

AN INDEPENDENT, SCIENTIFIC ASSESSMENT OF THE PENNSYLVANIA GAME COMMISSION'S ESTIMATED 2016 DEER HARVEST

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Abstract. This report represents the seventh in a series of independent, scientific assessments of PGC's annual deer harvest estimates. PGC has estimated that 333,254 deer were harvested in Pennsylvania during the 2016-17 hunting season, representing a 6% increase over PGC's previous year's estimated harvest. However, the author has calculated that in order for this number to be accurate, from a biological perspective there would need to be 1.6-2.1 million deer in the state. From a geographical perspective, this number would represent 62-76 deer per square mile (dpsm) on every square mile of forestland in the state up to one acre in size, or 37-45 dpsm on every square mile of Pennsylvania land area including the city streets of Pittsburgh and Philadelphia. Further, from social and economic perspectives, considering that many woodlands during the fall deer season are devoid of orange coats and gun shots because of the lack of deer, that hunting camps and family cabins stand empty and for sale across the northern tier because of the lack of deer, that bankruptcies and lost family businesses proliferate in Potter and Cameron Counties and throughout other northern-tier counties because of the lack of deer, and that official Pennsylvania Legislative Budget and Finance Committee investigations (2012/2017) reported that as of 2012 PGC's deer-reduction program was costing the Commonwealth \$501.6 million per year in lost economic activity and \$40 million per year in lost tax revenue, then even without the scientific evidence within this document, common sense dictates that the agency cannot be harvesting today nearly the same number of deer per year as were harvested during the heydays of deer hunting from the 1960s through the '90s – not even close. Therefore, it is again concluded that PGC's erroneous harvest claims can only be explained by incompetence or deception. This circumstance clearly exemplifies the need for change and accountability regarding PGC's deer management program.

It should be noted that only a week after claiming a 6% harvest increase over 2015's estimated harvest, PGC's board of commissioners announced a 7.5% increase in antlerless license allocations for the upcoming 2017-18 season – a 56,000 increase in doe tags from 748,000 in 2016 to 804,000 for 2017. The agency's deer team had requested 873,000—an increase of 125,000 doe allocations over the previous year, indicating that the Commission has no intention of returning our State Mammal to Penn's Woods.

Preface. The Game Commission's deer-reduction program was designed in 1998 at the whim of three men toward advancing an extreme environmental agenda – without first conducting a cost/benefit analysis and without regard for potential social, economic, or ecological impacts. They concocted a scheme in which DCNR would annually pay a German-based environmental organization for a bogus Green Certification Award. The annual award, which DCNR receives to date, is intended to mutually benefit the Forest Stewardship Council (FSC) and DCNR by making DCNR's forest products appear to be more environmentally appealing on wholesale and retail markets throughout America and the world. However, a 2012 Legislative Budget and Finance Committee (LB&FC) investigation indicated that whereas DCNR was receiving annual increased revenue of \$1.2 million yearly from this scheme, rural communities and the state's economy were losing over \$500 million per year. This is not an acceptable trade-off.

In addition, these three men included a clause into the Green Certification agreement that required the permanent and dramatic reduction of the deer herd in order for DCNR to receive the annual Green Certification award. While this was simply an attempted afterthought to reduce the herd, it worked. PGC complied with DCNR's request and in 2001 the biggest conservation mistake in the history of the Game Commission was implemented. A 2011 LB&FC study referred to the action as being "Based on politics, not science."

During the next five years, the Commission reportedly killed 2,500,000 deer – about 500,000 deer per year. PGC's target was to harvest 100,000 does and fawns over the average annual harvest of 379,000 deer during each of the five years in order to reduce the herd in some northern-tier regions to only 5-6 deer per square mile. However, commissioners stated in private conversation that the herd had been overshot to only 1-2 dpsm in some regions. A member of PGC's deer team bragged that "We've literally exterminated deer in some areas." Therefore, it is likely that significantly more than 2,500,000 deer had been slaughtered from 2001-06, and that the growth potential and ability of the herd to recover in these regions were irreparably harmed. Note that the Commission had still not addressed the primary problem (habitat deterioration) which PGC had mistakenly blamed on deer. Declining wildlife habitat was not the cause of deer, but due to aging state forests beyond their most productive years to 80-125 years old -- with large trees and tight canopies that were closing off sunlight from reaching the forest floor. The resulting lack of understory vegetation as wildlife habitat still remains practically unaddressed by the PGC, and the agency continues to reduce the herd.

Following Gary Alt as director of the deer-reduction program, PGC hired three North Carolina State University students who had all been trained on a small five-square-mile agricultural demonstration area called Chesapeake Farms on the Eastern Shore of Maryland. At Chesapeake Farms they were trained not as conventional wildlife biologists, but, instead, in methods to reduce deer in order to protect agriculture from deer impacts. Therefore, members of PGC's deer team were hired not to manage deer and wildlife for sport hunting, the economic interests of rural communities, or a balanced ecosystem, but simply to apply their Chesapeake Farms deer-reduction training on a statewide level in Pennsylvania. They have succeeded in advancing their deer-reduction training and the agenda of the three founders of the deer-reduction program.

