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AGENCY REVIEW

DEPARTMENT OF COMMERCE DIVISION OF NATURAL RESOURCES

AUDIT OVERVIEW

The State's Deer-Vehicle Collision Rate Is High, Reflecting a Serious Deer Problem and a Measure of Inadequacies in the State's Deer Management Policies. The DNR Should Follow the Lead of Other States That Have Recently Emphasized Goals and Strategies Designed to Control the Deer-Vehicle Collision Rate



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EXECUTIVE SUMMARY

Issue 1: The State’s Deer-Vehicle Collision Rate Is High, Reflecting a Serious Deer Problem and a Measure of Inadequacies in the State’s Deer Management Policies. The DNR Should Follow the Lead of Other States That Have Recently Emphasized Goals and Strategies Designed to Control the Deer-Vehicle Collision Rate.

This report represents the Agency Review of the West Virginia Division of Natural Resources (DNR), as part of the Departmental Review of the Department of Commerce. Overall, the Legislative Auditor finds that deer-vehicle collisions are a significant problem in West Virginia and they are representative of a deficiency in the State’s deer management plan. The DNR does not have specific performance measures or goals related to reducing damage caused by deer, such as deer-vehicle collisions. The agency should expand the focus of the deer management program to include a greater emphasis on managing and mitigating the damage caused by deer.

Report Highlights:

- West Virginia has the highest rate of deer-vehicle collisions in the country according to two national studies and the rate is significantly higher than any other state.
- West Virginia’s Office of the Insurance Commission began measuring deer-vehicle collisions because of the high economic costs associated with these incidents.
- Deer also appear to be causing excessive damage to agriculture and forests in many parts of the state.
- The wildlife management agencies in Maryland, Michigan, and Virginia have established policy statements, goals, objectives, and strategies in their deer management programs that relate to reducing deer-vehicle collisions.

Recommendations

1. *The Legislative Auditor recommends the Division of Natural Resources improve its collection and measurements of deer damage data related to crop damage and forest damage.*
2. *The Legislative Auditor recommends that the Division of Natural Resources should utilize the various deer-damage statistics, including deer-vehicle collision data, as performance measures to determine their appropriate levels, and to determine the effectiveness of the agency's deer management policies.*
3. *The Legislative Auditor recommends the Division of Natural Resources create objectives, performance goals, and strategies, in addition to hunting, to reduce the various forms of deer damage across West Virginia.*
4. *The Legislative Auditor recommends the Division of Natural Resources initiate research related to reducing deer-vehicle collisions, crop damage, and forest damage created by deer in West Virginia.*

OBJECTIVE, SCOPE & METHODOLOGY

Objective

This Agency Review was conducted as part of the Department Review of the Department of Commerce required by West Virginia Code §4-10-8(b)(3). The Division of Natural Resources (DNR) is statutorily obligated to provide a comprehensive program for the exploration, conservation, development, protection, enjoyment and use of the natural resources of the state of West Virginia under the State Natural Resources Law, West Virginia Code §20-1-1. Recent research indicates that West Virginia is suffering from excessive deer damage in the form of deer-vehicle collisions, crop damage, and forest damage. The objective of this performance review was to determine if the DNR's deer management plan adequately addresses the state's significant problems with white-tailed deer.

Scope

This review focuses on the DNR's deer management policies regarding deer damage in the agency's most recent white-tailed deer Operational Plan for 2006-2010.

Methodology

The evaluation of the Division of Natural Resource was conducted by interviewing and corresponding with agency personnel, examining State Code, and reviewing the Division of Natural Resources documents, records, and publications. Reports and newsletters on deer-vehicle collisions from the West Virginia Office of the Insurance Commissioner (OIC) and the automobile insurance industry were reviewed and compared for the sections on deer-vehicle collisions. The Legislative Auditor staff performed a statistical analysis on data compiled by the DNR and the OIC. Interviews with personnel from other West Virginia state agencies, personnel from other states' wildlife and transportation agencies, the United States Forest Service (USFS), State Farm Insurance Company, and non-government organizations were also conducted. Research from the USFS, other states' transportation agencies, and nongovernment organizations were reviewed. The DNR's deer management plan was also compared to similar plans in other states.

ISSUE 1

The State's Deer-Vehicle Collision Rate Is High, Reflecting a Serious Deer Problem and a Measure of Inadequacies in the State's Deer Management Policies. The DNR Should Follow the Lead of Other States That Have Recently Emphasized Goals and Strategies Designed to Control the Deer-Vehicle Collision Rate.

Issue Summary

The Division of Natural Resources (DNR) is charged with the management of West Virginia's wildlife under State Code. Although managing the state's wildlife is a broad responsibility, deer management is a significant part of DNR's wildlife management. The Legislative Auditor focused this review strictly on DNR's deer management because statistics from the Highway Loss Data Institute and State Farm Insurance show that West Virginia has the highest rate of deer-vehicle collisions (DVCs) in the country, and West Virginia's DVC rate is significantly higher than the second highest state (see Table 1). The losses incurred by DVCs are substantial. In some cases they can involve the loss of human life. If the DVC statistic reflects the agricultural and natural resource losses in the state, then the state likely has a significant problem with deer. The Legislative Auditor identified a few states that have recently incorporated DVC data in their deer management plans, with goals and strategies for mitigating their respective DVC rate. This suggests that these states consider DVC statistics as performance measures and indicators of the appropriateness of the state's deer management policy. The West Virginia DNR has no such emphasis in its deer management plan. Currently, the DNR lists only one performance measure in its Wildlife Management Section, which is to increase nonresident hunting license sales by 2011.

The Legislative Auditor focused this review strictly on DNR's deer management because statistics from the Highway Loss Data Institute and State Farm Insurance show that West Virginia has the highest rate of deer-vehicle collisions (DVCs) in the country, and West Virginia's DVC rate is nearly double the second highest state.

**Table 1
Top 10 DVC Claim Frequency Rates From Two National Studies**

HLDI Claim Frequency Rate per 1,000 Vehicle Years of Insurance		State Farm 2009 Ranking	
State	November	State	Likelihood
West Virginia	50.7	West Virginia	1 in 42
Pennsylvania	28.7	Iowa	1 in 67
Kentucky	25.4	Michigan	1 in 70
North Carolina	25.0	South Dakota	1 in 76
Michigan	21.5	Montana	1 in 82
Virginia	21.3	Pennsylvania	1 in 85
Iowa	21.2	North Dakota	1 in 91
Ohio	20.0	Wisconsin	1 in 96
Tennessee	19.9	Arkansas	1 in 99
Maryland	18.7	Minnesota	1 in 100
National	14.1	National	1 in 182

Source: Highway Loss Data Institute, "Losses Due to Animal Strikes" and State Farm Insurance Company, News Release Oct. 1, 2010.

Given the serious nature and significant costs of damage caused by deer, the Legislative Auditor recommends that the DNR incorporate deer damage data in its deer management plan as performance measures. Included in this emphasis should be goals and objectives for mitigating deer damage.

Deer Damage to Society Is On the Rise in West Virginia

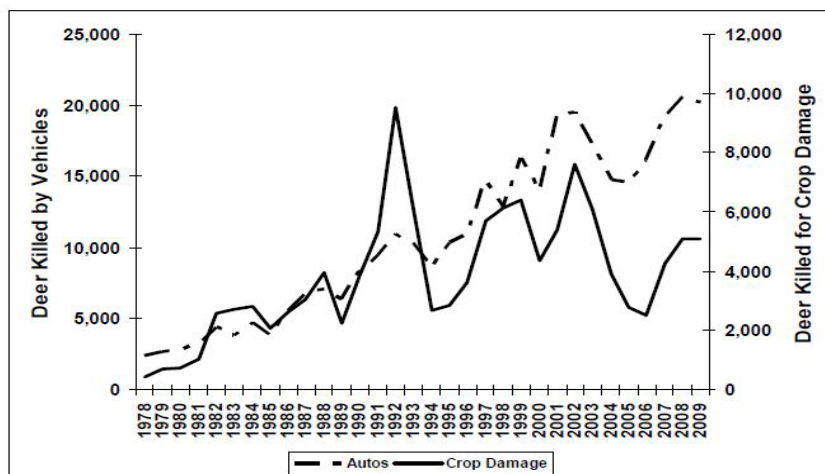
White-tailed deer cause significant damage to society in the form of vehicle collisions, and crop and forest damage in many areas of West Virginia. Biologists refer to this tolerance level of deer as the cultural (or social) carrying capacity (CCC). The CCC is measured by the negative economic and social impact caused by deer and is dependent on the local deer density, land use practices, and the attitudes and priorities of groups within the community. The Northeast Deer Technical Committee, an organization of state and provincial professional deer biologists from northeastern states (including West Virginia) and eastern Canadian provinces states that:

Excessive deer/vehicle collisions, agricultural damage and homeowner/gardener complaints all suggest that CCC has been exceeded.

White-tailed deer cause significant damage to society in the form of vehicle collisions, and crop and forest damage in many areas of West Virginia.

As this statement indicates, deer-vehicle collisions (DVCs) and other deer damage statistics are factors in determining if the CCC has been exceeded. Figure 1 shows the number of deer carcasses collected by the Department of Highways (DOH) from West Virginia's state roads has increased over the past 31 years. This is indicative of the rising incidence of deer-vehicle collisions in the state. Also, Figure 1 shows the number of deer killed through crop-damage

Figure 1
Deer Killed in Vehicle and Crop Damage, 1978-2009



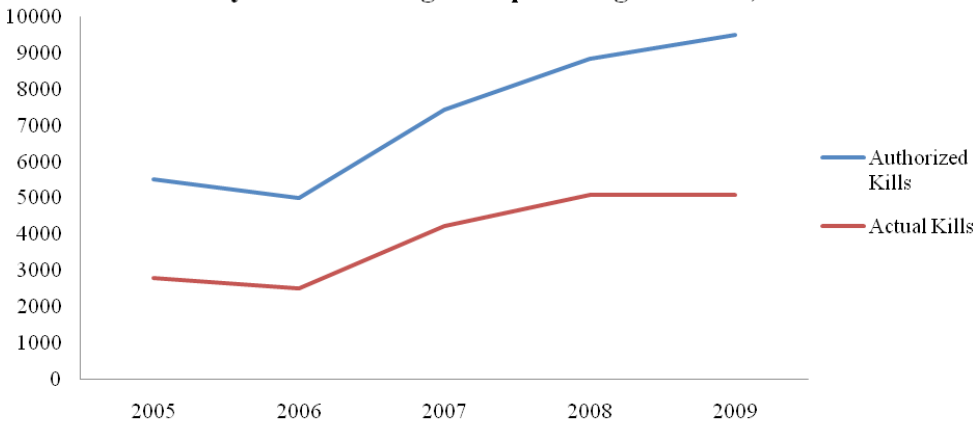
Source: West Virginia Division of Natural Resources

permits issued by the DNR to individuals who request permission to kill deer that are causing damage on their property. Although the reason for the increase in permitted kills is unclear, the dramatic increase in the number of DVCs indicates that there is also likely growth in damage to crops and landscaping vegetation caused by deer.

The Division of Natural Resources has tracked the number of deer permitted to be killed and the number actually killed. Although Figure 1 shows that the increase of deer killed for crop damage has slowed over the past 10 years, Figure 2 shows that the number of deer permitted to be killed for crop damage has actually continued to increase for at least the past four years. Between 2005 and 2009, the number of permits issued by the DNR statewide has almost doubled. The number of deer authorized to be killed is calculated by the DNR based on the extent of the problem landowners are having with deer. The number of deer actually killed is significantly below the number authorized. This suggests that either the DNR has over-estimated the extent of the problem, or the number of actual kills is not addressing the problem and the gap between the two represents a persistent problem.

Although Figure 1 shows that the increase of deer killed for crop damage has slowed over the past 10 years, Figure 2 shows that the number of deer permitted to be killed for crop damage has actually continued to increase for at least the past four years.

