objective 5: Recognize and evaluate other sources of potential deer mortality and the corresponding impacts on deer (and other animal populations) and identify ways to address these impacts.

Strategy 1: Monitor deer diseases and proactively initiate programs to minimize the threat to other wildlife populations and Maryland citizens.

Strategy 2: Strictly limit the possession of live cervids in Maryland in a way that minimizes the transfer of disease to wild deer, domestic animals and humans.

Strategy 3: Strictly limit the importation of dead cervids or parts from areas of the country with diseases of concern.

Strategy 4: Monitor the potential threats created by trends in deer management, such as feeding/baiting, the use of natural deer lures, the development of tick control methodologies or other potentially hazardous practices. When warranted, address these activities via the regulatory process.

Strategy 5: Remain current or initiate research on the impacts large predators (especially coyotes and bears) have on deer populations.

Objective 6: Proactively inform Maryland citizens of our management approach, goals and techniques so they may gain a better understanding of what options are available, what the anticipated outcomes are for those options and why we selected the ones we have in place.

Strategy 1: Identify and use effective mechanisms to get information on Maryland's deer management program to the general public (see Education Goal, pg. 41).

Objective 7: Maintain a staff of well trained, properly equipped and adequately protected employees to conduct deer related work in Maryland.

Strategy 1: Provide periodic training and certification of staff so they are current on proper techniques. This would include refresher training.

Strategy 2: Communicate with health officials in the state to proactively inform staff on the health risks associated with handling deer and equip them with the proper protective gear.

Education Goal: Educate Maryland citizens on all aspects of deer biology, including management tools, disease issues, economic aspects and recreational opportunities.

This goal is intended to increase the public's understanding of deer biology and the impacts deer have on landscapes and people. A number of outreach mechanisms exist and these should be carefully selected to enable WHS to reach a diverse set of customers. An emphasis should be placed on providing information on the realities of deer population dynamics and the impacts too many deer can have on cultural interests, habitat and other wildlife species. Concurrent with this emphasis should be a focus on non-lethal and lethal management tools. Finally, information on the recreational opportunities provided by deer should be included.

Objective 1: Increase the public understanding of deer biology and the impacts deer have on habitat, people, water quality, and the health of the Bay.

Strategy 1: Provide current and useful information on the MDNR Website in a way that is easy to navigate. This information should be diverse in order to appeal to the general public, not just specific user groups.

Strategy 2: Provide press releases, media interviews and popular articles covering diverse subjects related to deer.

Strategy 3: Partner with other organizations to conduct deer related outreach on topics compatible with the WHS message.

Strategy 4: Increase outreach efforts to schools by continuing and expanding the use of educational deer trunks and other tools to ensure this approach is consistent with what the school systems want to use.

Objective 2: Assist community groups or other organizations in managing specific deer populations and provide staff support to accomplish shared goals when appropriate.

Strategy 1: Make presentations to organized groups to provide the different management options available to address problems in specific situations, such as communities, local government tracts, corporate holdings, military bases or school campuses.

Strategy 2: Advise these groups how they can use public hunting as the preferred management option and, where feasible, consider enrolling any resulting program in a WHS operated managed hunt program.

Objective 3: Increase the public's understanding and acceptance of regulated deer hunting and its importance as a management tool.

Strategy 1: Using the outreach mechanisms noted above, provide timely and focused information on the role deer hunting has in managing this population in Maryland.

Strategy 2: Proactively provide information on the safety of deer hunting for participants and non-participants.

Strategy 3: Establish deer hunting regulations that promote the safe, fair and ethical pursuit of this species in order to remain compatible with the values of the majority of Maryland citizens.

Objective 4: Increase public understanding of non-lethal deer management techniques in a manner that allows them to make informed decisions on the applicability of these techniques in a given situation.

Strategy 1: Using the outreach mechanisms noted above, provide timely and focused information on new and existing non-lethal deer management options and the likely outcomes they would produce in common circumstances.

Objective 5: Focus outreach efforts on the impacts deer have on the ecosystem, to include the deleterious effects high deer densities have on other fauna, flora, water quality, and the health of the Chesapeake Bay.

Strategy 1: As they become available, use the outreach mechanisms noted above to provide timely and focused information on the impacts deer have on the environment. Where possible, tie this information to issues related to the health of the Chesapeake Bay, focusing on the role sound ecosystems have on water quality and the diversity of the Bay's living resources.

Objective 6: Educate Maryland deer hunters on the concept of Quality Deer Management (QDM) and encourage voluntary use of QDM.

Strategy 1: Work with the Quality Deer Management Association to develop a progressive and complete technical assistance program to guide landowners, clubs and hunters on voluntary adherence to QDM standards.

Strategy 2: Provide current and user-friendly QDM information on the MDNR website and in the annual hunting license guide.

Strategy 3: As work priorities allow, train selected staff on the application of QDM and have staff available to assist landowners, clubs, or hunters in applying this approach where they manage deer.

Recreation Goal: Provide the opportunity for all citizens to safely, fairly and ethically enjoy diverse deer-related recreational experiences and traditions consistent with established deer population trend goals.

Enjoyment of the deer resource in Maryland is very diverse, ranging from casual enjoyment by citizens incidental to other activities, to intensely focused hunting with strong traditional connections. The economic benefit of these uses is considerable, exceeding \$150 million annually in Maryland. Deer hunters spend an estimated 800,000 days afield each year pursuing deer

Objective 1: Provide adequate viewing opportunities of white-tailed deer combined with an outreach program designed to inform citizens on the biological and cultural aspects of deer.

Strategy 1: Incorporate input from non-consumptive white-tailed deer users into the biennial establishment of deer population objectives (Population Goal, Objective 2).

Strategy 2: Provide educational programs on the biology and cultural issues of deer designed to reach diverse audiences in Maryland.

Objective 2: Identify new non-consumptive deer-related recreational demands as they occur and develop quantifiable objectives for non-consumptive deer-related recreation.

Strategy 1: Use surveys, review popular literature, etc. to identify new non-consumptive demands for white-tailed deer. Use stakeholder groups/public input as needed to develop quantifiable objectives.

Objective 3: Consistent with deer population objectives and the legislative mandate to conserve and manage the wildlife of Maryland, maintain an annual average of 800,000 hunter-days for deer hunting.

Strategy 1: Incorporate input from consumptive white-tailed deer users (i.e., hunters) into the biennial establishment of deer population objectives.

Strategy 2: Use regulated hunting as the primary tool to achieve deer population objectives.

Strategy 3: Ensure that deer hunting regulations are responsive to the needs and traditions of the hunting community while remaining compatible with the expectations of the majority of the public.

Strategy 4: Recognize the value of venison donation programs in Maryland and support to the extent our resources allow.

Strategy 5: Promote deer hunting among youth, women, and non-traditional groups.

Strategy 6: Develop a deer hunter satisfaction index that can be administered annually via the Hunter Mail Survey.

Objective 4: Investigate and potentially endorse new deer hunting opportunities, techniques and management options that provide increased recreation, meet user expectations and help reach or maintain established deer population objectives. Monitor new techniques for long term feasibility, safety and compatibility with the cultural values of deer hunters and the general public.

Strategy 1: Evaluate the biological need to use new management approaches (such as Quality Deer Management) in order to meet or maintain established deer population objectives. Enact the appropriate regulation(s) when these programs, or the components of these programs, will significantly assist in achieving population objectives. Combine these new regulations with effective education programs.

Strategy 2: Evaluate the cultural demand to use new management approaches (such as Quality Deer Management) in order to increase user satisfaction. Be responsive to those demands in a manner that maintains hunting as the primary tool used to reach or maintain deer population objectives, is compatible with the desires of the majority of our users, and is culturally acceptable to the general public.

Strategy 3: Evaluate the safety and efficacy of new hunting techniques, seasons or weapons and review these for compatibility with hunter expectations and acceptance by the general public. This evaluation should consider local conditions that impact the ability of hunting to meet or maintain population objectives. Examples would be suburban areas, areas with localized ecological concerns or land tracts with unique conditions (such as urban parks or corporate grounds). Enact the appropriate regulations if the evaluations show positive results.

Objective 5: Ensure deer hunting remains a safe, fair and ethical activity that meets the expectations of the majority of Maryland citizens.

Strategy 1: Maintain high standards for the hunter and firearm safety programs required in Maryland.

Strategy 2: Promote the Hunter Education Program and provide technical assistance and advice to Natural Resources Police personnel who oversee the program.

Strategy 3: Evaluate, improve and standardize hunter qualification courses required to participate in managed hunts on public grounds.

Strategy 4: Retain or create regulations to keep hunting safe, fair and ethical while keeping this activity the most effective tool available to meet or maintain population trend goals.

Strategy 5: Ensure enforcement of deer hunting laws and regulations remains a priority of the agency.

Damage Goal: Identify and actively address the negative impacts the deer population has on human interests and the ecosystem in a manner consistent with the long term viability of the deer population in Maryland.

This goal includes economic losses as well as situations that detract from the overall quality of life for Maryland citizens. Economic losses can be wide ranging, from agricultural impacts to deer-vehicle collisions or damage to ornamental plantings. The overall quality of life includes a wide range of issues, including human health, safety, hygiene and peace of mind.

Ecosystem impacts are just being recognized, usually in very qualitative ways with little data available to establish in measurable terms what these impacts are or where they are most critical. It is necessary to document the impacts deer may be having on various natural communities before the value of any remedial action can be assessed.

Objective 1: Reduce deer-vehicle collisions across Maryland as measured by the number of vehicles registered in the state compared to the frequency of reported deer strikes.

Strategy 1: Continue to educate the public on defensive driving techniques by issuing press releases to the media at strategic times.

Strategy 2: Encourage state, county and city highway departments to maintain or erect new fences and incorporate wildlife passage ways under/over roads.

Strategy 3: Work in conjunction with the Maryland Department of Transportation (MDOT) to improve the reporting of deer-vehicle collisions and develop models to determine the relationships between habitat, geography and road conditions

with the frequency of a deer-vehicle collision occurrence. Use this information to target education and prevention measures to problem areas.

Strategy 4: Continue to participate in interstate and interagency task forces concerning deer-vehicle collision reduction strategies.

Strategy 5: Work with local governments, communities and other owners of open space to reduce deer populations in high traffic areas via managed hunting, Deer Cooperators or non-lethal approaches that remove deer.

Objective 2: Reduce deer damage incurred by agricultural producers in Maryland.

Strategy 1: Partner with leaders in the agricultural community to address deer damage in ways that are economically feasible, culturally acceptable and compatible with recreational hunting interests.

Strategy 2: Continue to issue Deer Management Permits as per existing protocols. Review the protocols every five years at a minimum to ensure compatibility with the expectations and needs of recipients and staff.

Strategy 3: Offer guidance to producers concerning alternative deer damage control measures (fencing, repellents, dogs, etc.). Monitor the progress of some of these approaches to ascertain effectiveness, using the results to further educate producers and refine techniques.

Strategy 4: Establish regular deer hunting seasons and bag limits in a manner intended to reach population objectives. These goals should be established to meet many criteria, including being responsive to agricultural interests.

Strategy 5: Identify public tracts of land with high deer populations that are adjacent to, or near agricultural producers and work with the managers or owners to address the overpopulation of deer.

Objective 3: Remain current on the potential deer related disease threats to human health and maintain a responsive approach to minimizing these threats.

Strategy 1: Monitor new developments and research concerning the potential disease threats to human health that are directly or indirectly associated with deer (Lyme disease, chronic wasting disease, ehrlichiosis, human babesiosis, fecal contamination, etc) and incorporate new information into a responsive technical assistance approach with the public.

Strategy 2: Take management actions to reduce any significant health threats to the public when warranted and feasible.

Strategy 3: Maintain deer populations at levels that minimize the threat of deer associated diseases or other human health implications.

Objective 4: Identify public tracts or other large parcels of land with high deer populations and work with the managers or owners to address the situation via lethal or non-lethal means. These tracts may be experiencing significant damage to their natural communities and/or providing a refuge for deer impacting surrounding properties.

Strategy 1: Meet with the appropriate land managers to inform them of the problems presented and provide technical guidance on how to rectify the situation.

Strategy 2: Assess the ability of WHS to actively manage any deer control measures on a tract by tract basis and initiate appropriate programs where feasible to do so.

Objective 5: Work with urban/suburban communities to reduce deer problems, including damage to gardens, shrubs and landscaping or the impacts to personal hygiene from extensive deer feces around homes, schools, parks, athletic fields and other public places.

Strategy 1: Provide technical guidance via presentations, meetings, correspondence and the DNR Website.

Strategy 2: Establish regular deer hunting seasons and bag limits in a manner intended to reach population objectives. These goals should be established to meet many criteria, including being responsive to urban/suburban community needs.

Objective 6: Provide a responsive means for effective localized deer management actions to address special situations where deer control outside existing hunting regulations is in the public interest.

Strategy 1: Issue Letters of Authority for special situations, such as airports and military bases.

Strategy 2: Operate a Deer Cooperator Permit program that maintains a safe and professional approach to addressing local deer population issues.

Objective 7: Provide staff with appropriate equipment and training to respond quickly to localized deer emergencies on a statewide basis. This would include deer that have entered buildings or are entangled in various manners; are injured; appear diseased; or are threatening public safety.

Strategy 1: Offer periodic staff training and certification on current techniques.

Strategy 2: Monitor new developments in firearms, immobilization drugs and delivery equipment and incorporate into staff training as appropriate.

Objective 8: Establish a means to quantify deer impacts to natural communities and/or listed species with the goal of identifying where those impacts are the most critical.

Strategy 1: Partner with Maryland Natural Heritage Program staff to find an efficient and feasible means to identify the natural communities most impacted by deer.

Strategy 2: Identify the natural communities most critically impacted by deer and develop remedial programs to address the deer population locally. Monitor ecosystem response as the remedial programs are enacted.

Operational Resources Goal: Ensure that all necessary resources are available to support the proper management of white-tailed deer in Maryland.

A variety of resources will be required in order to complete all desired tasks related to managing white-tailed deer in Maryland. These tasks are addressed in this management plan but won't achieve the desired outcomes if the resources aren't available to complete them. Funding is the most critical of these necessary resources and has traditionally been obtained via a variety of fees and taxes placed primarily on the consumptive user groups. However, other sources of revenue need to be explored due to a long term declining trend in hunter participation. The most efficient means to collect good data and/or satisfactorily complete projects is to use well trained/equipped staff from within WHS. Thus, having trained staff able to dedicate time to deer management tasks is equally critical.

Objective 1: Maintain and/or increase revenue through the sale of hunting licenses and stamps.

Strategy 1: Develop a standing committee of WHS staff charged with maintaining a national level understanding of hunter recruitment and retention trends and the programs in place to address these issues.

Strategy 2: Pending the conclusions of the committee, initiate and conduct programs intended to address hunter recruitment and retention that are related to deer.

Objective 2: Identify alternative sources of funding and support to conduct deer management in Maryland.

Strategy 1: A variety of grants are available for natural resources management. Identify and apply for those grant opportunities that pertain to deer research, management, disease monitoring and public education.

Strategy 2: Develop a program to enlist volunteers to conduct certain management activities. These volunteers should be well trained and offered incentives to assist with WHS deer management efforts.

Strategy 3: Investigate the applicability of successful efforts elsewhere in the nation to obtain funding that is not tied to the consumptive user groups. Seek to enact any of these programs, or innovative new ones that would apply in Maryland.

Appendix 1. White-tailed deer biology

Physical Description - Native white-tailed deer live in all Maryland counties across a wide range of landscapes. The white-tailed deer's distinctive white tail and white rump patch is readily visible when they bound away from real or perceived danger. White-tailed deer can sprint up to 35 miles per hour and are able to vertically leap over 8 feet.

Adult white-tailed deer are about 3 feet tall at the front shoulder. Yearling whitetail bucks (1.5 year old males) weigh an average of 135 pounds and yearling does (females) average 120 pounds in Maryland. During the warm months, deer possess reddish-brown hair. A grayish-brown coat with a thick undercoat replaces the reddish hair during the cold time period.

Whitetail bucks grow and shed antlers each year. On rare occasions females may exhibit antlers. Bucks use their antlers to establish dominance over other bucks during breeding season. Antlers, which are composed of true bone, begin to grow in late March and early April. The growing antlers are covered with skin and blood vessels called velvet. As testosterone levels increase for the fall breeding season, the antlers harden and the velvet is rubbed off. Antlers typically are shed in January and February. Bucks in poor physical condition tend to drop their antlers first.

Habitat - Maryland white-tailed deer habitat includes most parts of the state except for open water and the intensely developed urban areas (i.e., downtown Baltimore). Deer thrive in landscapes intermixed with wooded/brushy sections and open areas such as cropland, pasture or landscaped yards. Deer use the wooded areas for food and cover while open areas provide food. Landscapes with a bountiful interface of forested and open areas provide prime deer habitats.

Suburban sprawl and exurban growth can create ideal habitat conditions for white-tailed deer. When forested areas are converted into housing developments, portions are cleared for roads and home sites, while other sections remain forested. When open farmland is transformed into residential areas, new homeowners plant trees, shrubs and perennials. Both of these types of residential conversions provide excellent deer habitat.

Home Range - The typical annual average home range for white-tailed deer is considered no larger than 1 square mile (640 acres). However, sex, age and habitat quality can influence an individual deer's home range size. Yearling males will typically move many miles before establishing a stable home range while adult females usually travel much shorter distances before doing so. Deer in quality habitat typically travel less than deer in poorer habitat.

Food Habits - Deer feed on nuts, berries, leaves, woody shoots, plant stems, grasses and cultivated crops. Some of their preferred foods include acorns, honeysuckle, poison ivy, greenbrier, young tree seedlings and mushrooms. Soybeans, corn and ornamental shrubs are several of their favorite foods planted by humans.

Deer have a four-chambered stomach that is required to digest the vegetation they eat. Food first travels to the rumen where bacteria and protozoa begin the digestive process. The reticulum then circulates food back to the mouth so deer can chew it more thoroughly. The omasum functions as a pump and directs the partially digested food from the reticulum to the abomasum. This final chamber functions as a true stomach and completes the digestive process.