Figure 2
The Total Number of Deer Permitted to Be Killed and
Actually Killed Through Crop Damage Permits, 2005-2009



Source: West Virginia Division of Natural Resources

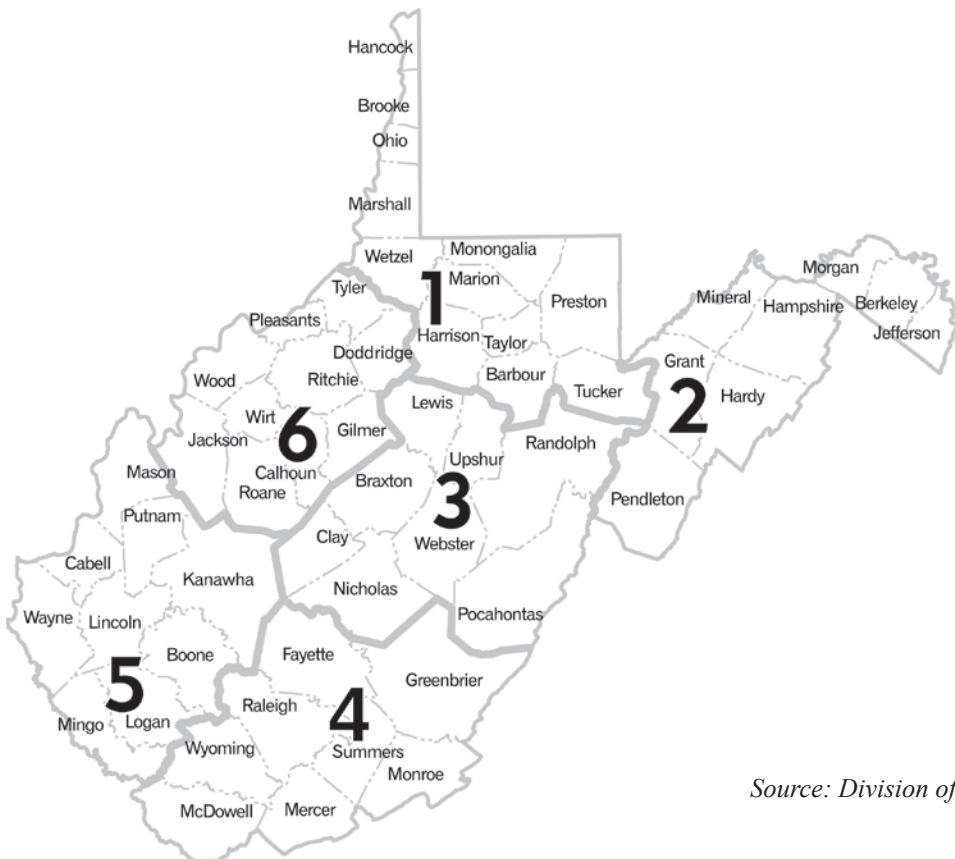
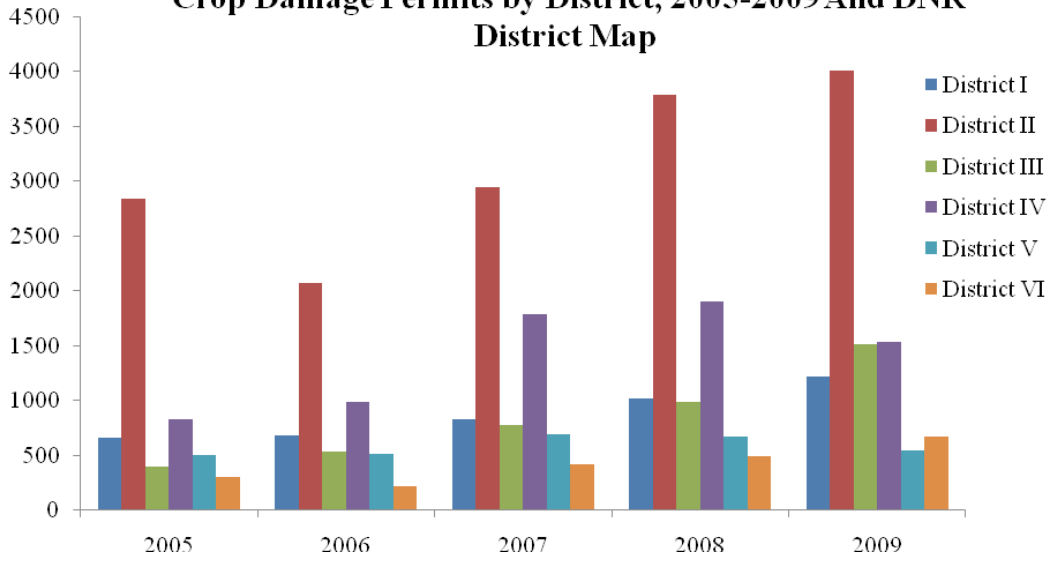
Deer are also threatening the health of West Virginia’s forests, which will be discussed in greater detail later in this report. Deer damage to regenerating stands of recently timbered trees in the Monongahela National Forest suggests some areas may have exceeded the deer

population's environmental limits or Biological Carrying Capacity (BCC). If this damage continues at present rates, the current research indicates that West Virginia's oak forest ecosystems are threatened. Determining the extent or rate of damage to agricultural and forest lands is difficult to determine at this time because of a lack of measures.

As Figure 3 shows, crop damage, as represented by the number of crop-damage permits issued, is most prevalent in District II, which represents the counties in the eastern panhandle. However, most of the other districts have also increased. Forty-three percent of all deer permitted to be killed in the state were in District II. Of that, 44 percent of the kills were in Jefferson and Hampshire Counties. Districts I and III, have steadily increased. The number of permitted kills in District V has remained relatively steady, and District IV increased between 2005 and 2008, with a significant jump between 2006 and 2007 and decreased between 2008 and 2009.

Deer damage to regenerating stands of recently timbered trees in the Monongahela National Forest suggests some areas may have exceeded the deer population's environmental limits or Biological Carrying Capacity (BCC).

Figure 3
Crop Damage Permits by District, 2005-2009 And DNR
District Map



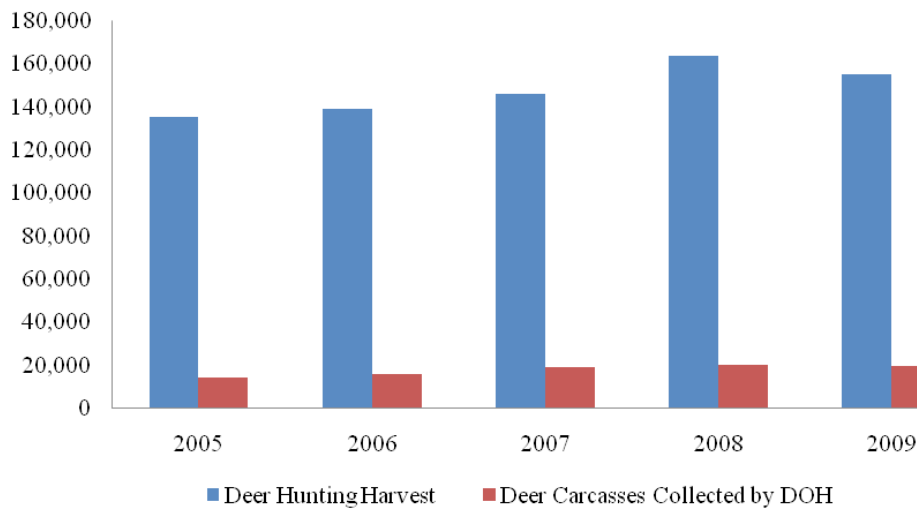
Source: Division of Natural Resources

Although Additional Measures Are Necessary to Reduce Deer Damage, Hunting Provides the Best Form of Population Control and Has a Significant Economic Impact in West Virginia.

While crop damage and DVCs are a significant problem for society, Figure 4 shows that hunting has had the most significant impact on the deer population. The number of deer harvested annually by hunters ranged from 135,361 to 163,603 between 2005 and 2009. During that same time period, the number of deer carcasses collected by the DOH ranged from 14,527 to 20,352. The number of DVCs for at least the past five years has followed a pattern similar to the annual total deer harvest. Both the deer harvest and the number of DVCs increased from 2005 until 2008 and then dropped slightly from 2008 to 2009. Although the reason for this pattern is unclear, it is likely due to a number of factors affecting population growth and decline, including the previous year’s hunter harvest.

While crop damage and DVCs are a significant problem for society, Figure 4 shows that hunting has had the most significant impact on the deer population.

**Figure 4
Deer Harvest vs. Deer Carcass Collection,
2005-2009**



Sources: West Virginia Department of Natural Resources

Hunting, combined with fishing and other wildlife recreation, also has a significant economic impact in West Virginia. According to the DNR's calculations these wildlife-related activities generate an estimated \$1.2 billion annually as of 2006. This calculation is based upon the combined estimated totals from the National Survey of Fishing, Hunting and Wildlife Associated Recreation: West Virginia. The survey is conducted every five years by the U.S. Fish and Wildlife Service and the Census Bureau.

The West Virginia University Extension Service Is In the Process of Conducting a Statewide Survey on Crop Damage

There is insufficient data at this time to measure the extent and cost of crop and landscape damage. However, due to the rising concern of deer damage in the state, the West Virginia University Extension Service is in the process of conducting a mail survey gathering crop damage information from farmers throughout the state. The Extension Service decided to conduct the survey after receiving numerous complaints about deer damage from farmers. The survey will ask farmers to measure the extent and estimate the cost of deer damage on their property, including the loss of crops, as well as the costs of deterrents such as fencing and deer spray. When completed, the WVU Extension Service survey of crop damage should provide policymakers and researchers with data to quantify the cost and extent of deer damage.

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The West Virginia Office of the Insurance Commissioner Has Also Been Concerned With the Rising Deer Damage in the State

A few years ago, the West Virginia Office of the Insurance Commissioner (OIC) noted the state's high rate of DVCs and subsequent costs to citizens. As a result, the OIC began to annually track DVC claims and use that information to project the statewide and county-level DVC rate, costs per DVC, and total statewide losses in dollars. In 2009, the OIC estimated that 1 out of every 55 West Virginian drivers was involved in a DVC. **In terms of statewide economic losses, the OIC calculates that DVCs have cost West Virginians an average of \$44 million a year between 2002 and 2009; however this is only a portion of the total costs associated with DVCs.** These additional costs represent numerous other damage payments and can be found on page 40 (Appendix B). The OIC uses DVC data provided by the top 4 insurance companies in the West Virginia automobile insurance market. These 4 companies cover

In 2009, the OIC estimated that 1 out of every 55 West Virginian drivers was involved in a DVC.

roughly 72 percent of drivers with comprehensive coverage in the state. The projected number of claims is determined by dividing the number of claims in the sample population by the sample market share. The sample market share is determined by dividing the number of insured vehicles in the sample by the total number of registered vehicles in the state. The OIC also uses this method to determine the projected totals for every county in the state.

The OIC began tracking DVC rates after a staff member noted the large number of deer carcasses along West Virginia's highways between 2002 and 2003. The OIC requested the data from the insurance companies to begin a study to calculate the number of DVCs and the costs associated with them. Around the same time, the West Virginia Legislature requested the OIC perform a twelve-month study to quantify claim payments for DVCs. The Legislature requested the study at the time because there were, "...numerous sources which provide data on the economic benefit of the hunting industry to the State, but little which quantifies the economic losses caused by deer." The OIC was able to provide the Legislature with its research and since then has annually released a DVC press release to the public. The press release has also been sent to several members of the Natural Resources and Agriculture Joint Committees since 2008.

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Two National Studies Find West Virginia Has the Highest Rate of DVCs in the United States and That Rate Is Significantly Higher Than Any Other State

Motorists traveling in West Virginia are more likely to have a vehicular collision with a deer than in any other state. The Highway Loss Data Institute (HLDI), an affiliate of the Insurance Institute for Highway Safety, and State Farm Insurance are two studies that have tracked and compared DVC rates across the country based on insurance claims data. **Both national studies rank West Virginia as the state with the highest DVC rate** (see Table 2).