Reproduction - The white-tailed deer breeding season in Maryland begins in October and continues until about mid-December. The shortening of the day length (photo period) triggers the breeding season. Most does become pregnant during the first half of November. Any receptive doe that does not become pregnant will recycle back into estrous in about 28 days and will mate again.

Fawns are born during May and June after a gestation period of about 200 days. Yearling does usually give birth to single fawns. Mature does in good physical condition frequently produce twins. Newborn spotted fawns remain hidden and solitary for about three weeks. The doe initially visits its young only two to three times per day in order to nurse and groom the offspring. When the fawn is strong enough, it will follow the doe and begin to sample the foods she eats. Fawns can live independently of the doe at about 2 months old.

Mortality - Hunting is the primary cause of mortality for white-tailed deer in most rural sections of Maryland. Other deer mortality factors include collisions with vehicles, diseases, parasites, malnutrition and accidental injuries. Where hunting is limited or not possible (i.e., some suburban and urban locales), vehicle collisions, diseases and malnutrition often become the primary mortality factors.

In pre-Colonial Maryland, wolves, mountain lions and Native Americans served as effective predators of white-tailed deer. All were capable of taking any age class of healthy deer (fawns or adults). Today, bears, bobcats and coyotes (a recent immigrant to Maryland) are the only remaining non-human predators of deer in Maryland and they primarily take fawns or sick/injured adults. While these predators can have an effect on the deer population at a localized level, they represent a very small portion of overall deer mortality on a landscape scale. Humans remain the most effective modern era predator.

Appendix 2. 2009 – 2018 White-tailed Deer Management Plan stakeholder group participants

Mr. Kip Adams, Quality Deer Management Association
Ms. Deborah Barber, The Nature Conservancy
Mr. Scott Bates, National Park Service
Mr. Jim Benton, Washington Suburban Sanitary Commission
Dr. Jacob Bowman, Maryland/Delaware Chapter of the Wildlife Society
Ms. Stephanie Boyles, The Humane Society of the United States
Lt. Colonel Chris Bushman, MDNR Park Service
Mr. Fred Carter, DFJ Wildlife Control Specialists
Mr. Ira Click, Western Maryland Sportsman Coalition
Dr. Mark Conner, Chesapeake Farms
Ms. Gerda Deterer, Wildlife Rehabilitator
Ms. Wendy Donohoo, Maryland Sportsmen Association
Ms. Enid S. Feinberg, Deer Solutions Maryland
Mr. Edwin Fry, Wildlife Advisory Commission
Mr. Kurt Fuchs, Maryland Farm Bureau
Mr. Nick Gray, Maryland Bowhunters Society
Mr. Mike Griffith, Allegany/Garrett Sportsman Association
Mr. Bill Hamilton, Maryland-National Capital Park and Planning Commission
Sgt. Kelly Johnson, MDNR Natural Resources Police
Mr. Tyler Johnson, Maryland Outfitters and Guides Association
Mr. Holliday Obrecht, US Fish & Wildlife Service
Mr. Jack Purdue, MDNR Forest Service
Mr. William Shields, Deer Hunter
Mr. Kevin Sullivan, USDA Wildlife Services
Ms. Candus Thompson, The Baltimore Sun
Mr. Bob Wardwell, Dept. of Army

Appendix 3.

Responsive Management



THE OPINIONS OF RESIDENTS, DEER HUNTERS, AND LANDOWNERS ON DEER MANAGEMENT IN MARYLAND

2007

**Conducted for Maryland Department of Natural Resources
by Responsive Management**

Responsive Management National Office

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EXECUTIVE SUMMARY

INTRODUCTION AND METHODOLOGY

This study was conducted for the Maryland Department of Natural Resources (MDNR) to determine the opinions of residents, active deer hunters (they had hunted deer within the previous 2 years), and landowners (who own at least 20 acres and who grow commercial agricultural crops) on the deer population in Maryland, deer hunting, and deer management. The study entailed three telephone surveys of the three aforementioned groups. For the surveys, telephones were selected as the preferred sampling medium because of the universality of telephone ownership.

The telephone survey questionnaires were developed cooperatively by Responsive Management and the MDNR, with additional input from the Maryland Deer Management Plan Stakeholder Group and the Maryland Wildlife Advisory Commission on subject areas about which they wanted information in the survey. Responsive Management conducted pre-tests of the questionnaires and revised them, as necessary, based on the pre-tests. Interviews were conducted Monday through Friday from 9:00 a.m. to 9:00 p.m., Saturday noon to 5:00 p.m., and Sunday from 5:00 p.m. to 9:00 p.m., Eastern Standard Time. The surveys were conducted in June-July 2007. Responsive Management obtained a total of 405 completed interviews of general population in Maryland, 407 completed interviews of active Maryland deer hunters, and 406 completed interviews of large landowners who grow commercial agricultural crops. Note that in the report, the general population are also referred to as Maryland residents, and the latter two groups are referred to simply as “deer hunters” and “large landowners” or “landowners.” The software used for data collection was Questionnaire Programming Language 4.1. The analysis of data was performed using Statistical Package for the Social Sciences software as well as proprietary software developed by Responsive Management.

OPINIONS ON DEER IN GENERAL

- All groups surveyed have large majorities who enjoy seeing and having deer around, despite problems that deer cause; low percentages unequivocally regard deer as a nuisance—even large landowners who have crops that can be damaged by deer. All groups surveyed also agree that deer are important enough that some damage to yards, gardens, and/or crops can be tolerated. Finally, all groups agree that deer are an important part of the balance of nature.

OPINIONS ON THE DEER POPULATION

- The majority of all groups (with a large majority of hunters) agree that Maryland does a good job of conserving its deer population.
- More than three-fourths of Maryland residents and nearly all deer hunters and large landowners agree that deer should be hunted to maintain a healthy deer population.
 - Even a majority of non-hunters in the general population of Maryland agree that deer should be hunted to maintain a healthy deer population.

- In a question that has bearing on a healthy deer herd, large majorities of all three groups would support a substantial reduction in the deer population by legal, recreational hunting in areas where chronic wasting disease is found.
- A large majority of Maryland residents support controlling deer populations on public and private lands in urban and suburban areas.
 - Even a majority of non-hunters in the general population of Maryland support controlling deer populations on public and private lands in urban and suburban areas.
 - Maryland residents and deer hunters most commonly say that the deer population where they live is just right; however, they are otherwise more likely to say that the population is too high than to say it is too low. Likewise, they most commonly say they would like to see the population stay the same, but, again, otherwise the percentage wanting a decrease exceeds the percentage wanting an increase.
 - Aesthetic considerations are the top reasons for wanting an increase among residents, and aspects of better hunting are the top reasons among hunters.
 - Residents and hunters wanting a decrease most commonly give as their reasons to reduce vehicle collisions with deer and to reduce deer damage and deer-human conflicts.
 - The majority of large landowners say that the deer population where they live is too high. Otherwise, they are much more likely to say that the population is just right than to say it is too low. Likewise, a majority would like to see the population decreased, while a substantial percentage say they want it to stay the same, and very few say that they want the population increased.
 - Those landowners who want an increase in the deer population were asked for their reasons: improving hunting opportunities and harvest success, as well as simply wanting to see more deer, are the top reasons for wanting an increase.
 - Those landowners who want a decrease were asked for their reasons: by far, the most popular answer is to reduce losses to crops (and timber) from deer, as well as to reduce vehicle collisions with deer and damage to yards, gardens, and flower beds.
 - Interestingly, hunters, who indicated that the deer population is either just right or too high have different feelings about where they hunt. For most of their hunting areas, hunters are more likely to think that the deer population is too low than to think it is too high (although for all areas, there are many hunters who indicate that the deer population is just right). For most hunting areas, a majority of hunters want the deer population increased.
 - The tabulations on the next page summarize feelings about the deer population in the various places among the three groups surveyed.

Group	Location	Too High (%)	Just Right (%)	Too Low (%)
Maryland residents	Where they live	28	50	14
Deer hunters	Where they live	31	44	22
Large landowners	Where they live	59	33	4
Deer hunters who hunted public lands in Region A	Public lands in Region A	2	32	63
Deer hunters who hunted private lands in Region A	Private lands in Region A	1	48	47
Deer hunters who hunted public lands in Region B	Public lands in Region B	12	44	41
Deer hunters who hunted public lands in Washington or Frederick Counties	Public lands in Washington or Frederick Counties	4	40	54
Deer hunters who hunted private lands in Region B	Private lands in Region B	23	55	21

Group	Location	Wants a Decrease (%)	Wants It to Stay the Same (%)	Wants an Increase (%)
Maryland residents	Where they live	28	59	10
Deer hunters	Where they live	23	48	28
Large landowners	Where they live	55	38	4
Deer hunters who hunted public lands in Region A	Public lands in Region A	2	25	71
Deer hunters who hunted private lands in Region A	Private lands in Region A	3	27	69
Deer hunters who hunted public lands in Region B	Public lands in Region B	6	35	57
Deer hunters who hunted public lands in Washington or Frederick Counties	Public lands in Washington or Frederick Counties	2	35	63
Deer hunters who hunted private lands in Region B	Private lands in Region B	15	49	36

KNOWLEDGE OF AND OPINIONS ON DEER CONTROL AND MANAGEMENT IN MARYLAND

- The majority of all three groups agree that Maryland does a good job of conserving its deer population, and less than 1 in 5 of any group disagree.
- Regarding knowledge of the MDNR’s Deer Management Program: hunters are the most knowledgeable, landowners are next, and the general population are the least knowledgeable.