Motorists traveling in West Virginia are more likely to have a vehicular collision with a deer than in any other state.

**Table 2
 HLDI Comprehensive Claims Losses for the 10 States With
 the Highest Claim Frequency of Animal Strikes in
 August and November
 2006-2009**

States	Claim Frequency	
	August	November
West Virginia	17.9	50.7
Pennsylvania	5.9	28.7
Kentucky	7.6	25.4
North Carolina	6.6	25.0
Michigan	5.8	21.5
Virginia	5.7	21.3
Iowa	3.8	21.2
Ohio	4.1	20.0
Tennessee	7.6	19.9
Maryland	3.8	18.7
National	3.9	14.1

Source: Highway Loss Data Institute, "Losses Due to Animal Strikes," September 2009.

The HLDI conducted a comprehensive national study that measures and compares deer-vehicle collision rates and found West Virginia not only has the highest rate of DVCs, but that the rate is nearly double the rate of the second highest state.¹ The study looked at the monthly rates per 1,000 registered vehicle years for the month with the lowest (August) and the highest (November) rate from 2006 through 2009. West Virginia’s rate for November is nearly double the rate of the second closest state, and the August rate is more than double. As Table 2 shows, West Virginia had an average rate of 50.7 claims per 1,000 insured vehicle years for the month of November. Pennsylvania had the second highest rate with 28.7 claims. West Virginia also had the highest rate for August with 17.9 claims;

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¹ *The HLDI technically measures animal strikes. Most insurance agencies do not track the species of animal involved in an accident in their comprehensive claim data; however, the HLDI states four out of five animal strikes involve either deer or elk. The Legislative Auditor therefore assumes that the large majority of strikes reported in the HLDI report involved deer.*

followed by Kentucky and Tennessee each with a rate of 7.6 claims. It is interesting to point out that 9 of the top 10 states are contiguous to one another. Although the surrounding states face similar problems with deer strikes, the issue is more severe in West Virginia than anywhere else. In terms of fatalities from DVCs, West Virginia has experienced fewer than many other states. The HLDI tracked human fatalities in crashes with animals in all fifty states from 1993 through 2007 and found that West Virginia has had 36 deaths in the 14 year period. Twenty-seven states had experienced more deaths in collisions with animals, with the three highest numbers coming from Texas (227), Wisconsin (123), and Pennsylvania (112). Although West Virginia does not have as significant of a problem with fatalities from animal vehicle collisions as many other states do, if the number of DVCs continues to increase, the likelihood for fatalities will grow as well.

The HLDI maintains the largest database of comprehensive claim information for animal-vehicle collisions in the country. The insurance industry reports information on more than 150 million individual passenger vehicles, or 80 percent of all privately insured vehicles in the United States to the HLDI. The sample population is limited to passenger vehicles produced from 1998 through 2009. The collision rate for each state is based on the total number of years of exposure of the vehicles involved in a collision with an animal under comprehensive coverage. The “insured vehicle year” is the portion of a 12-month period that a vehicle has been insured under comprehensive coverage. A state’s animal-collision rate is determined by dividing the total number of insured vehicle years for all the vehicles in the claims by the number of comprehensive claims from animal strikes. This number is then multiplied by 1,000 to arrive at the final rate.

State Farm Insurance, the largest insurer in the country, annually ranks states by DVC frequency rates and, like the HLDI, has found West Virginia has had the highest rate of collisions since at least 2007. West Virginia’s rate has increased from a 1:57 chance of a *vehicle* being involved in a collision from the second half of 2006 through the first half of 2007 to a 1:42 chance of a *driver* experiencing a collision with a deer between 2009 and 2010. State Farm did not calculate DVC likelihood rates prior to 2007. Just as it was in the HLDI report, West Virginia’s rate was significantly higher than the second closest state. Iowa was second in the most recent State Farm report with a driver having a 1:67 chance of being involved in a collision with a deer. The next three highest-rated states were Michigan (1:70), South Dakota (1:76), and Montana (1:82). Once again, West Virginia not only has the highest rate in the country, but it is significantly higher in comparison to all other states.

Although West Virginia does not have as significant of a problem with fatalities from animal vehicle collisions as many other states do, if the number of DVCs continues to increase, the likelihood for fatalities will grow as well.

State Farm Insurance, the largest insurer in the country, annually ranks states by DVC frequency rates and, like the HLDI, has found West Virginia has had the highest rate of collisions since at least 2007.

The Legislative Auditor performed a correlation analysis using the OIC's claims data and the DOH deer carcass report for calendar years 2005 through 2008 and found the OIC's estimates are representative of the number of deer carcasses found along state roads.² The Legislative Auditor concludes that, the DOH data are the most comprehensive independent evidence of the location and numbers of DVCs available, since each carcass collected by the DOH represents one potential comprehensive claim. In other words, the DOH data represents a majority of known deer carcasses for each potential claim. The four years of data from all 55 counties provided a sample population of 220 data points. The analysis returned a positive correlation of .851, which is a strong correlation, with a margin of error of $\pm .066$. The strong positive correlation reinforces the accuracy of the OIC estimates, which in turn validates the State Farm data since OIC's 2009 rate (1:55) is close to State Farm's 2009 rate (1:42). Assuming State Farm's methodology is uniformly applied to all states, the correlation analysis also substantiates West Virginia's national ranking.

The OIC and State Farm, the largest insurer in the country, use the same formula in their methodologies; however, the data sets in each study are significantly different. The first key difference between the two reports is the sample population. The OIC collects data from the top four companies in the West Virginia insurance market, whereas State Farm uses its own collision data. As previously mentioned, the OIC collects data on close to 72 percent of the state's insurance market, of which State Farm represents around 33 percent. The second key difference between the reports is the selection of independent variables; however this has recently changed. The OIC uses the total number of registered drivers and State Farm used to use the total number of registered privately-owned passenger vehicles. State Farm has switched to using registered drivers in the 2010 study, after the Legislative Auditor's staff discussed this issue with the public affairs media contact who conducts the study. The public affairs representative was not aware of the Federal Highway Administration registered driver data prior to discussing the issue with the Legislative Auditor's Office. Additionally, another State Farm researcher had found the federal registered vehicle data from some other states was inaccurate. The West Virginia rate does not appear to be significantly affected by the change in methodology, since it decreased only slightly between the 2009 and 2010 rates.

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State Farm has switched to using registered drivers in the 2010 study, after the Legislative Auditor's staff discussed this issue with the public affairs media contact who conducts the study.

²The Legislative Auditor could not test the methodology of the other studies however the OIC was the only source that provided data.

The DNR Offers Deer Management Guidance to Landowners on Its Website

In terms of mitigating crop damage, the DNR offers landowners guidance on how to determine the number of deer to remove from their property, but again, the agency does not have performance measures or goals to show if the agency’s advice is being utilized by landowners or if the guidelines are effective at mitigating damage. The DNR created a “Fundamentals of Deer Management” webpage that explains how the state calculates harvest objectives and suggests how landowners can implement a similar strategy on their property to control deer populations. The guidelines offer landowners a practical method for controlling deer: “A general rule is that deer herds increase if you shoot only bucks; stabilize at present levels when you shoot equal amounts of bucks and antlerless deer; and decrease if you shoot more antlerless deer than you do bucks.” The webpage also provides a table that explains how many antlerless deer to harvest to increase, stabilize, and decrease the deer herd (see Figure 5).

In terms of mitigating crop damage, the DNR offers landowners guidance on how to determine the number of deer to remove from their property, but again, the agency does not have performance measures or goals to show if the agency’s advice is being utilized by landowners or if the guidelines are effective at mitigating damage.

Figure 5
The DNR Guidelines for Managing Deer Through Hunting

If the number of bucks harvested on your land is:	2	4	6	8	10	12	14	16	18	20
and you want your deer herd to:	then harvest this many antlerless deer:									
increase rapidly	NONE									
increase slowly	1	3	5	6	8	10	11	13	14	16
maintain present level	2	5	7	10	12	15	17	19	22	24
decrease slowly		6	8	11	14	17	20	22	25	28
decrease rapidly	4	7	10	13	16	19	23	26	29	32

Source: West Virginia Division of Natural Resources “Fundamentals of Deer Management” www.wvdnr.gov

The DNR's website also recommends an "Integrated Population Management" (IPM) system to reduce damage. The IPM system uses a combination of strategies including: fencing, repellents, and careful monitoring. The DNR states: "Deer have high nutritional requirements and can be very destructive; however, deer damage is a natural hazard of the farming profession and should be considered analogous to insect and disease problems." Deer are a natural form of plant pest similar to insect and disease; however farmers cannot destroy deer at will like they can other pests. The agency therefore seems to believe their role in mitigating crop damage is to provide the public with information on ways to control damage and leaves it to individual citizens to implement the recommendations. As the state agency with the authority of protecting and managing the state's wildlife, the DNR should be actively working to find ways to reduce deer damage to crops and other vegetation.

The DNR's website also recommends an "Integrated Population Management" (IPM) system to reduce damage. The IPM system uses a combination of strategies including: fencing, repellents, and careful monitoring.

Prevention of deer damage to crops and landscaping is expensive and often fails without vigilant monitoring and application of controls. Repellents are one preventive method in the IPM system. These are deterrents that are applied manually on or near vegetation to keep deer and other wildlife from chewing on plants. They can be useful for short term protection; however, the Internet Center for Wildlife Damage Management³ states, "Success with repellents is measured in the reduction, not total elimination, of damage." Exclusion through fencing or caging is another element of the IPM system. Fences are physical barriers that prevent deer and/or other animals from entering the garden or field, whereas tree cages are used to protect individual trees or bushes. For fencing to be effective, it must provide a psychological and/or physical barrier that keeps deer from entering the enclosed area. These deterrents can be highly effective, however they are also expensive. According to the Internet Center for Wildlife Damage, an internet resource recommended by the DNR, fencing materials costs on average between \$0.11 and \$4.00 per linear foot. These figures do not include the cost of installation and repair.

The DNR recommends hunting as the primary method to control excessive crop damage.

The DNR recommends hunting as the primary method to control excessive crop damage. The DNR has created two programs to help landowners and urban communities to control the population of deer. The first program is the nuisance deer permits. West Virginia Code §20-2-15 permits landowners to kill deer or other wildlife (excluding bear and protected species) that cause damage to cultivated crops, trees, commercial

³ *The Internet Center for Wildlife Damage Management is a collaborative resource of information and research on wildlife damage management between Cornell University, Clemson University, the University of Nebraska—Lincoln, and Utah State University.*

nurseries, homeowners' shrubbery and vegetable gardens. After a landowner has suffered damage and contacted the agency, a Conservation Officer visits the site and determines if substantial damage has occurred. If it is safe to hunt on the property, the officer will determine the number of deer that should be removed to prevent significant damage in the future. The second program is the special urban archery season which provides cities and housing developments an opportunity to thin out deer herds in wooded areas of the community. In 2009 nine cities and five homeowner associations took advantage of this program, harvesting a total of 447 deer. This special season opens 14 days prior to the opening of the statewide deer archery season and closes on the last day of December.⁴ The number of deer that can be harvested under these two programs does not count against a hunter's bag limit during the regular hunting seasons. The crop damage permits are provided and used outside the constraints of the normal hunting season dates. Also, deer killed through the permits or during the special season are not counted towards a hunter's regular season bag limit.

Deer May Also Be Causing Significant Damage to West Virginia's Forests

The white-tailed deer population appears to be nearing or has exceeded Biological Carrying Capacity (BCC) in some areas of West Virginia. An area's BCC is defined by the number of deer the area can support in good physical condition. When BCC is exceeded, "habitat quality decreases with the loss of native plant species and herd physical condition declines." Recent research in the Monongahela National Forest and the MeadWestvaco Wildlife and Ecosystem Research Forest near Huttonsville, West Virginia, indicates that excessive deer browsing is impacting the ability of recently timbered oak stands to regenerate after harvesting. The DNR also recognizes that deer are causing damage to regenerating tree stands in oak forests throughout the state, as well as the potential impact that damage could have on forest ecosystems' in the future. As is the case with deer-vehicle collisions and agricultural damage, the DNR does not have performance measures to manage damage to the state's forests.

The DNR identifies deer damage as an ecological threat to various types of forests in the West Virginia Wildlife Conservation Plan. The conservation plan is required by federal law for states to receive State Wildlife Grants from the United States Fish & Wildlife Service. These grants support cost-effective conservation aimed at preventing wildlife

Recent research in the Monongahela National Forest and the MeadWestvaco Wildlife and Ecosystem Research Forest near Huttonsville, West Virginia, indicates that excessive deer browsing is impacting the ability of recently timbered oak stands to regenerate after harvesting.

As is the case with deer-vehicle collisions and agricultural damage, the DNR does not have performance measures to manage damage to the state's forests.

⁴ Charleston has an extended urban archery season and opens 28 days prior to the opening of the regular archery season. The bag limit is also larger in Charleston. In any other municipality or homeowners association the limit is two deer, but in Charleston the limit is seven. Of those seven deer, the first one must be antlerless and only two of the remaining six deer can be antlered.

from becoming endangered. The purpose of the plan is to prioritize and protect species and their habitats for conservation. In West Virginia's current plan, the DNR briefly mentions overgrazing by deer, in addition to other threats, as a risk to some forest habitats. The DNR explains, "Today, oak's intolerance of shade and its palatability by deer may result in a future decline in areal cover as forests succeed towards more mesophytic types such as mixed mesophytic and hemlock forests." The West Virginia Division of Forestry agrees with this statement. Oak species are at high risk of destruction because many species, "...have seedlings with very slow juvenile growth rates, thereby increasing the susceptibility to browsing damage over several growing seasons." **If the oak populations in these forests continue to decline, 35 animal species would be at risk of becoming endangered according to the DNR.**

The United States Forest Service's (USFS) researchers have identified significant damage in the Monongahela National Forest associated with excessive deer browsing and has experimented with methods to mitigate damage. In an e-mail responding to the Agricultural Commissioner's request for information on deer damage, a USFS Silviculturalist who works for the Monongahela National Forest acknowledges that deer over browsing impacts the regeneration of trees in recently timbered areas. The attached photograph in Appendix C shows a section of forest with a dense fern bed. According to the silviculturalist, ferns are one of the few plants that deer will not eat, so they often take over the understory in heavily browsed areas. In order to protect young trees from deer damage, the USFS has experimented with and measured the efficiency of using tree shelters, fencing, wire cages, and repellent sprays in the Monongahela National Forest. This study and other federal research on preventing deer damage to trees supports the DNR's acknowledgement in the Conservation Action Plan that deer are contributing to the decline of certain types of Oak forests in West Virginia.

The DNR explains, "Today, oak's intolerance of shade and its palatability by deer may result in a future decline in areal cover as forests succeed towards more mesophytic types such as mixed mesophytic and hemlock forests."

A study in the *Northern Journal of Applied Forestry* explains how deer overgrazing on regenerating timber negatively impacts the health of new growth. During the summer of 2001, the research team that authored the report measured deer damage in 810 one square meter plots of regenerating West Virginia timberland in the MeadWestvaco Wildlife and Ecosystem Research Forest. The research team found:

Within clearcuts, heavy browsing of sassafras, American basswood, yellow birch, and chestnut oak, coupled with their low relative abundance suggest that future stands, may contain fewer trees of these species....the commercial value of future stands may be diminished, particularly given the moderate to high relative browsing pressure on black cherry, which is traditionally considered a low preference deer forage.

The article cites the high deer density as the cause of over-browsing. The authors' state, "...deer maintained at densities of 14 deer/km² in the central Appalachians of West Virginia may alter the dynamics of clearcut regeneration." As a solution, the team suggests significantly reducing the deer herd to a density of 6 to 8 deer/km², as a "reasonably accurate guidelines for timber industry land in central Appalachians of West Virginia." Furthermore, the team believes, "that without management activities aimed at reducing deer browsing, in many parts of this region the ability of forest managers to regenerate stands will be jeopardized and the forested ecosystem will be compromised." This article further indicates that white-tailed deer populations are beyond the BCC in many recently logged areas of West Virginia's forests.

The information and research discussed above indicates that deer are having a negative impact on the health and ecology of West Virginia forests. Although the Legislative Auditor could not locate an information source detailing the extent of damage, the available studies and information discussed above indicate that deer are having a negative impact on forest regeneration in the state. The West Virginia Conservation Action Plan states that in order to postpone future loss of oak forest "intensive management of [mesophytic and hemlock] timber and game production..." is necessary. However, the plan did not give any further indication of what intensive management of game production involves or provide alternative strategies if game management alone is unsuccessful.

The only performance measure related to the DNR's Wildlife Resource Section is to increase the sales of non-resident hunting and fishing license by 15 percent of the 2005 sales by 2011.

The DNR's Policies Are Not Designed to Adequately Address Deer-Human Conflicts, Despite the Agency's Collection of Quality Data

The DNR is responsible for managing the state's wildlife under state code; however the agency does not have adequate policies or effective practices in place to manage deer-human conflicts. The agency primarily focuses on hunting in its deer management policies, and does not consider alternative methods of managing deer-human conflicts in addition to population control. The only performance measure related to the DNR's Wildlife Resource Section is to increase the sales of non-resident hunting and fishing license by 15 percent of the 2005 sales by 2011. At the same time, the DNR collects and/or tracks a large amount of data on the number of deer killed every year during the hunting season

and in conflicts with human society. However, the agency currently uses these data only to set the harvest objectives for the upcoming year's deer hunts. While this is an appropriate use for the deer kill data, the Legislative Auditor has determined that these data are being underutilized. The DNR should create policies to reduce deer-human conflicts and use DVC and crop damage data to create performance measures and goals to gauge the success of those policies.

The DNR's Comprehensive White-Tailed Deer Operational Plan Does Not Emphasize Deer-Human Conflicts as a Deer Management Issue

The comprehensive White-Tailed Deer Operational Plan, the agency's primary document to manage the state's deer herds, does not emphasize the significant issues with deer-human conflicts in West Virginia. The overall objective of this plan is to, "Maintain white-tailed deer populations at levels compatible with biological and sociological conditions; **and meet projected use by providing a diversity of deer hunting opportunities.**" (Emphasis added by the Legislative Auditor) By relying solely on hunting to control deer populations, the Operational Plan expresses all of its management objectives in terms of hunting goals. The plan is an effective and concise document that adequately describes the biological conditions affecting the deer population and hunting opportunities. Each of the six management districts has its own section detailing:

- sub-objectives for each county,
- county histories regarding herd health and hunting,
- descriptions of the habitat and herd health,
- a discussion of hunter pressure/success, and
- recommendations for season lengths
- the number of bucks to be harvested per square mile for each county.

Discussion on sociological conditions is limited in the Operational Plan. For example, there is mention of DVCs and crop damage, but there is no indication that the DNR has determined if regions of the state have a deer-human conflict problem, and there is no goal of controlling deer-human conflicts. Furthermore, it does not include alternative strategies to deal with problems that deer hunting alone cannot adequately address. Still, the Operational Plan is a well-organized and detailed plan that allows DNR to set and adjust goals, as well as, accurately monitor results of special management programs.

The comprehensive White-Tailed Deer Operational Plan, the agency's primary document to manage the state's deer herds, does not emphasize the significant issues with deer-human conflicts in West Virginia.

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The Operational Plan requires district biologists to account for, “human population density, amount and quality of deer range, amount of or anticipated crop damage, potential for disease outbreaks, number of deer-vehicle collisions, and other factors,” when setting harvest objectives; however the plan does not have performance measures or goals for mitigating and reducing DVCs, crop damage or forest damage. One notable exception in the Strategic Plan section related to crop damage is a goal to, “Monitor crop damage complaints, improve Division response rates to these complaints, liberalize the issuance of crop damage permits where needed, and provide technical assistance to landowners concerned with deer damage control.” While this is a step in the right direction, there are no strategies on how to reduce the need to increase the issuance of crop damage permits, and there does not appear to be an acknowledgment of the inadequacies of the DNR methods when liberalization of crop-damage permits is needed.

Deer-human conflicts are not treated as independent management issues in the Operation Plan. The data from the DOH’s deer carcass report and the crop damage permits are grouped with other forms of “nonseasonal mortalities” (such as disease, poaching, and predation), as part of the previous year’s biological data collection. In every district section, the management states, “Collection of nonseasonal mortality data serves as an inventory of decimating factors as well as an indicator of population levels and of sociological problems.” The management in Districts I, II, and V also have moderate to serious problems with crop damage. In discussing the district operational objectives however, the goals in every district are related to hunter harvest. Furthermore, the district operational plans almost never discuss DVC rates. District III is the only exception and provides an example of a good approach to dealing with DVCs:

...major highways alter deer movement patterns, attract deer to roadside plantings, and increase the average speed and volume of vehicular travel, thereby increasing the chances of vehicle-deer collisions. However, the improved highway fencing (8’ height) installed along portions of Corridor H, helps prevent the occurrence of vehicle-deer collisions and subsequent road killed deer.

This statement affirms the district management’s support of using fencing alongside roadways as a viable method of mitigating DVCs. They have identified road development as sources of deer-human conflict, but still they do not have any plans to identify additional roads that could benefit from fencing and the DNR does not work with the DOH in preventing DVCs. The operational objectives should be expanded in each district to include goals and strategies for reducing DVCs and other forms of deer-damage.

The data from the DOH’s deer carcass report and the crop damage permits are grouped with other forms of “nonseasonal mortalities” (such as disease, poaching, and predation), as part of the previous year’s biological data collection.

The agency reliance on hunting as the primary means of controlling the deer populations has not been successful in reducing conflicts between deer and humans.

The agency reliance on hunting as the primary means of controlling the deer populations has not been successful in reducing conflicts between deer and humans. This is not to say that hunting is not an important aspect of deer management, but with the increasing rate of DVCs and crop-damage permits, alternative programs to reduce the amount of damage created by deer need to be added to the plan. DVC and crop-damage permit data should be used as performance measures and indicators to determine the adequacy of the deer management plan. Objectives should be established to determine what the appropriate levels of these statistics should be and strategies should be developed to set goals for achieving the appropriate levels.

Some State Wildlife Agencies Are Actively Working to Reduce Their DVC Rates

Since West Virginia is not unique in having a problem with DVCs, the Legislative Auditor compared the management policies of West Virginia's neighboring states and other states with significant deer damage problems to see what other states are doing to reduce their DVC rates. Of the states reviewed, Virginia, Michigan and Maryland's wildlife management agencies have created long-term goals to reduce their DVC rates. All three states' deer management plans include these key components: a policy statement regarding DVCs, a goal related to managing DVCs, objectives related to the goals and the strategies each state plans to implement in order to manage or reduce their DVC rates. The policy statement refers to the language used by the wildlife management agency regarding the magnitude of the problem and the need to monitor and control DVCs. Each state highlights both the economic impact as well as the costs in terms of injury and death from DVCs. The goal refers to what the state needs to do. In the objective section, each state affirms with varying specificity their determination to reduce their rate. Finally, the strategy section provides a discussion from each state's deer management plan as to the methods the wildlife agency will employ to meet their DVC reduction goal.

Michigan

Policy Statement: *Approximately 1.5 million deer-vehicle collisions occur on U.S. roads annually and Michigan ranks second in the country in reported collisions. In 2008, 61,010 deer-vehicle collisions were reported in Michigan resulting in 12 human deaths and 1,648 injuries to the person involved (Michigan Office of Highway Safety Planning 2009). **Reduction of deer numbers in areas where deer-vehicle collisions present a significant public safety concern is imperative, as are education and campaigns that promote safe driving and explain what to do when deer are present on roads.** (Emphasis added by the Legislative Auditor)*

DVC and crop-damage permit data should be used as performance measures and indicators to determine the adequacy of the deer management plan.