- A large majority of Maryland residents support controlling deer populations on public and private lands in urban and suburban areas. Follow-up questions asked about various methods to control deer (with landowners being asked about control methods, too). The percentages are tabulated for ease of readability.
- In an open-ended question—one in which no response set is read and respondents can give any response (given prior to questions about specific methods so as to not bias the answers)—hunting was the most popular method named for controlling the deer population, followed by biological birth control, and trapping and relocation.
 - After the individual questions about specific methods of controlling deer, a final question asked residents to choose from among the three methods (and including a “no control” response) that they would want the MDNR to use, and legal, recreational hunting was the most favored, followed by immunocontraceptives and use of sharpshooters.

	Strongly support (%)	Moderately support (%)	Total support (%)	Strongly oppose (%)	Moderately oppose (%)	Total opposition (%)
Do you support or oppose the use of immunocontraceptives in deer population management efforts for wild deer herds? (Prior to an explanation of potential drawbacks of this method.) (Among Maryland residents.)	31	26	57	22	9	31
Given this information [i.e., the explanation of potential drawbacks], do you support or oppose the use of immunocontraceptives in deer population management efforts for wild deer herds? (After explanation of potential drawbacks.) (Among Maryland residents.)	25	25	50	26	12	38
Do you support or oppose the use of regulated archery hunting to control deer in urban and suburban areas? (Among Maryland residents.)	23	25	48	27	13	40
Do you support or oppose using state tax revenue to administer immunocontraceptives to wild deer? [Note that this question specifically tied the program to use of tax revenues.] (Among Maryland residents.)	17	27	44	35	12	47
Do you support or oppose the use of immunocontraceptives in deer population management efforts for wild deer herds? (Prior to explanation of potential drawbacks.) (Among deer hunters.)	13	23	36	34	13	47
Do you support or oppose the use of professionals or sharpshooters to control deer in urban and suburban areas? (Among Maryland residents.)	14	21	35	39	17	56
Do you support or oppose using state tax revenue to administer immunocontraceptives to wild deer? [Note that this question specifically tied the program to use of tax revenues.] (Among deer hunters.)	10	17	27	53	11	64
Given this information [i.e., the explanation of potential drawbacks], do you support or oppose the use of immunocontraceptives in deer population management efforts for wild deer herds? (After explanation of potential drawbacks.) (Among deer hunters.)	11	15	26	44	17	61

- As noted previously, large majorities of Maryland residents, deer hunters, and landowners would support a substantial reduction in the deer population by legal, recreational hunting in areas where chronic wasting disease is found.
- Six questions asked about how important various things should be in making deer management decisions. Maryland residents and landowners rated scientific information and the professional judgement of MDNR biologists as the most important in making deer management decisions; they rated political concerns as the least important. The percentages are tabulated below and on the next page for ease of readability, sorted from most important to the least.

Questions asked of Maryland residents	Very important (%)	Somewhat important (%)	Total important (%)	Very unimportant (%)	Somewhat unimportant (%)	Total unimportant (%)
Q72. How important or unimportant should scientific information such as hunter kills and deer population survey data be in making decisions about deer management?	56	28	84	3	5	8
Q73. How important or unimportant should the professional judgement of biologists with the Maryland Department of Natural Resources be in making decisions about deer management?	53	29	82	4	5	9
Q75. How important or unimportant should public opinion be in making decisions about deer management?	38	40	78	7	8	15
Q76. How important or unimportant should hunters' concerns be in making decisions about deer management?	31	34	65	14	12	26
Q74. How important or unimportant should the economic impact of hunting in Maryland be in making decisions about deer management?	26	38	64	13	13	26
Q77. How important or unimportant should political concerns be in making decisions about deer management?	9	20	29	47	15	62

Questions asked of large landowners	Very important (%)	Somewhat important (%)	Total important (%)	Very unimportant (%)	Somewhat unimportant (%)	Total unimportant (%)
Q58. How important or unimportant should scientific information such as hunter kills and deer population survey data be in making decisions about deer management?	54	30	84	3	7	10
Q59. How important or unimportant should the professional judgement of biologists with the Maryland Department of Natural Resources be in making decisions about deer management?	39	40	79	4	5	9
Q62. How important or unimportant should hunters' concerns be in making decisions about deer management?	42	37	79	6	7	13
Q60. How important or unimportant should the economic impact of hunting in Maryland be in making decisions about deer management?	38	32	70	8	9	17
Q61. How important or unimportant should public opinion be in making decisions about deer management?	20	35	55	16	17	33
Q63. How important or unimportant should political concerns be in making decisions about deer management?	8	18	26	45	16	61

- The state of Maryland is broken down into two hunting regions (Regions A and B). Region A is made up of Allegany and Garrett Counties; Region B is all other counties. Region A deer hunters are split on whether they want deer hunting in Region A managed differently on public versus private lands. Similarly, Region B deer hunters who hunted in Washington and/or Frederick Counties are split on whether they want deer hunting there managed differently on public versus private lands.
- The survey asked deer hunters about their frequency of practicing quality deer management (by harvesting mostly does and refraining from harvesting bucks less than 2½ years old): the overwhelming majority do so always or sometimes. In line with the fact that most deer hunters practice quality deer management, most are in favor of mandatory quality deer management regulations.
 - Prior to the questions above, deer hunters were asked what quality deer management means to them. Most commonly, they say it means bigger bucks and an increased size of deer, an increase in the overall health of the herd, or an increased size of antlers.
- Most large landowners know about deer management or crop damage permits (to allow the reduction of deer on their property), and a substantial percentage use them.

DAMAGE FROM DEER

- About a quarter of Maryland residents and a third of deer hunters have experienced damage to their yard, garden, or crops from deer in the past year. Regarding trends in damage, most commonly Maryland residents and deer hunters say that the incidence of deer damage is

about the same as it previously was; otherwise, the percentage thinking that damage is increasing exceeds the percentage thinking it is decreasing by about 2 to 1.

- When asked if they do anything to prevent damage by deer, the majority of Maryland residents and deer hunters do nothing. Otherwise, hunting (particularly among hunters), fencing, and repellants are the most common preventatives.
- A majority of large landowners in Maryland have experienced damage to their yard, garden, or crops from deer in the past year—this percentage is higher than among the general population likely because the sample is of large landowners who grow commercial crops, so they have more that can be damaged. When asked specifically about *crop* damage, a large majority of large landowners have had damage from deer. Regarding trends in damage, landowners most commonly say that the incidence of deer damage is about the same as it previously was, but the percentage is nearly the same as the percentage who think that damage is increasing.
- When asked if they do anything to prevent damage by deer, landowners most commonly do nothing, but nearly the same percentage hunt to prevent damage. Obviously, fencing is also a common preventative followed by repellants.
 - When those who had experienced *crop* damage were asked to estimate the dollar amount of damage, the majority had less than \$2,000 in damage from deer.
 - Most large landowners know about deer management or crop damage permits (to allow the reduction of deer on their property). Among those landowners who know of crop damage permits, about a third use them. Most of those landowners who know of crop damage permits are satisfied with the process for obtaining the permits. Finally, there is a regulation that stipulates that all healthy deer harvested for population control and crop damage control be processed and used for food, regardless of the time that they are harvested: the overwhelming majority of large landowners agree with this policy.
- Small, but not insubstantial, percentages of Maryland residents, deer hunters, and landowners—about 1 in 10—have had a vehicular accident with a deer in the past year.
- A majority of Maryland residents support allocating a portion of general state tax revenues to fund the installation of fences and underpasses along highways for animals in an effort to reduce vehicular accidents with deer.
- Public safety is the most common reason for wanting fences and underpasses installed (among those who support doing so), followed by concern for the deer themselves.
- Despite the damage that deer cause, the majority of residents, the overwhelming majority of deer hunters, and the majority of landowners agree that deer are important enough that they (the respondents) are willing to tolerate some damage to yards, gardens, or crops.

GENERAL OPINIONS ON DEER HUNTING

- A majority of Maryland residents and landowners are in favor of deer hunting. Indeed, a large majority of large landowners allow deer hunting on their property.

- Even a majority of non-hunters within the general population of Maryland are in favor of deer hunting, and among non-hunters the percentage in favor exceeds the percentage opposed by slightly more than 2 to 1.
- Large majorities of Maryland residents, deer hunters, and landowners agree that deer should be hunted to maintain a healthy deer population.
- When presented with a list of six possible reasons for people to hunt deer in Maryland, residents most commonly select deer population control as the most important reason for hunting deer, distantly followed by hunting for the meat; note that about 1 in 10 indicate that there is no good reason for hunting deer. Deer hunters, on the other hand, who are *personally* involved in hunting, most commonly say that the most important reasons for hunting deer are for the meat or for the sport and recreation. Finally, landowners are like residents in that their top reason is deer population control, distantly followed by for the sport and recreation and for the meat.
- In a question that pertains to the acceptability of hunting, the overwhelming majority of Maryland residents have *not* experienced any problems with hunters in the past 2 years. While large landowners are slightly more likely to have experienced problems with hunters, the large majority of them have *not* experienced any problems.