Of the states reviewed, Virginia, Michigan and Maryland's wildlife management agencies have created long-term goals to reduce their DVC rates.

Goal: *Reduce Conflict Between Humans and Deer.*

Objective: *Reduce Deer-vehicle Collisions on Michigan Roads*

Strategies:

- *Consider deer-vehicle collisions when establishing population goals and setting antlerless quotas.*
- *The DNRE [Division of Natural Resources and Environment] Deer and Elk Program Leader and Other staff, as appropriate, will continue to work with and increase involvement with the Michigan Deer Crash Coalition (MDCC) to develop and implement programs designed to reduce deer-vehicle collisions.*

Virginia

Policy Statement: *Deer-vehicle collisions are one of the most critical types of deer damage in Virginia....Based on their known market share in Virginia, State Farm Insurance projected 43,453 deer-vehicle claims for all insurance companies in the state during July 1, 2005 – June 30, 2006.... Although reliable, consistent data on deer-vehicle collisions in Virginia is lacking, it is currently assumed that the economic loss associated with deer-vehicle collisions and resulting damage is equal to or exceeds deer crop damage.... In addition to property damage, deer-vehicle collisions cause human injuries and fatalities. Annually during 1999-2003, an average of 2.2 fatal accidents and 384 injury accidents involved deer.*

Damage Goal: *Proactively manage deer impacts on a local basis consistent with deer population objectives and acceptable levels of damage. Manage agricultural, urban, ecosystem, vehicular, forestry, animal health, human health and safety, and other impacts caused by deer. **Deer damage management should use diverse approaches and promote personal and community responsibility.** (Emphasis added by the Legislative Auditor)*

Objective: *To implement a program to manage deer-vehicle collisions by January 1, 2010.*

Strategies:

- *Develop a program, in cooperation with the Virginia Department of Transportation (VDOT), to accurately monitor deer-vehicle collisions on a management unit basis annually.*

- *Develop objectives for deer-vehicle collisions by management unit.*
- *Educate community leaders and citizens, especially drivers, on techniques to reduce deer-vehicle collisions (e.g., news releases during the fall breeding season).*
- *Ensure that development and road construction projects consider deer-vehicle collisions.*
- *Support research on incidence and prevention of deer vehicle collisions in Virginia*
- *Assist VDOT with development of carcass disposal procedures that are environmentally safe, socially acceptable, practical, and cost effective.*

Maryland

Policy Statement: *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 [Maryland Department of Natural Resources].*

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.

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.*

Objective: *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.

Strategies:

- *Continue to educate the public on defensive driving techniques by using press releases to the media at strategic times.*
- *Encourage state, county and city highway departments to maintain or erect new fences and incorporate wildlife passage ways under/over roads.*
- *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.*
- *Continue to participate in interstate and interagency task forces concerning deer-vehicle collisions reduction strategies.*
- *Work with local governments, communities and other owners of open space to reduce deer populations in high traffic areas via managed hunting, Deer Cooperators⁵ or non-lethal approaches that remove deer.*

West Virginia

Policy Statement: *Deer mortality other than hunting is primarily the result of crop damage kills and road kills. Illegal kills, dogs, trains, fences and disease also contribute to nonseasonal mortality. Annual nonseasonal mortality data is collected by Law Enforcement and Wildlife Resources personnel and the WV Division of Highways.*

Damage Goal: None

Objective: None

Strategies: None

As the goals from these wildlife agencies show, a few states are beginning to recognize and accept their role in managing the social

⁵ *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.*

problems related to deer. The three states discussed above, besides West Virginia, have policy statements acknowledging the economic and human impact of deer vehicle collisions in their states. All three also have a clearly stated goal to monitor and reduce their DVC rate. Those goals are matched with strategies that require interagency cooperation to find ways to reduce and/or mitigate their state's DVC rates.

Research is another important aspect of DVC management and currently is facilitated through state and regional support of DVC research institutions. The Michigan Deer Crash Coalition, for instance, is a research and educational institution that is attempting, "to mitigate both the frequency and severity of vehicle-deer crashes through public information, driver education, and applied research." Additionally, the Deer Vehicle Crash Information Clearinghouse is a coalition of 9 states and the Federal Highway Administration Office of Project Development and Environmental Review that gathers DVC related data and supports research on DVCs. The underlying goals of these cooperative efforts are twofold: (1) to identify and standardize data collection methods and, (2) to collect and disseminate research data and findings through the organization's website deercrash.com. The Virginia Department of Transportation's Transportation Research Council (VTRC) conducted research on the effectiveness of wildlife crossings and fencing along state roads over a 12-month period between 2004 and 2005. The VTRC found success in mitigating the potential for DVCs with underpasses with a minimal height of 12 feet. Other states also attempt to proactively reduce DVCs by including DVC rates in their harvest goal measurements. West Virginia includes deer carcass reports in their population calculations as well; however the DNR does not treat DVCs as an independent population parameter like these other states. The DNR has some of the most comprehensive data collection available, and the agency should use it to work on lowering West Virginia's DVC rate.

Research is another important aspect of DVC management and currently is facilitated through state and regional support of DVC research institutions.

West Virginia's hunting seasons are shorter than those of bordering states.

West Virginia's Deer Hunting Seasons Are Shorter Than Those of Bordering States.

West Virginia's hunting seasons are shorter than those of bordering states. A season is a combination of the four season-types regularly held in West Virginia: archery, buck, antlerless, and muzzleloader seasons. Archery is the only season that runs through the entire deer season.⁶ According to the West Virginia Code of State Rules §58-45-3, the archery season runs from the Saturday nearest to October 15 and closes on the last day of December. The length and days of the antlerless season are determined by the Natural Resource Commission. In the 2010 season,

⁶ Dates for specific weapon seasons can be found in West Virginia Code of Rules §58-45-3.

the regular antlerless season runs from November 22 to November 23 on private land only, November 24 through December 11, and December 29-31 on public and private lands.⁷ A special two-day antlerless season was held in Hampshire County on October 29-30 with a bag limit of one deer.⁸ In total there are 82 days of deer hunting in the 2010 season.

West Virginia's deer hunting season is shorter than all of the bordering states' seasons as Figure 6 shows. Kentucky's hunting season lasts for a total of 136 days and runs from September 4 through January 17. Ohio has 120 days of deer hunting season which runs from September 25 through February 6. West Virginia, Kentucky, and Ohio are the only three states reviewed that allow hunting on Sundays throughout the entire season. Maryland's season runs from September 15 through January 1 with an additional bow season from January 3 through the 31. Hunting on Sundays in Maryland is allowed October 17, 24, 31 and November 7 and 14. Pennsylvania's deer hunting season runs from September 18 through December 11 and December 27 through January 29. Virginia's regular deer hunting season runs from September 4 through January 1, with an additional antlerless season between the dates January 3 through March 26 for a combined total of 175 days—the longest season of any of the states reviewed. Both Pennsylvania and Virginia do not allow any hunting on Sundays. West Virginia has the fewest number of hunting days compared to the five bordering states. It is also the only state that does not have deer hunting in January.

In addition to having the longest deer hunting season, Virginia has also created special programs for controlling its antlerless population. The first is known as the "Earn a Buck" program, which allows hunters to take an additional two bucks in specific counties in exchange for hunting up to three antlerless deer. Although the program has only been in effect in eight counties since 2008, the Department of Game and Inland Fisheries has seen a significant increase in antlerless harvest in these areas. Hunters may also purchase an unlimited number of "Bonus Deer Permits" for hunting antlerless deer only. Areas of West Virginia with high deer populations and excessive deer damage would likely benefit from similar programs that focus on doe removal if they were created and implemented in the state.

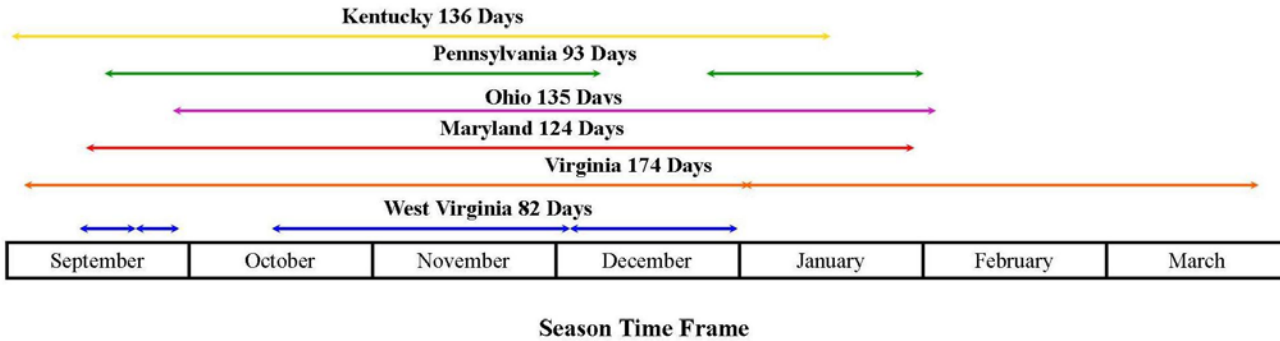
⁷ The antlerless season was closed in following counties: Boone, Clay (south of the Elk River and on public land north of the Elk River), Fayette (south and west of the New River and west of the Gauley River), the northern portion of Greenbrier County, Kanawha County (South of the Elk River and east of Corridor G), Lincoln, Mercer (west of Interstate 77), Nicholas, Pocahontas, Raleigh, Randolph, Wayne (South of Route 37), Webster, Logan, McDowell, Mingo, and Wyoming.

⁸ Chronic Wasting Disease (a neurological disease that affects species of deer and elk) has been found in Hampshire County, and the special season was used to help determine the prevalence and distribution of CWD within the county.

West Virginia has the fewest number of hunting days compared to the five bordering states. It is also the only state that does not have deer hunting in January.

In addition to having the longest deer hunting season, Virginia has also created special programs for controlling its antlerless population.

Figure 6
Length of Hunting Seasons in West Virginia and the Bordering States



Source: PERD Analysis of Each State’s Hunting Season Dates

Conclusion

Estimates from different sources, at the state and national levels, using different methodologies have concluded and reinforce each other that West Virginia has the highest deer-vehicle collision rate in the country, and that it is significantly higher than the second highest state. Conflicts between humans and deer have become an increasing problem in West Virginia, yet the DNR has not developed strategies to adequately deal with the issues. West Virginia suffers from more DVCs per population, than any other state. Additionally, the available evidence suggests that deer are causing significant damage to vegetation in West Virginia’s croplands and forests but research needs to be conducted to measure the total extent of damage. Although the DNR’s own data indicates that these problems are a constant and growing problem, it continues to primarily rely on regulated hunting to deal with these issues. While significant problems with deer-human conflicts are not unique to West Virginia, a few states have recently incorporated deer damage data in their deer management plans and are working to develop strategies and goals to monitor and mitigate the problems. The West Virginia DNR should use DVC data, crop-damage permit data, and similar data, as performance measures of the adequacy of its deer management plan. Furthermore the DNR should incorporate deer-damage data in its deer management plans with the purpose of:

The West Virginia DNR should use DVC data, crop-damage permit data, and similar data, as performance measures of the adequacy of its deer management plan.

1. improving their measurements,
2. monitoring them to determine their appropriate levels,
3. developing strategies and goals to mitigate these statistics in addition to regulated hunting, and
4. working towards developing research on ways to reduce conflicts between deer and humans.