PARTICIPATION IN DEER HUNTING AND HARVEST OF DEER

- Many questions in the deer hunter and landowner surveys asked about hunting participation. The results are tabulated below.

Group	Location	Type of Game/ Equipment	Timeframe	Percent Who Had Hunted
Deer hunters	Anywhere	Any deer	1 year	97
Deer hunters	Anywhere	Antlerless deer	1 year	72
Deer hunters	Region A	Any deer	2 years	28
Deer hunters	Region B	Any deer	2 years	83
Deer hunters	Public lands in Washington or Frederick Counties	Any deer	2 years	12
Deer hunters	Private lands in Washington or Frederick Counties	Any deer	2 years	23
Deer hunters	Maryland	Any deer/ crossbow	2 years	18
Deer hunters	Maryland	Any deer/over bait	2 years	29
Large landowners	Anywhere	Any deer	Ever	48
Large landowners	Anywhere	Any deer	2 years	26

- Among those who had hunted deer, a majority had harvested a deer. Regarding the number of deer each hunter harvested, they most commonly had harvested only 1 or 2 deer.
- Satisfaction levels of deer hunters for hunting deer has most commonly remained the same over the past 10 years. Otherwise, more say satisfaction has increased than say it has decreased.
- When deer hunters who had harvested at least one deer were asked if they would have harvested *more* deer under certain situations (a list of seven situations were read to the respondents), they most commonly said that they would have harvested more deer if more private landowners allowed deer hunting or if they had been able to take more time off from work. Another common answer was if more public lands were open to hunting.
- Deer hunters who had *not* harvested a deer were asked about nine situations that might have affected their harvest success: they most commonly said that they think that they would have harvested a deer if more private landowners allowed deer hunting. Other common answers were if they had seen trophy deer, if the deer population was larger, if they had been able to take more time off from work, if there were more public lands open to hunting, and if the season was longer.
- Those deer hunters who did *not* hunt antlerless deer in the previous year most commonly gave as their reasoning that antlerless deer are not trophy deer; other common reasons were that doing so would have a negative effect on the deer population and simple lack of time.
- Landowners who have hunted previously but did not hunt within the previous 2 years were asked for their reasons for not hunting: lack of interest was the top reason, followed by lack of time and health/age. Among landowners who have never hunted, lack of interest and not wanting to kill animals are the top reasons for never hunting.

OPINIONS ON DEER HUNTING REGULATIONS

- Maryland residents are split on whether additional lands (e.g., parks) should be opened for regulated deer hunting to increase hunting opportunities.
- Residents are about evenly split on the use of archery hunting to control deer in urban and suburban areas.
- Opposition far exceeds support for hunting deer over bait among the general population. Among deer hunters, hunting deer over bait is more acceptable, with a slight majority who support being allowed to do so; nonetheless, about a third of deer hunters oppose. When deer hunters were asked specifically about whether regulations should be instituted making it illegal to hunt deer over bait *on private lands*, the large majority oppose such a regulation. Finally, landowners slightly more often oppose than support, although they are fairly evenly split, hunting deer over bait.
 - The most common reasons given by all three groups (among those who support) for supporting hunting deer over bait are to allow hunters to better control the deer population and/or to increase harvest success.

- The most common reasons given by all groups for opposing hunting deer over bait are that it does not give the deer a fair chance and/or that it is unethical to trick deer.
- Opposition exceeds support for deer hunting on Sundays in Maryland among Maryland residents. On the other hand, among deer hunters, a majority support hunting deer on Sundays. Large landowners are like residents in that opposition exceeds support for hunting deer on Sundays.
 - The survey asked several questions about bow and crossbow hunting.
 - The survey asked deer hunters about the length of the crossbow season: most commonly they want the number of days for legal crossbow hunting to stay the same; otherwise, slightly more want to see the number of days for crossbow hunting increased than want to see the number of days decreased.
 - The survey also asked deer hunters if they want to have a separate crossbow season (with different dates and bag limits) from the regular bow season: a majority do *not* want a separate season; however, just more than a quarter want to have a separate crossbow season.
 - Deer hunters are split, with slightly more agreement, on whether crossbows should be allowed for the entire bow season (currently they are allowed for only some of the time early in the bow season and then another stretch of time at the end of the bow season).
 - The majority of deer hunters agree that Maryland should expand crossbow seasons in suburban and urban counties.
 - Maryland residents and landowners most commonly say that the allowable distance from a normally occupied structure for legal bowhunting, which is currently set at 150 yards, is acceptable (i.e., it should remain the same); however, a substantial percentage think the allowable distance should be increased.
 - The state of Maryland is broken down into two hunting regions (Regions A and B). Region A is made up of Allegany and Garrett Counties; Region B is all other counties. A majority of deer hunters who had hunted in Region A in the past 2 years support reducing the antlered bag limit in Region A from 3 antlered deer to 2 per year; however, just more than a third oppose such a reduction in the antlered bag limit.
 - In a similar question as above regarding Region B, deer hunters who hunted Region B were asked about reducing the total bag limit for antlered deer in Region B from 6 antlered deer to 3 per year or from 6 antlered deer to 2 per year (this sub-sample was divided, each getting either the question about reducing to 3 or reducing to 2). They are fairly evenly split on this question between support and opposition, with neither side being in the majority (because of the small percentage who had no opinion).
 - The survey asked about having a single antlered deer bag limit for all seasons rather than three separate bag limits (one for each season—bow, firearms, and muzzleloader): the majority of deer hunters oppose having a single bag limit replace three separate bag limits; nonetheless, more than a third support. Similarly, most deer hunters oppose having a single antlered deer bag limit statewide instead of separate bag limits for Regions A and B; about a third support a single statewide bag limit. Finally, the survey asked about a single antlered

deer bag limit for all seasons *and* regions together: a majority oppose, while about a third support.

- Region B deer hunters were also asked about the antlerless bag limit: a large majority support the current bag limit of 10 antlerless deer in Region B for the bow, firearms, and muzzleloader seasons, while just less than a quarter oppose.
- In another regulation pertaining to Region A, deer hunters there are split on whether they want deer hunting in Region A managed differently on public versus private lands.
- In a question pertaining to Washington and Frederick Counties within Region B, deer hunters there are split on whether they want deer hunting in those two counties managed differently on public versus private lands.
- Deer hunters who hunted Region B were asked about their frequency of trying to harvest 2 antlerless deer so that they may harvest a bonus antlered deer (as is required by regulations): while 2 in 5 always or sometimes do so, the majority rarely or never do so. In a follow-up question, the majority of Region B deer hunters who said that they attempt to harvest 2 antlerless deer to be allowed to harvest the bonus antlered deer indicated that they would harvest the same number of antlerless deer even if they would not be allowed to harvest the bonus antlered deer.
- The survey asked deer hunters about their frequency of practicing quality deer management (by harvesting mostly does and refraining from harvesting bucks less than 2½ years old): the majority practice quality deer management always, and the overwhelming majority do so always or sometimes. In line with the fact that most deer hunters practice quality deer management, most are in favor of mandatory quality deer management regulations, while about a quarter oppose such mandatory regulations.
- There is a regulation that stipulates that all healthy deer harvested for population control and crop damage control be processed and used for food, regardless of the time that they are harvested: the overwhelming majority of large landowners agree with this policy.
- Awareness is high among deer hunters of venison donation programs in Maryland for extra harvested deer: more than three-fourths of deer hunters are very aware of venison donation programs.

LANDOWNERS' USES OF LAND AND HUNTING PERMISSION ON LANDS

- Most of the land of the landowners in the study is used primarily for commercial agricultural crops, but other agricultural uses include livestock production, commercial forestry, orchards, and nurseries.
- An overwhelming majority of large landowners allow deer hunting on their property. However, most of those who allow hunting allow only friends and family. Of those who allow others besides friends and family to hunt on their property, just more than a quarter charge hunters for that privilege.

- Reasons for allowing only friends and family include not wanting strangers on the property, concern about personal safety, to limit crowding on the land, the poor behavior of hunters, and legal liability.
- In line with their majority opposition to Sunday hunting (as discussed previously in another section of this report), large landowners are less likely to allow Sunday deer hunting on their property than to allow it.

KNOWLEDGE OF AND OPINIONS REGARDING CHRONIC WASTING DISEASE

- Just less than a third of Maryland residents had heard of chronic wasting disease (CWD) prior to the survey. After being given an explanation of CWD, a majority of Maryland residents said that they are very or somewhat concerned about CWD. Finally, a large majority of Maryland residents would support a substantial reduction in the deer population by legal, recreational hunting in areas where CWD is found.
- The overwhelming majority of Maryland deer hunters had heard of CWD prior to the survey, are very or somewhat concerned about CWD, and would support a substantial reduction in the deer population by legal, recreational hunting in areas where CWD is found.
- Deer hunters are split on whether they, personally, would decrease their amount of deer hunting in Maryland if CWD were found in the state: while half would not be at all likely to decrease their deer hunting, nearly half would be very or somewhat likely to decrease their deer hunting in Maryland. They were then asked if they would *quit deer hunting entirely* in Maryland if CWD were found in the state: about three-fourths would be not at all likely to quit deer hunting entirely, but one-fourth would be very or somewhat likely to do so.
- The majority of large landowners had heard of CWD prior to the survey. After being given an explanation of CWD, the majority of large landowners said that they are very or somewhat concerned about CWD. Also, a large majority of landowners would support a substantial reduction in the deer population by legal, recreational hunting in areas where CWD is found.