Recommendations

1. *The Legislative Auditor recommends the Division of Natural Resources improve its collection and measurements of deer damage data related to crop damage and forest damage.*
2. *The Legislative Auditor recommends that the Division of Natural Resources should utilize the various deer-damage statistics, including deer-vehicle collision data, as performance measures to determine their appropriate levels, and to determine the effectiveness of the agency's deer management policies.*
3. *The Legislative Auditor recommends the Division of Natural Resources create objectives, performance goals, and strategies, in addition to hunting, to reduce the various forms of deer damage across West Virginia.*
4. *The Legislative Auditor recommends the Division of Natural Resources initiate research related to reducing deer-vehicle collisions, crop damage, and forest damage created by deer in West Virginia.*

Appendix A: Transmittal Letter

WEST VIRGINIA LEGISLATURE *Performance Evaluation and Research Division*

Building 1, Room W-314
1900 Kanawha Boulevard, East
Charleston, West Virginia 25305-0610
(304) 347-4890
(304) 347-4939 FAX



John Sylvia
Director

December 15, 2010

Mr. Frank Jezioro, Director
West Virginia Division of Natural Resources
Building 74
324 Fourth Avenue
South Charleston, WV 25303

Dear Mr. Jezioro:

This is to transmit a draft copy of the Performance Review of the West Virginia Division of Natural Resources. This report is scheduled to be presented during the January 9-11, 2011 interim meetings of the Joint Committee on Government Operations, and Joint Committee on Government Organizations. We will inform you of the exact time and location once the information becomes available. It is expected that a representative from your agency be present at the meeting to orally respond to the report and answer any questions the committees may have.

After today's exit conference, we will make any agreed upon changes to the report and provide you with a copy of those changes. Please provide a written response by noon on December 27, 2010 in order for it to be included in the final report. If your agency intends to distribute additional material to committee members at the meeting, please contact the House Government Organization staff at 340-3192 by Thursday, January 6, 2011 to make arrangements.

We request that your personnel not disclose the report to anyone not affiliated with your agency. Thank you for your cooperation.

Sincerely,

A handwritten signature in blue ink that reads "John Sylvia".

John Sylvia
Director

c: Kelley Goes, Cabinet Secretary, Department of Commerce
Scott Warner, DNR Wildlife Resource Section

_____ *Joint Committee on Government and Finance* _____

Appendix B: West Virginia Office of the Insurance Commissioner's 2010 Economic- Impact of Deer-Vehicle Collision Study



STATE OF WEST VIRGINIA
Offices of the Insurance Commissioner
 JOE MANCHIN III
 Governor

JANE L. CLINE
 Insurance Commissioner

September 23, 2010

The Honorable Randy White
 Agriculture and Agri-business Committee
 Co-Chair, West Virginia Senate
 212 River Drive
 Webster Springs, WV 26288

Dear Senator White:

The Offices of the West Virginia Insurance Commissioner (“OIC”) has completed its 2009 calendar year study quantifying the economic impact of deer-vehicle crashes (DVC’s) within our State. This is the eighth consecutive year that the study has been performed.

To complete this study, we requested relevant information from automobile insurers doing business in our State whose market shares by premium volume comprise 65% of the West Virginia automobile physical damage insurance market as of 2009. We then aggregated those responses and used the combined result to project figures that should be representative of the entire physical damage insurance market our State.¹ Accordingly, we feel comfortable making the following estimates based upon the information received.

	2002	2003	2004	2005	2006	2007	2008	2009
Number of deer-vehicle claims	28,037	21,624	18,890	20,097	21,144	24,590	26,265	25,602
Average amount per claim	\$1,626	\$1,681	\$1,757	\$1,838	\$1,899	\$1,927	\$2,140	\$2,236
Statewide losses in dollars	\$44.8M	\$36.3M	\$33.2M	\$36.9M	\$40.2M	\$47.4M	\$56.2M	\$57.2M

It is of utmost importance to also understand that these costs, while substantial and averaging over \$44M per year over the past 8 years, only represent a portion of the total cost incurred by West Virginians every year due to deer-vehicle crashes; the report does not reflect the total losses resulting from all DVCs. Specifically, the Statewide loss estimates only consider amounts which are actually paid by insurance companies, and are further limited to only those amounts that are paid under the “Comprehensive” (i.e. ‘other than collision’) portion of auto physical damage insurance coverage.

¹ The methodology used to extrapolate the survey data is premised on an assumption that we believe has led to overestimation of the number of claims in prior years. We continue to use the earlier methodology, however, because it accurately depicts the trends. Under our refined methodology, the estimated market data would be adjusted for:

- ✓ Differences in automobile physical damage market penetration rates between standard and non-standard insurers (Standard ~78%, Non-standard ~40%).
- ✓ The relative presence of different types of insurers in our physical damage insurance marketplace (In 2009: 87.8% Standard, 6% Standard/Hybrid, & 5.7% Non-standard)
- ✓ A fit of the estimated market data to the actual number of class A vehicles registered in West Virginia during 2009 (1,303,181) according to data available from the West Virginia Department of Motor Vehicles, and a further adjustment to estimate only those vehicles which were insured for physical damage coverage (837,849).
- ✓ An adjustment to remove the estimated number of vehicles that were uninsured during 2009 (~10%).
 Due to reporting differences over the years, however, this new methodology cannot be applied to all prior years.

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Telephone (304).558.3354
 Facsimile (304).558.0412
 www.wvinsurance.gov

Accordingly, myriad other associated costs are not included in the figures that are provided above. For example:

- The cost of Deductibles paid by insureds as part of the covered claims above.
- Any costs paid under Collision coverages (*missed the deer, but hit the guardrail instead, etc.*)
- Any costs paid under Auto Med Pay coverages due to injuries associated with the DVC.
- Any costs which were paid by Health or Accident insurers due to DVC injuries.
- Any costs paid by Workers Compensation insurers (work related driving) due to DVCs.
- Any cost for lost wages or missed work, etc due to deer crash injuries.
- Any cost of a DVC where the auto was not insured for physical damage coverage.

Other estimates achieved from the results of the latest study:

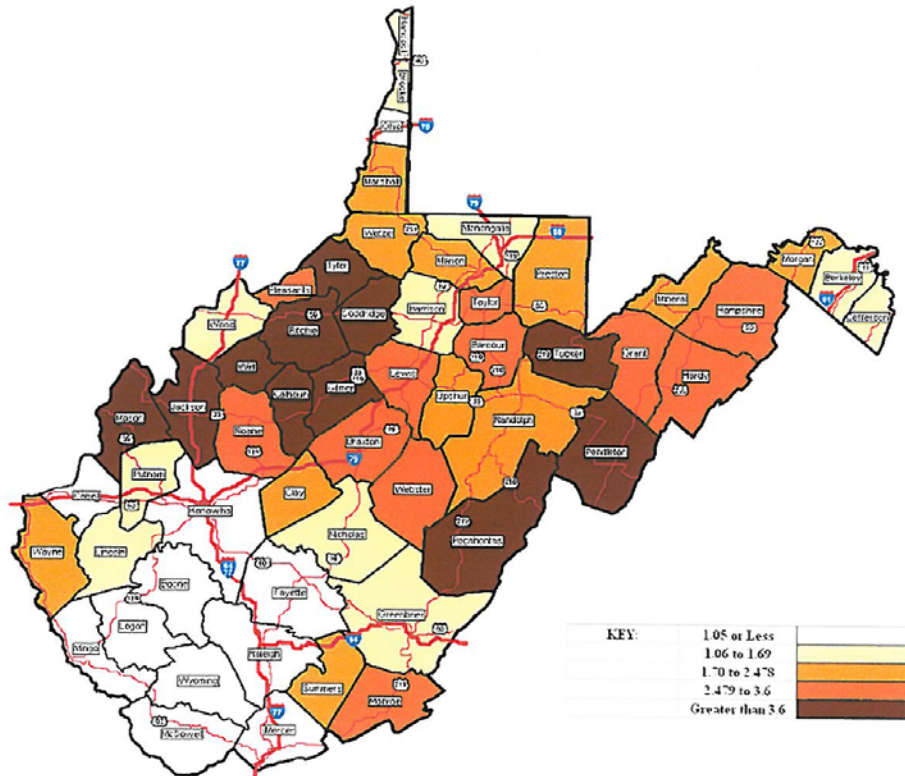
- 2009 Rate of licensed drivers in WV to estimated total DVC **1 in 55**
- Worst months for DVC: October, November, and December¹
Worst times of day to travel: From 5AM to 7AM and from 6PM to 11PM²
- DVC's accounted for nearly 24% of the all personal auto physical damage insurance loss in 2009 in West Virginia. (*Comprehensive, Collision, Towing, and Rental coverages combined*)
- DVC's accounted for nearly 7% of all personal auto insurance cost in 2009 in West Virginia.
- 2009 annual cost per auto insured for physical damage in WV which was solely attributable to DVC: **\$54.59**. (Cost per insured car per day 15¢)

¹ Source: *Highway Loss Data Institute, Losses Due to Animal Strikes, September 2009*

² Source of DVC information for various statewide statistics is the *Mid-West Deer Crash Coalition, 2005*

Utilizing the 2009 deer survey data (which also provides results on a per county basis), and again data available from the West Virginia *Department of Motor Vehicles*, we are also able to develop the following representation:

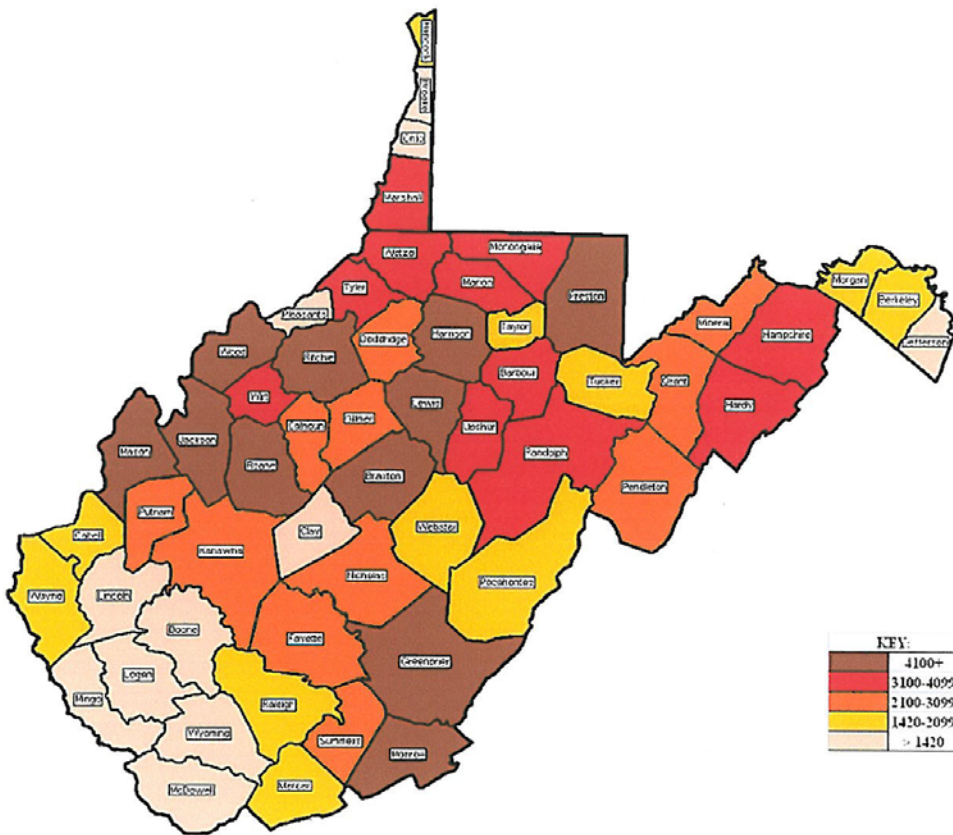
2009 Number of Deer Accident Insurance Claims per 100 Registered Vehicles
(By County)



From the graphic above, note that an inverse relationship appears to be present between the number of interstates and major roadways in a given county relative to the number of DVC per registration occurring in 2009 for that same county. In other words, the lower the relative number of interstates and roadways in a county, *generally* the higher the likelihood of a DVC occurring appears to be. This could also be quantified as the likelihood of a DVC occurring being much greater in those counties with lower overall populations (more rural, and therefore having fewer roadways), as those five counties with the highest populations (Kanawha, Berkeley, Cabell, Monongalia, & Wood respectively) all have lower than average DVC rates, and the five counties with the lowest populations (Wirt, Tucker, Gilmer, Pleasants, and Calhoun respectively) all can be observed to have experienced higher than average DVC rates.

Other differences in observed DVC rates by county are likely to be mainly explained through the additional consideration of the relative deer population in our counties as can be reasoned by considering the results of the 2009 cull.

2009 Deer Harvest By County



While the information presented in the initial map demonstrates how the costs of DVC are spread throughout the state relative to population size (or in this case on a per registered auto basis), estimating total DVC costs on a per county basis with no relative adjustment reveals that counties with higher populations (and therefore more registered autos) also have higher aggregate claim costs as one might expect.

This is demonstrated by the table that follows.³

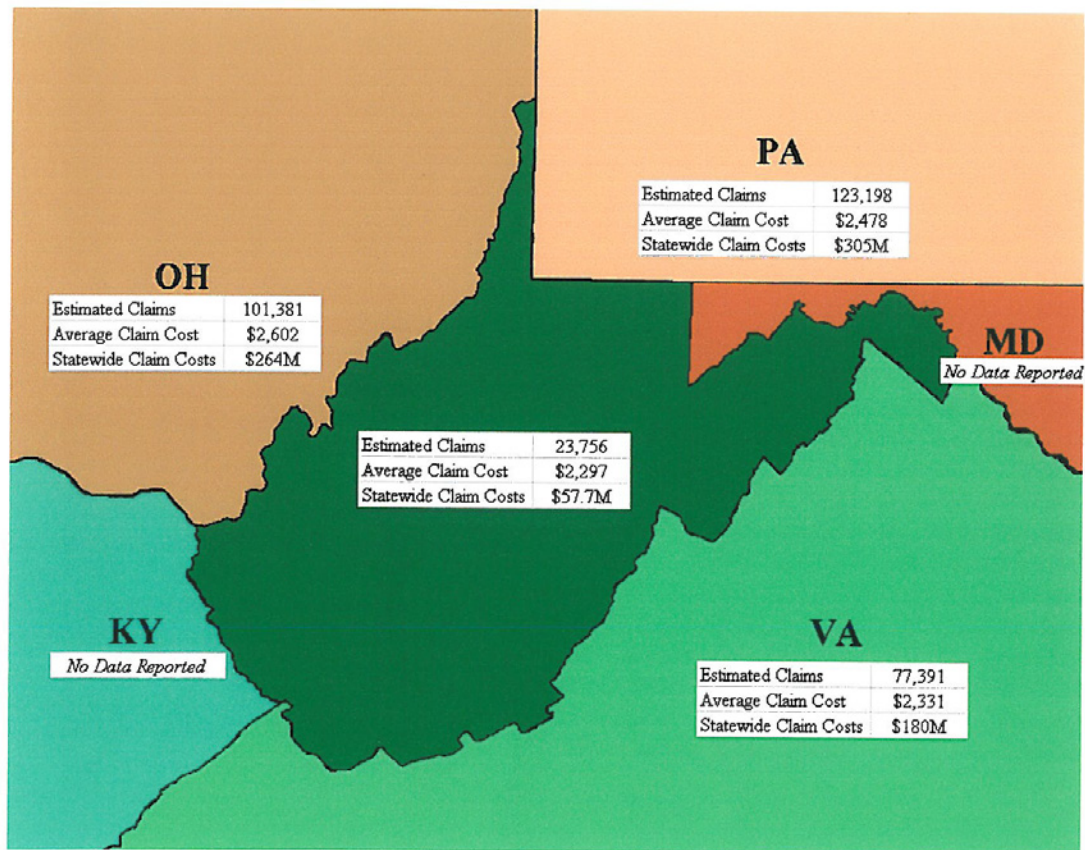
By County	2009 DVC Cost (est)*
Barbour	\$ 816,290.43
Berkeley	\$ 1,753,921.32
Boone	\$ 275,773.79
Braxton	\$ 764,812.65
Brooke	\$ 478,007.91
Cabell	\$ 1,253,851.51
Calhoun	\$ 705,980.91
Clay	\$ 319,897.60
Doddridge	\$ 478,007.91
Fayette	\$ 647,149.17
Gilmer	\$ 628,764.25
Grant	\$ 827,321.38
Greenbrier	\$ 978,077.72
Hampshire	\$ 1,114,126.12
Hancock	\$ 797,905.51
Hardy	\$ 937,630.90
Harrison	\$ 1,562,718.16
Jackson	\$ 1,992,925.28
Jefferson	\$ 1,507,563.40
Kanawha	\$ 2,253,991.14
Lewis	\$ 1,044,263.43
Lincoln	\$ 489,038.86
Logan	\$ 452,269.02
Marion	\$ 1,033,232.48
Marshall	\$ 823,644.40
Mason	\$ 1,448,731.66
Mcdowell	\$ 172,818.24
Mercer	\$ 562,578.54
Mineral	\$ 1,161,926.92
Mingo	\$ 187,526.18
Monongalia	\$ 1,334,745.16
Monroe	\$ 636,118.22
Morgan	\$ 518,454.73
Nicholas	\$ 636,118.22
Ohio	\$ 654,503.14
Pendleton	\$ 1,147,218.98
Pleasants	\$ 375,052.36
Pocahontas	\$ 672,888.06
Preston	\$ 1,073,679.30
Putnam	\$ 1,070,002.32
Raleigh	\$ 779,520.59
Randolph	\$ 1,220,758.66
Ritchie	\$ 1,062,648.35
Roane	\$ 853,060.27
Summers	\$ 441,238.07
Taylor	\$ 625,087.26
Tucker	\$ 658,180.12
Tyler	\$ 522,131.72
Upshur	\$ 941,307.88
Wayne	\$ 908,215.03
Webster	\$ 408,145.21
Wetzel	\$ 731,719.80
Wirt	\$ 683,919.01
Wood	\$ 2,287,083.99
Wyoming	\$ 382,406.33
Grand Total	\$ 48,094,949.53

By Cost	2009 DVC Cost (est)*
Wood	\$ 2,287,083.99
Kanawha	\$ 2,253,991.14
Jackson	\$ 1,992,925.28
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Boone	\$ 275,773.79
Mingo	\$ 187,526.18
Mcdowell	\$ 172,818.24
Grand Total	\$ 48,094,949.53

³ These figures, including the \$48M total, result from the application of the refined methodology referred to in note 1.

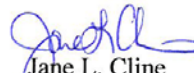
Survey responses included DVC counts by county. These counts by county were extrapolated to approximate the number of claims for each county in the entire insured market, then individually multiplied by the single average claim cost for 2009 to reach the estimated total cost per county provided above. Accordingly, these estimates may only be accurate on a relative basis, and a given county may likely have experienced a total claim dollar amount unequal to the figures provided above during 2009.

Estimates comparing DVC in West Virginia to surrounding states was also requested as part of our 2009 survey. While the outcome of this portion of the survey is unlikely to yield credible findings due to limited responses being provided (No results provided for KY or MD, and an average market share response of only 12% for the remaining states), those results are given here for consideration only. Note that while our average cost per claim is similar to that in surrounding states, both the total estimated number of claims and the estimated overall insured claim costs in West Virginia are dwarfed by those in our surrounding states. This is assumed to largely be due to differences in human populations.



I hope that the preceding information answers many of your questions relevant to the economic impact of the deer population in West Virginia. Should you have any questions, please feel free to contact me.

Sincerely,



Jane L. Cline
Commissioner

Appendix C: Photograph of a Forest Understory Covered in Ferns



According to the U.S. Forest Service silviculturalist that submitted the photograph above, Ferns are one of the few plants deer will eat and will take over the understory in a forest with heavy deer browsing.

Source: Emailed response to the West Virginia Department of Agriculture's request for information on deer damage.

Appendix D: Agency Response



DIVISION OF NATURAL RESOURCES

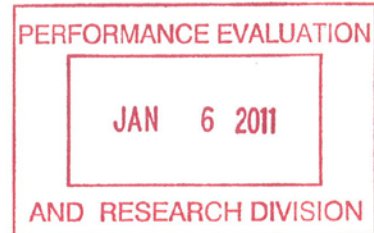
324 4th Avenue
South Charleston, WV 25303-1228
Telephone (304) 558-2754
Fax (304) 558-2768
TDD (304) 558-1439

Earl Ray Tomblin
Governor

Frank Jezioro
Director

January 5, 2011

Mr. John Sylvia, Director
West Virginia Legislature
Performance Evaluation and Research Division
Building 1, Room W-314
1900 Kanawha Boulevard, East
Charleston, West Virginia 25305-0610



Dear Mr. Sylvia:

Thank you for the opportunity to review the Performance Evaluation and Research Division's Performance Review of the West Virginia Division of Natural Resources. Attached is a summary of our comments relating to this document.

The West Virginia Division of Natural Resources' first White-tailed Deer Operational Plan was written in 1979, and we are in the process of developing our ninth revision of this planning document. Each revision has utilized the most currently available data and prescribed the most appropriate management actions for deer in West Virginia. These plans have also reflected the latest scientific information concerning the management of white-tailed deer in West Virginia and throughout the eastern United States. The West Virginia Division of Natural Resources is confident the state's white-tailed deer management program is solid and founded on sound principles of wildlife management. Our agency's deer management program is also dynamic and takes into consideration changing biological, sociological and economic factors.

I am pleased to report that many of the recommendations noted in the Performance Review have already been implemented by the West Virginia Division of Natural Resources and/or have been identified for inclusion in the next revision of the White-tailed Deer Operational Plan that is scheduled for release in 2011.

Mr. John Sylvia
January 5, 2011
Page 2 of 2

Once again, thank you for the opportunity to review the Performance Evaluation and Research Division's Performance Review of the West Virginia Division of Natural Resources. Should you have any questions after reviewing our response to your report, please contact me.

Sincerely,


Frank Jezioro
Director

FJ/prj

Attachment

cc: The Honorable Jeffrey Bowers
The Honorable Byron Chambers
The Honorable Peter Cuffaro
The Honorable Thomas Dotson
The Honorable David Milne
The Honorable David Truban
The Honorable Kenny Wilson
Keith Burdette
Curtis Taylor
Colonel David Murphy
Scott Warner

Summary of the West Virginia Division of Natural Resources Response to the Performance Evaluation and Research Division's Report

January 5, 2011

The West Virginia Division of Natural Resources welcomes the opportunity to comment on the Performance Evaluation and Research Division's (PERD) review of West Virginia's white-tailed deer management program. The report contains several points and recommendations with which the West Virginia Division of Natural Resources agrees and several with which we disagree. A summary of our comments, including points of agreement and disagreement, is listed below.

General Comments

- Management of the state's white-tailed deer resource is a difficult and challenging task. Balancing conflicting biological, social and economic interests that often come to bear on deer management decisions requires extensive technical expertise and a willingness to embrace public involvement in our programs. The West Virginia Division of Natural Resources continues to meet these challenges by implementing management programs supported by a highly trained, dedicated and professional staff. These individuals have a command of the principles, practices and techniques associated with scientific wildlife management.
- The state's deer management program is guided by a comprehensive planning process that includes both strategic and operational components. The deer management program in West Virginia is generally well received, as it provides tremendous recreational opportunities and economic benefits to the state's citizens. The West Virginia Division of Natural Resources manages the deer herd in individual counties using the buck harvest per square mile as a population index and for setting management objectives. These management objectives are not equivalent to the biological carrying capacity of the land. Rather, these management objectives are a compromise between the number of deer wildlife biologists believe the land can support and other sociological factors (e.g., the potential for crop damage and deer/vehicle collisions).
- Each county in the state is treated as a unique deer management unit. Therefore, there are 55 county management units located across the state with separate, but sometimes common, deer management objectives. County deer management objectives are expressed as the buck kill per square mile (i.e., the number of bucks killed by hunters during the 2-week bucks-only season per 640 acres of deer habitat). These county-level deer management objectives are determined by a variety of parameters such as percent forest land, percent agricultural land, human population density, habitat quality, winter severity, physical condition of the deer and socioeconomic factors.
- Harvesting appropriate numbers of female deer during the hunting season is the most effective method for managing deer populations, reducing nuisance problems and

ensuring a healthy and productive herd. The West Virginia Division of Natural Resources has consistently been able to achieve deer management objectives on public land by harvesting appropriate numbers of female deer during the various hunting seasons. However, regulating deer populations on private land in some areas of the state is a challenge for this agency. Landowners control access to their property and ultimately determine the number of female deer and bucks that will be harvested on their land.