SOURCES OF INFORMATION ABOUT DEER

- The survey asked Maryland residents where they obtain most of their information about deer in Maryland: newspapers were the most common source, followed by television. Among deer hunters, the most common sources of information about deer are the *Maryland Hunting Seasons and Regulations* handbook, magazines, the MDNR Website, newspapers, and brochures/pamphlets. Among landowners, the most popular sources are newspapers, magazines, and word-of-mouth.
- The survey asked Maryland residents about the credibility of five sources of information about deer. Those perceived as the most credible by residents are a professor of natural resources, biology, or environmental science at a Maryland college or university or a biologist with the MDNR. The percentages are tabulated below. Note that each source had a low percentage perceiving it as “not at all credible”; the low percentages answering very

credible or somewhat credible on some of the sources are as a result of a large percentage answering “don’t know.” A second tabulation excludes “don’t know” answers; in this latter tabulation, all sources are perceived as highly credible among residents.

Do you think each of the following is very credible, somewhat credible, or not at all credible as a source of information on deer?	Very credible (%)	Somewhat credible (%)	Total credible (%)	Not at all credible (%)	Don't know (%)
Q97. A professor of natural resources, biology, or environmental science at a Maryland college or university	50	39	89	3	8
Q96. A biologist with the MDNR	60	27	87	2	11
Q95. Humane Society of the United States	40	38	78	12	10
Q98. Magazines such as Buckmasters and North American Whitetail	19	44	63	12	24
Q94. Fund for Animals	8	23	31	7	62

Note that rounding causes apparent discrepancies.

Do you think each of the following is very credible, somewhat credible, or not at all credible as a source of information on deer? (Don't know answers excluded.)	Very credible (%)	Somewhat credible (%)	Total credible (%)	Not at all credible (%)
Q96. A biologist with the MDNR	67	30	97	3
Q97. A professor of natural resources, biology, or environmental science at a Maryland college or university	55	42	97	4
Q95. Humane Society of the United States	44	42	86	13
Q98. Magazines such as Buckmasters and North American Whitetail	25	58	83	16
Q94. Fund for Animals	22	60	82	18

Note that rounding causes apparent discrepancies.

- The survey also asked large landowners about the credibility of the same five sources of information about deer. Those perceived as the most credible by landowners are a biologist with the MDNR or a professor of natural resources, biology, or environmental science at a Maryland college or university. The percentages are tabulated below. A second tabulation excludes “don’t know” answers. In this latter tabulation, sources that are perceived as highly credible are a biologist with the MDNR; a professor of natural resources, biology, or environmental science at a Maryland college or university; and magazines such as Buckmasters and North American Whitetail.

Do you think each of the following is very credible, somewhat credible, or not at all credible as a source of information on deer?	Very credible (%)	Somewhat credible (%)	Total credible (%)	Not at all credible (%)	Don't know (%)
Q115. A biologist with the MDNR	45	36	81	3	16
Q116. A professor of natural resources, biology, or environmental science at a Maryland college or university	36	43	79	6	15
Q117. Magazines such as Buckmasters and North American Whitetail	23	35	58	8	33
Q114. Humane Society of the United States	15	37	52	29	20
Q113. Fund for Animals	3	13	16	17	67

Note that rounding causes apparent discrepancies.

Do you think each of the following is very credible, somewhat credible, or not at all credible as a source of information on deer? (Don't know answers excluded.)	Very credible (%)	Somewhat credible (%)	Total credible (%)	Not at all credible (%)
Q115. A biologist with the MDNR	53	43	96	4
Q116. A professor of natural resources, biology, or environmental science at a Maryland college or university	42	50	92	7
Q117. Magazines such as Buckmasters and North American Whitetail	35	53	88	11
Q114. Humane Society of the United States	19	46	65	36
Q113. Fund for Animals	8	41	49	51

Note that rounding causes apparent discrepancies.

Appendix 4. Status of objectives and strategies of the 1998 White-tailed Deer Plan by major category

Objective by Major Category	Objective Met?	Explanation
General Deer Population Management		
1. Develop deer population level objectives for deer management units.	Partially met	Deer management regions and management units were developed. Deer population level objectives were not developed.
2. Utilize all available deer management options in an integrated program to maintain deer populations at acceptable levels.	Met	MDNR has researched, promoted and implemented numerous new non-lethal and lethal deer control methods. The population has been stabilized, although at higher than desired levels.
3. Develop effective deer population monitoring techniques.	Met	Collection of harvest data has been streamlined via telephone/Internet check in. Aerial FLIR surveys were implemented in urban/suburban areas (discontinued after 9/11/01).
4. Develop models for deer population assessment, behavior and habitat impacts management.	Met	Deer population models were developed. Habitat studies have been conducted. Research studies have been completed in cooperation with universities.
5. Increase the efficiency and application of regulated hunting for deer population control while maximizing recreation opportunities for hunters.	Met	Antlerless seasons and bag limits were liberalized. Eliminated fee for antlerless harvest tags. Seasons and bag limits were set based on regions. Bonus antlered tags requiring two antlerless deer to be harvested were instituted. Legislation was passed contributing \$1 from every hunting license sale to venison donation programs.
6. Assist local governments and communities in developing effective deer management strategies.	Mostly met	Urban deer biologist was hired who primarily met with community associations, local governments, etc. Various outreach materials were developed and provided to constituents. Suburban deer management

		demonstration area was not developed.
7. Minimize deer damage problems for agricultural operations	Partially met	DMP program was streamlined significantly. Landowner guide to deer management was created. Deer population still remains too high in some areas, resulting in serious crop depredation problems.
Deer Management on Public Lands		
1. Manage deer at levels compatible with available habitat.	Partially met	Deer harvest monitored on all public lands that had active deer hunting. Other deer population metrics (deer-vehicle collisions, habitat impacts, complaints, spotlight counts, etc.) not monitored for all public lands. Population level objectives for individual public lands were not developed.
2. Balance deer management techniques with traditional and new recreational uses of area.	Partially met	Some public lands underwent the public input process to develop deer management options. Outreach materials were developed. Pilot projects not formally completed. Many public lands not addressed.
Educational Opportunities		
1. Provide to interested individuals and groups information and educational materials regarding deer biology, management, recreational opportunities and the impacts that deer have on landscapes and people.	Mostly met	Information and education outreach concerning deer management was performed through all media (press releases, Internet, oral presentations, etc.). Numerous deer-related segments produced with MPT. Numerous outreach materials developed and provided to public. Public service announcements using celebrities not developed/used.
Human Safety Considerations		
1. Reduce vehicle-deer collisions across Maryland.	Partially met	Based on Responsive Management survey, deer-vehicle collisions remained nearly stable over 10-year period. Outreach was developed warning motorists of dangers of deer-vehicle collisions and how to help

		avoid them. Portable roadside message signs not employed. Science-backed, peer-reviewed reflector study not conducted. Discussions did occur with MDOT concerning the reporting of deer-vehicle collisions.
2. Increase public awareness regarding Lyme disease and work to reduce the incidence of Lyme disease in Maryland.	Met	Outreach materials concerning Lyme disease were developed. MDNR permitted insecticide studies involving deer feeders.
3. Increase public understanding of regulated hunting programs.	Met	Hunter safety classes continue to be refined. Shooter qualification program developed for managed hunts. Various outreach materials regarding firearm and hunting safety were produced for hunters and non-hunters.
Staffing, Funding and Legislative Needs		
1. Provide necessary funding to implement the deer management plan.	Met	Federal aid monies used efficiently. Hunting license fees were increased (however, bonus tag revenue decreased). Alternative grant monies were solicited (matching funds for university studies, USDA grants for CWD research, etc.).
2. Provide necessary staffing to implement the deer management plan.	Met	Staffing for the Deer Project increased from one person to three persons. Regional staff were incorporated into more deer management activities.
3. To facilitate changes to existing statutes that will allow the DNR to implement the strategies outlined in the deer plan for population control.	Met	Select statutes were changed to regulations. Dorchester County statutes were changed. Additional licenses were made available (non-resident three-day and junior).

Appendix 5. Deer management options and their advantages and disadvantages

The following deer management actions are often proposed as options to be considered when managing white-tailed deer in Maryland. Several of the options are viable in Maryland while others are not. Information in this section was adapted from the publication “An Evaluation of Deer Management Options” originally produced in 1996 and revised in 2009 by the Northeast Deer Technical Committee and the New England Chapter of The Wildlife Society (Ellingwood and Caturano 1996).

No Action (Allow Nature to Take Its Course) - Settlers and Native Americans in North America altered many natural ecosystems. Some native plants and animals have been eliminated while exotic plants and animals have been introduced as modernization spread across the continent. Wolves and mountain lions, the large native predators of Maryland white-tailed deer, disappeared with the expansion of settlements. Maryland settlers removed and degraded deer habitat through extensive timber harvest in order to build homes and to heat their dwellings.

Modern humans, who were responsible for the near extinction of deer, relocated white-tailed deer back into its original range of Maryland. After an era of protection and management, deer numbers in some locations now are at levels that negatively impact native habitats and other wildlife such as forest dwelling birds (Bates and Dawson 2005).

White-tailed deer at high densities often are in poorer condition than deer at lower densities due to competition for limited resources. High-density deer herds also increase the potential for spreading diseases and parasites (Davidson and Doster 1997).

Humans have been involved in the survival, demise and return of the white-tailed deer from pre-colonial times to the computer age. The resulting changes to the landscape and fauna of the state have so drastically modified natural processes that they no longer function adequately enough to keep a species such as white-tailed deer in check with the environment. To suggest that we now remove ourselves from the active management of deer would be ecologically irresponsible.

Relocation - Relocating deer requires the existence of habitat lacking suitable deer numbers to act as the release site. Most traditional white-tailed deer habitat in North America already contains adequate white-tailed deer densities. Deer released from problem areas into new areas may contribute to crop and ornamental plant damage within the new range.

Relocating excess deer requires baiting, capturing, handling and transporting deer over substantial distances. The capture of deer, as with any wild animal, contains risks. Deer relocation projects often experience significant deer mortality related to the stress of capture and to human activity at the release sites (Beringer et al. 2002). When wildlife is being relocated to vacant habitat, mortality rates resulting from capture must be accounted for in the wildlife restoration project.

Relocation of white-tailed deer and other animals may contribute to the spread of disease. Once thought to be a western state deer and elk disease, chronic wasting disease (CWD), a fatal disease of deer and elk, has been found in white-tailed deer east of the Mississippi River in Wisconsin, Illinois, New York and West Virginia. Most states, including Maryland, have

imposed bans on the importation of live deer and elk in order to help stop the spread of this serious wildlife health threat. Maryland also bans the movement of live white-tailed deer within the state.

Relocating deer incurs financial burdens as well. In 1997, the Gaithersburg City Council investigated the potential for relocating deer to Kentucky. Costs to capture and relocate each deer were estimated at \$800. The relocation effort did not occur due to cost concerns and to the risk of spreading hemorrhagic disease and Lyme disease.

Repellants - Repellents deter deer from feeding on plants (DeNicola et al. 2000). ‘Contact’ repellents are placed directly on the plant and discourage deer by producing an unpleasant taste. ‘Area’ repellents are placed in the vicinity of the vegetation and repel deer by an unpleasant odor.

Repellents provide the best protection when used in small areas such as gardens or landscaping ornamentals and when regularly applied after rainfall. Commercial croplands require large amounts of repellents and usually make their use cost prohibitive.

Repellents fail to address the growing deer population. The effectiveness of repellents declines as deer numbers rise. Competition for food can force deer to eat previously less palatable vegetation.

Fences - Fences create a barrier between deer and the protected vegetation. Fences may be an eight foot tall barrier or a shorter electric fence (Miller et al. 2001). The barrier fence is more costly than the electric fence. Both require regular inspection and maintenance to ensure their effectiveness. Small fenced enclosures can protect small backyard garden plots and some high value commercial agricultural crops.

The Smithsonian Environmental Research Center (SERC) located in Edgewater (Anne Arundel County) used eight foot high electric fences in an experimental deer control project for 80 acres of soybeans (Correll 1994). The SERC final Environmental Assessment stated “The fence was not a sufficient barrier to the dense deer population and in 1993 crop damage to soybeans within the fenced area was severe. This result convinced the farmers that they could no longer afford to farm the fields on SERC property or on private properties adjacent to SERC.”

Contraceptives - Interest in fertility control of deer populations continues within the scientific and private communities. As research has progressed, questions remain regarding public health implications, percentage of does requiring treatment, methods of treating each doe, effects on deer social structure and overall long-term health of the deer population.

Deer management through contraception remains experimental. Deer contraception researchers believe that small isolated populations, such as those found on islands or in adequately fenced areas, have the greatest potential for success. Managing free ranging white-tailed deer populations over large landscapes with contraceptives would present tremendous challenges.

In an effort to learn more about contraceptives as a potential management tool, MDNR has approved and supported two contraceptive studies in Montgomery County and one on the upper Eastern Shore. Results of the studies are pending.

MDNR and other state wildlife agencies are consulting with the Association of Fish and Wildlife Agencies (AFWA) to prepare appropriate guidelines for the potential future use of deer contraceptives. These procedures and guidelines will ensure that this new deer management tool is applied in appropriate situations.

Supplemental Feed - Supplemental feeding programs are most often designed to attempt to attract deer away from ornamental vegetation and gardens to minimize damage. Advocates of this approach believe that deer will eat the supplemental forage and stop damaging crops or ornamental plants.

Unfortunately, deer feeding programs can cause deer damage to increase over the long term. Providing an artificial food source can actually increase deer densities and the potential for damage can escalate as well.

Wildlife biologists discourage the long term supplemental feeding of deer (Williamson 2000) because concentrating deer at food sources for extended periods of time elevates the potential for disease and parasite transmission. Likewise, the surrounding natural vegetation often is over-browsed by the large concentration of deer attracted to the artificial food source.

Predator Reintroduction - The white-tailed deer's ability to leap over objects and run at high speed evolved from their need to escape large predators such as wolves and mountain lions. Some groups have suggested that large predators could be reintroduced into their historical ranges in Maryland to control deer. The urban and suburban locations, which harbor some of the most dense deer populations in Maryland, could not supply suitable habitat for these wide ranging predators. The safety of humans and domesticated animals would obviously hamper the release of mountain lions and wolves anywhere in Maryland.

Existing Maryland predators such as bobcats, coyotes and bears are not effective predators of white-tailed deer. While they do take fawns and sick or injured adult deer, deer productivity data in sections of the state with long-term coyote, bear and bobcat populations do not suggest that these animals are measurably affecting deer productivity.

Sharpshooting - Facilities or areas that have high densities of homes or may have security concerns are often conducive to deer sharpshooting operations (DeNicola et al. 2000). Secure military facilities, often with airfields where roaming deer are a serious danger to incoming and outgoing aircraft, commonly use sharpshooters to remove deer in Maryland. Narrow stream valley public parklands with residences lining the woodlands are other typical landscapes where sharpshooting can provide deer population control.

Sharpshooting provides a tightly controlled method for removing deer. Deer are often baited to specific shooting locations that offer safe shooting conditions that enable shooters to choose specific deer to kill (i.e., females). While sharpshooting is very effective, it is also expensive.

Costs for deer removal using sharpshooting typically include venison donation costs and range from \$150 to \$450 per deer.

Modern Regulated Hunting – Experience from the past 100 years of deer management indicate that regulated hunting is the most effective method available to manage white-tailed deer. Regulated deer hunting is ecologically sound and fiscally responsible. Presently, hunters remove 90,000 – 100,000 deer a year from the Maryland population at virtually no cost to the public. Conservative estimates suggest it would cost in excess of \$50 million to lethally remove the same number of deer each year using other methods. At the same time, non-lethal techniques do not exist to effectively manage deer on a statewide basis.

The disadvantages of regulated hunting are mostly culture-based. Some citizens do not accept the need to kill any animal via hunting. Likewise, extensive development in many parts of Maryland creates severe limitations on where hunting may occur legally or safely. Unfortunately, deer populations can quickly rise in these areas due to low mortality rates and excellent habitat, exacerbating the cultural and ecological problems associated with too many deer. In these localized areas, other lethal and non-lethal control methods must often be employed.

Appendix 6. Common white-tailed deer diseases and ailments

Hemorrhagic Disease - Hemorrhagic disease (HD) is the most common deer disease in Maryland and across many of the southeastern states. There are two types of HD caused by two different viruses: epizootic hemorrhagic disease (EHD) and blue-tongue (BT) (Davidson and Nettles 2006).

Biting midges in the genus *Culicoides* spread the HD virus among animals. Cattle may become infected and spread the virus but they rarely exhibit clinical symptoms of HD. Humans, dogs and cats are not infected. Infected deer that develop secondary bacterial infections or abscesses may not be suitable for human consumption.

Deer infected with HD lose their appetite and often their fear of humans. As the disease progresses, deer grow weaker, salivate excessively and are short of breath. Lesions on the tongue and upper front palate may appear. High fever associated with the disease drives deer to water for relief and sick or dead deer are often found near ponds and streams. Farmers may find groups of deer carcasses near farm ponds or in their crop fields during the harvest season.

Deer that survive the initial onslaught of HD may exhibit the sloughing of tissue on the hooves. MDNR staff routinely check the hooves of harvested deer for signs of HD while collecting biological data from deer at deer processors. These data are reported to the Southeast Cooperative Wildlife Disease Study (SCWDS) at the University of Georgia. SCWDS staff discovered HD and have extensive research experience with this disease.