- This past fall was the 13th year in a row that concurrent antlerless deer hunting was permitted during portions of the buck season in selected counties. For the 9th year in a row, these counties were open to concurrent antlerless deer hunting during the entire 2-week buck season. Where adequate harvests of antlerless deer are occurring, Wildlife Biologists report significant positive benefits associated with this regulation strategy (e.g., adjustments in deer population densities to levels compatible with biological and sociological conditions, reductions in buck hunting pressure and increases in antlerless deer hunting pressure). As a result, a larger percentage of bucks are surviving in the population, older-age deer are being reported in the harvest and deer populations are being adjusted to meet management objectives. Improvements in antler size, body weight and overall physical condition are also being reported.
- It should be noted, however, that a number of counties have deer populations above management objectives and beyond the capacity of the habitat to support in a sustainable fashion. Therefore, liberal antlerless deer harvest regulations will continue to be used in selected counties to reduce overall deer populations to desired levels. Where deer populations have declined to or below management objectives, more conservative antlerless deer harvest regulations will be implemented. These hunting season recommendations are based upon the most current biological and sociological data and guidelines associated with the West Virginia Division of Natural Resources' *White-tailed Deer Operational Plan*.
- The West Virginia Division of Natural Resources encourages public input on ways to improve its various wildlife management programs, including the state's white-tailed deer management program. For example, the Natural Resources Commission meets quarterly, and these meetings provide specific opportunities for public comment. In addition, the agency conducts a series of regulation meetings across the state in March of each year to solicit public comment on its various wildlife management programs.
- The Natural Resources Commission has the authority to set hunting seasons and bag limits, and serves in an advisory capacity to the Director on issues relating to the conservation and management of the state's natural resources. We will be pleased to forward your recommendations to the Natural Resources Commission for their information and consideration. In addition, we urge you to attend the upcoming Natural Resources Commission meeting tentatively scheduled for 1:00 PM on February 27, 2011 at the West Virginia Division of Natural Resources Headquarters in South Charleston, West Virginia. A summary of the PERD's Performance Review will be presented at that time.

Points of Agreement

- Deer/vehicle collisions across the United States, including West Virginia, are a significant and increasing transportation safety problem.
- The deer/vehicle collision problem and its potential countermeasures are complex, interdisciplinary issues with significant transportation safety implications.
- The complexity and interdisciplinary nature of the deer/vehicle collision problem and its countermeasures requires adequate research funding, development of effective partnerships and appropriate exchange of information and technology.
- Deer/vehicle collisions have always been a concern for the West Virginia Division of Natural Resources. The reality, however, is that these unfortunate incidents will continue to occur because of the rural nature of West Virginia. Interstate and corridor highways continue to be developed within prime deer habitat across the state. The increased speed on these highways is also an influencing factor relating to this problem.
- The West Virginia Division of Natural Resources has long recognized the potential threat associated with deer/vehicle collisions on interstate and corridor highways. In 1974, we initiated a 3-year study of deer killed along I-79 (Goetz and Butterfield 1978). Based upon data from that study, we recommended that an 8-foot fence be incorporated into the design plan for Corridor H from Buckhannon to Elkins.
- Where deer crossings are evident on primary and secondary roads, the West Virginia Division of Natural Resources has recommended that the West Virginia Division of Highways erect warning signs to alert motorists. We have also recommended modifications to vegetation management strategies along highways that would make this habitat less attractive for deer. We will continue to work collaboratively with West Virginia's transportation officials on these important issues.
- The white-tailed deer is a keystone species in West Virginia that provide significant intrinsic, ecological, recreational and economic values to the citizens of West Virginia.
- White-tailed deer hunting has a tremendous positive impact on the state's economy. Deer hunting in West Virginia generates a total annual economic impact of \$233 million, and many of these dollars are spent in the rural areas of the state that depend upon the deer seasons for a large portion of their annual income.
- White-tailed deer are herbivores and constitute a major component of the state's ecosystem. Even at relatively low population densities, white-tailed deer can generate negative impacts (e.g., deer/vehicle collisions, crop damage, impacts to forest regeneration, etc.).

- The West Virginia Division of Natural Resources strives to develop and utilize a very comprehensive and diverse database for making management decisions relating to the state's white-tailed deer resource.
- The West Virginia Division of Natural Resources should incorporate additional biological and sociological parameters into its decision making processes for managing the state's white-tailed deer program. The agency plans to incorporate many of these additional parameters into its revision of the *White-tailed Deer Operational Plan* which is scheduled for release later this year.

Points of Disagreement

- The West Virginia Division of Natural Resources always considers sociological factors when proposing deer hunting regulations. In fact, sociological factors will be highlighted and given further consideration when the *White-tailed Deer Operational Plan* revision is completed. In addition, most county-level harvest objectives are set below biological carrying capacity because sociological parameters are applied to the decision making process. Sociological factors are specifically addressed in the West Virginia Division of Natural Resources' strategic plan with a goal statement for the white-tailed deer program that reads in part "Maintain white-tailed deer populations at levels compatible with biological and sociological conditions . . ." Specific action items contained in both the strategic and operational plans are clearly articulated and designed to reduce the negative sociological, economic and ecological impacts of West Virginia's deer population.
- The West Virginia Division of Natural Resources has made dramatic improvements in the state's deer management program (e.g., improvement in herd health conditions, increase in number of management units achieving their harvest objectives, reduction in crop damage permit requests, etc.) since the last PERD review took place in 1995; however, these management improvements were not contained in the current PERD report.
- Deer/vehicle collisions and crop damage permits are influenced by a variety of factors and are not solely a function of white-tailed deer population size.
- The West Virginia Division of Natural Resources recognizes deer/vehicle collisions are an important parameter to consider when making decisions relating to white-tailed deer management. We agree with the numerical estimates relating to deer/vehicle collisions that were prepared by the West Virginia Division of Highways and West Virginia Office of the Insurance Commissioner; however, these data may be misinterpreted.
- The State Farm Insurance Company and West Virginia Office of the Insurance Commissioner's high deer/vehicle collision rate is an artifact of West Virginia's low human population and rural nature. As such, the deer/vehicle collision rate is influenced by the relatively low number of people in West Virginia (i.e., the denominator in the calculation rate), and it is not necessarily driven by a high deer population as the PERD report suggests. For example, the Philadelphia metropolitan area alone has three times the number of people in all of West Virginia. If West Virginia had the additional human

population of Philadelphia, it would have a deer/vehicle collision rate of 1 collision per approximately 284 drivers which is well below the State Farm Insurance Company's national average of 1 in 182.

- The State Farm Insurance Company's methodology does not adjust the deer/vehicle collision rate to account for the large number of out-of-state drivers in West Virginia (i.e., the denominator in the calculation rate is not appropriately adjusted to account for these out-of-state drivers). Therefore, any state with a lower human population (e.g., West Virginia) will find the use of this methodology causes inflated deer/vehicle collision rates.
- The PERD report may have incorrectly analyzed data about deer/vehicle collisions during their statistical analysis. The true sample size in their correlation analysis may not have been independent, leading to statistical problem known as pseudoreplication.
- Compared to the surrounding states, West Virginia ranked lowest in the number of deer/vehicle collisions. According to the West Virginia Office of the Insurance Commissioner, deer/vehicle collisions in 2009 were as follows: West Virginia (23,756), Virginia (77,391), Ohio (101,381) and Pennsylvania (123,198). Kentucky and Maryland did not report these statistics. We believe these data (i.e., number of deer reported to be hit along the highways) more accurately reflects the true nature of the situation.
- The West Virginia Division of Natural Resources consults with the West Virginia Division of Highways and additional agencies concerning highway construction projects with respect to deer/vehicle collisions and other wildlife related issues. However, The West Virginia Division of Natural Resources has not specifically articulated this action very well in either its strategic or operational plans. These collaboration and consultation strategies will receive further consideration in the *White-tailed Deer Operational Plan* revision.
- The West Virginia Division of Natural Resources recognizes that crop damage occurs at various deer density levels, and the agency provides landowners with technical assistance, including crop damage permits, to address these problems. Unfortunately, the PERD report attempts to show an increase in the issuance of crop damage permits when in fact the number of these permits has actually decreased over the last 20 years.
- Crop damage permits are only one tool that the West Virginia Division of Natural Resources makes available to landowners to deal with crop damage. They are not an accurate index of white-tailed deer populations and are influenced by a multitude of other factors.
- The West Virginia Division of Natural Resources has established numerous white-tailed deer exclosures throughout the state and in different habitat types. These exclosures provide long-term data sets designed to measure the impacts of white-tailed deer on understory vegetation and forest regeneration.
- The PERD report states that excessive deer browsing is impacting the regeneration of the state's oak forests but it fails to mention the numerous other factors (e.g., lack of fire on

the landscape, poor timbering practices, invasive plant species, etc.) that also impact oak regeneration.

- The West Virginia Division of Natural Resources conducts annual white-tailed deer herd health checks to determine their relative health status in various regions of the state. These surveys provide an index to the health status of the deer herd relative to the carrying capacity of the habitat. This information can directly relate to the impact of deer on the habitat; however, it was not included in the report.

Recommendations

1. *The Legislative Auditor recommends the Division of Natural Resources improve its collection and measurements of deer damage data related to crop damage and forest damage.*

Response: The West Virginia Division of Natural Resources will continue to explore more efficient and accurate methodologies for evaluating white-tailed deer impacts to agricultural crops and forests.

2. *The Legislative Auditor recommends that the Division of Natural Resources should utilize the various deer-damage statistics, including deer-vehicle collision data, as performance measures to determine their appropriate levels, and to determine the effectiveness of the agency's deer management policies.*

Response: The West Virginia Division of Natural Resources will continue to use deer harvest data (e.g., the buck and antlerless deer harvest figures per square mile) as a performance measure for the deer management program. Other sociological data (e.g., deer/vehicle collisions, crop damage, etc.) will continue to be utilized by agency biologists in the establishment of deer population objectives and appropriate hunting regulations. Additional parameters will be given them further consideration in the *White-tailed Deer Operational Plan* revision.

3. *The Legislative Auditor recommends the Division of Natural Resources create objectives performance goals, and strategies, in addition to hunting, to reduce the various forms of deer damage across West Virginia.*

Response: The West Virginia Division of Natural Resources will continue to use deer harvest data (e.g., the buck and antlerless deer harvest figures per square mile) as a performance measure for the deer management program. We concur that strategies need to be developed to prevent and reduce various forms of deer damage. These strategies will be incorporated into the *White-tailed Deer Operational Plan* revision.

4. *The Legislative Auditor recommends the Division of Natural Resources initiate research related to reducing deer-vehicle collisions, crop damage, and forest damage created by deer in West Virginia.*

Response: The West Virginia Division of Natural Resources recognizes that the complexity and interdisciplinary nature of deer/vehicle collisions, crop and forest damage problems and their countermeasures require adequate research, funding, development of effective partnerships, and appropriate exchange of information and technology. We recognize deer/vehicle collision research needs to be addressed as a collaborative effort and representatives from the Rahtall Appalachian Transportation Institute at Marshall University, Division of Forestry and Natural Resources at West Virginia University, West Virginia Office of the Insurance Commissioner, West Virginia Department of Transportation and West Virginia Division of Natural Resources could form a committee to investigate the wide range of issues, concerns and contributing factors associated with deer/vehicle collisions. Expenses necessary to conduct this committee's activities and any forth coming research should be funded through legislative appropriations.



WEST VIRGINIA LEGISLATIVE AUDITOR

PERFORMANCE EVALUATION & RESEARCH DIVISION

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