There are no preventative measures available to control HD. MDNR staff collect suspected HD deer and transports them to the Maryland Department of Agriculture Animal Health Laboratories. Health lab staff collect samples and ship them to SCWDS for isolation of HD viruses and final diagnosis.

The impact HD has on white-tailed deer populations is difficult to determine. Localized outbreaks in West Virginia and Missouri had estimated infection rates of 29% and 24% and estimated overall fatality rates of 20% and 8% (Davidson and Nettles 2006).

In September 1999, HD infected a group of radio-collared white-tailed deer in Dorchester County. Seventeen white-tailed deer were collared and 3 deer died with HD type symptoms (18%). One of the deer was tested for HD and tested positive.

Maryland experienced another significant outbreak of HD in 2007. Estimates of mortality are not available, but a decline in the annual deer harvest in some counties suggests it is likely that 10 – 20% of the population may have been impacted in localized areas. Impacted deer populations normally rebound to previous levels within several years of an outbreak.

Chronic Wasting Disease - Chronic wasting disease (CWD) is not currently found in Maryland. It is a fatal disease that attacks the brain and spinal cord of deer and other cervids, specifically white-tailed deer, moose, mule deer and Rocky Mountain elk. While the exact cause is not known, it is believed to be a prion disease. A prion is an altered protein that causes other normal

proteins to change and cause sponge-like holes in the brain. The origin of these prions is currently unknown.

CWD is related to, but different from, scrapie in sheep, bovine spongiform encephalopathy (BSE or mad cow disease) in cattle and Creutzfeldt-Jacob disease (CJD) in humans. These diseases also attack the brain and cause deterioration and eventual death. CWD was first identified in the 1960s in a Colorado research facility and since that time it has been found in Illinois, Kansas, Minnesota, Montana, Nebraska, New Mexico, New York, Oklahoma, South Dakota, Utah, West Virginia, Wisconsin, Wyoming and Canada. CWD has not been found in white-tailed deer in Maryland.

In the early stages of CWD, affected animals may not show signs of the disease. As the disease progresses, infected animals will show signs of weight loss, generally accompanied by behavioral changes. In later stages of the disease, affected animals may show emaciation, excessive drooling, increased drinking and urination, listlessness, stumbling, trembling, loss of fear of humans and nervousness.

CWD appears to be passed between animals via saliva, feces or urine. Transmission between females and their fetuses (maternal transmission) does not seem to be a factor although indirect transfer, from contaminated soil for example, may occur. CWD may be transmitted more readily within overpopulated herds and at deer or elk feeding stations where direct physical contact among individuals is more likely. Prion diseases, like CWD, do not move easily between species. There is no scientific evidence that CWD has been transmitted to animals other than deer, elk and moose.

Research has not demonstrated transmission of CWD between cervids and humans. Scrapie, a similar prion disease in sheep has been studied for centuries and has not been shown to be transmissible to humans. However, in Great Britain, BSE (“mad cow disease”) was found to be transmissible to humans through the consumption of contaminated meat; the human form of this disorder is known as new variant Creutzfeldt-Jacob disease (vCJD). As a precaution, people who handle deer and elk from areas where CWD is known to occur are being instructed to take special measures to avoid possible infection. As a general precaution it is recommended that people avoid all wild animals that appear to be sick and to not consume their meat.

The Maryland Department of Agriculture (MDA), Maryland Department of Health & Mental Hygiene (DHMH) and the United States Department of Agriculture (USDA) are integral partners in all CWD surveillance plans. These agencies readily assist MDNR staff in monitoring wild deer populations with the goal of protecting domestic animals and human health. MDNR has worked with these partners to conduct targeted CWD surveillance of sick deer since 1999, with random active surveillance of hunter-harvested deer beginning in 2002. Each year a sample of hunter harvested deer from each county are examined. To date, over 4,500 free ranging Maryland deer have been tested for CWD with none testing positive.

Maryland Deer Project staff meet on a regular basis with their peers from the northeastern and southeastern states and SCWDS to discuss new information regarding CWD. Soon after CWD was identified in West Virginia in 2005, MDNR staff attended regional CWD and public

meetings held in West Virginia. MDNR's CWD Response Plan will guide Maryland's response should CWD be detected within the state or within another adjacent state.

MDNR has implemented several measures to prevent CWD from infecting Maryland deer. Because captive deer are a higher risk for CWD infection, all illegally held captive deer are confiscated, euthanized and tested for CWD. Likewise, a hunter may only bring in certain parts of cervids harvested in sections of states or provinces harboring CWD. Hunters must immediately contact MDNR if they are notified that the cervid they harvested in another state tests positive for CWD.

Cutaneous Fibroma - Cutaneous fibroma are warty hairless growths on the skin of white-tailed deer caused by viruses that are believed to be spread by biting insects. The nonfatal tumors vary in size from less than an inch to more than 8 inches in diameter. The tumors may be smooth or warty and vary from black to gray in color. Transmission to other animals such as livestock does not occur. Human consumption of infected deer would only be compromised by extremely large tumors with secondary infections. Deer managers have no method of preventing or controlling the spread of this condition.

Arterial Nematode Infection (Lumpy Jaw) – “Lumpy jaw” is the result of an infection by the arterial nematode *Elaeophora schneideri*. The adult arterial nematode worm lives primarily in the deer's carotid arteries. High worm infestations reduce blood flow, causing partial paralysis of the deer's jaw muscles. Food becomes impacted inside the deer's mouth due to the jaw muscle paralysis. The food impaction causes the “lumpy jaw” appearance. The common horsefly passes the nematode larvae from an infected deer to an uninfected one by feeding on deer blood. Infection rates do not impact deer populations and no human health implication has been reported. There is no method that can prevent or control the spread of this parasite.

Nasal Bot Fly Larvae - Fly larvae of the genus *Cephenemyia* live in the nasal passages and retropharyngeal pouches of deer. The adult fly lays an egg packet on the deer's skin around the nose or mouth. The deer licks the egg packet and the larvae are released into the deer's mouth. The larvae grow within the deer's nasal passages. Mature larvae drop on the ground to pupate in the soil. Nasal bots are not harmful to deer and do not make the meat unsuitable for consumption. When hunters are dressing deer, they may observe these bots exiting the nasal passages. The transmission of this larva cannot be prevented through deer management techniques.

Brain Abscess – Brain abscesses are a fatal deer disease caused by bacterial infections of the brain (a primary bacteria agent is *Actinomyces pyogenes*). Bacteria typically enters the brain through skin infections near the antlers; therefore antlered bucks are more prone to having this malady due to antler rubbing and sparring. This disease usually occurs during the time period immediately following velvet shedding through antler drop (September through March). Infected deer exhibit neurological problems, such as circling and lack of coordination and some deer may exhibit strange behavior such as walking toward humans. Deer may be in poor physical condition. Total mortality in the deer population is probably low with adult antlered bucks being at higher risk than females and yearling bucks. Deer with brain abscesses should not be consumed. There is no deer management remedy for the spread of these bacteria.

Appendix 7. Summary of public comments regarding the draft 2009-2018 Maryland White-tailed Deer Management Plan

Public comments regarding the draft 2009-2018 Maryland White-tailed Deer Management Plan were accepted for 30 days after the plan was thoroughly reviewed and edited by MDNR staff, WAC, the deer plan stakeholder group, and an outside professional. MDNR announced the public comment period via a press release and on the agency website. The public could submit comments via the website, email, fax, letter, or telephone.

A total of 90 public comments were received regarding the draft plan and predominantly focused on hunting issues including Sunday hunting, crossbow use, antler restrictions, deer check-in, and the Washington County deer harvest. Numerous comments suggested increasing the number of Sundays available to hunt, increasing the opportunities to hunt with crossbows, and implementing quality deer management regulations to improve buck age structure in the Maryland deer population. Likewise, several individuals expressed concern with the current liberal deer harvest regulations in Washington County, and several were concerned with possible abuse of the electronic check-in system. While all of these comments were very constructive, they were more operational in nature, and can be addressed via the biennial regulatory process (or legislatively as required in the case of Sunday hunting) instead of specifically in the 10-year deer plan. It should be noted that all of these comments are broadly addressed via the Population and Recreation Goals of the plan (pp. 38 & 43).

Several comments were received by concerned individuals regarding the welfare of hunted deer, the emphasis of the plan on lethal control via hunting, and the perceived lack of effective policing of hunters via MDNR enforcement. Hunting remains the most effective and economical method for managing deer and therefore plays a prominent role in the management plan. Objective 5 (pg. 45) under the Recreation Goal specifies that “deer hunting remains a safe, fair, and ethical activity that meets the expectations of the majority of Maryland citizens.” Strategies under Objective 5 are designed to educate Maryland deer hunters so that they can enjoy the deer hunting pastime without negatively impacting the remaining public. The Department will continue to work with both the hunting and non-hunting public to ensure deer hunting remains the effective and ethical deer management tool that it currently is while at the same time minimizing any negative impacts to the non-hunting public.

Lastly, several comments were received regarding the high number of deer-vehicle collisions (DVCs) and high incidence of deer crop damage in Maryland. Both of these issues will remain a primary concern of MDNR and are addressed specifically in the body of the plan (pp. 33 – 35) and under the Damage Goal (pg. 45).

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