I. INTRODUCTION

For the past seven years (2010-16), the author has scientifically assessed the Pennsylvania Game Commission's annual deer harvest estimates in order to determine their validity. This document provides an independent, scientific assessment of PGC's 2016 estimated deer harvest, and is intended to provide legislative decision makers and sportsmen with sound scientific information toward making wise deer management decisions.

II. METHOD

Considering PGC's estimated harvest, the following metrics were used to determine its scientific validity (Table 1).

- (1) Herd mortality (the number of deer lost from all causes) was calculated. This number includes the hunting harvest.
- (2) From this number, the size of the population that would be required to annually replace the number of deer lost to mortality (including hunting) and to achieve the PGC's annual deer harvest estimates was calculated considering that in a stable population annual production equals total yearly mortality.

(3) Finally, the total population was used to determine deer densities (the number of deer per square mile (dpsm)) that would exist throughout the state if PGC's harvest estimates were accurate.

The reader should remember that the projected herd sizes in this report do not represent the author's estimate of the actual number of deer that exist in Pennsylvania, but, instead, represent the number of deer that would be required to exist if PGC's claimed annual harvests were accurate.

Two scenarios are considered: (1) a deer population and harvest dynamic that is uninfluenced by predation; and (2) separate calculations that include the impacts of predation. It should be noted that the PGC has not considered the impact of predation (especially on fawns by bears and coyotes) when preparing annual deer management plans and determining the allocations of antlerless permits, stating, *"We have no evidence to suggest that fawn survival rates we observed were preventing population growth."*

In addition, in Table 2 the author presents a comparison of PGC's recent deer harvest estimates with past harvests from 1986-1999 which represent the "heydays" of deer hunting in Pennsylvania prior to the beginning of herd reduction in the year 2000.

Note that PGC's annual harvest estimates do not include the DMAP harvest.

III. RESULTS

PGC estimated that 333,254 deer were harvested during the 2016-17 hunting season – representing an increase of 6% over the previous year's claimed harvest of 315,813 deer.

A. ASSESSMENT OF PGC'S ESTIMATED 2016 DEER HARVEST

From the scientific assessment of PGC's 2016 harvest estimate, the following results were calculated.

Scenario 1: Predation IS NOT Considered

If predation by coyotes and bears had no impact on fawn survival rates (as is claimed by the PGC), then 1,341,062 deer would be required in order for the PGC to harvest 333,254 deer – the agency's published 2016 harvest estimate. (See the results of two population dynamics methods in Table 1.)

The associated densities of deer that would be required to produce a harvest of 333,254 deer (as is claimed by the PGC) would be:

- 51 deer per square mile (dpsm) on all forested land within the state.
- 38 dpsm on all forest and agricultural lands, combined.
- 30 dpsm on all land area throughout the state, including cities, developed, and industrialized areas.

Note that this scenario is presented only for comparative purposes, in that predation of fawns is a real and highly significant occurrence that is impacting the rate of herd growth throughout the state.

Scenario 2: Predation IS Considered

To include the impacts of predation (by coyotes and bears) on fawn recruitment and, therefore, on the overall size of the population, two separate studies were considered (see Table 1).

- (a) PGC/PSU Study.** According to a 2000-01 PGC/Penn State University study that was conducted in both forested and agricultural areas, a combined total of 22.5% of fawns were killed by predators.

Coyotes and bears each accounted for about 11% of the predation, while bobcats accounted for 1% of predation on fawns.

Using the results from the PGC/PSU 2000-01 predation study, 1,642,800 deer would be required in the state in order to replace deer that are lost to hunting, predation, and all other causes. If this number of deer occurred in the state, then a stable herd could exist that would be able to provide a harvest of 333,254 deer – as has been claimed by the PGC in 2016. The corresponding densities of deer would be:

- 62 dpsm on all forested land in the Commonwealth.
- 46 dpsm on all forest and agricultural lands, combined.
- 37 dpsm on all land area within the state.

(b) Eastern States Studies. From recent studies that have been conducted throughout eastern states, about half of all fawns were lost to predation during their first three months of life (Journal of Wildlife Management, May 2014). It is reasonable to assume that there is a comparable predation impact on fawns in Pennsylvania, and, therefore, that roughly 50% of the state's yearly fawn crop is being lost to predators.

It is likely that Pennsylvania's coyote population has dramatically increased since the PGC/PSU 2000-01 study. In 2012 over 40,000 coyotes were harvested, indicating that coyote number could have reached 400,000-500,000 in the state. Then it is, again, likely that the rate of predation on fawns in Pennsylvania is now closer to 50% of the annual fawn crop than to 22.5%. Also, considering that the state's bear population has remained relatively stable at 20,000-25,000 animals during this period, it is likely that the continuing increase in predation (from 22.5% to 50%) can be attributed to coyotes.

Regarding the recent results from these eastern-states fawn-predation studies, a statewide herd size of 2,122,685 deer would be required in order for the PGC to harvest their claimed 2016 estimate of 333,254 deer (Table 1). The corresponding deer densities would be:

- 76 dpsm on all forested lands in Pennsylvania.
- 57 dpsm on all forest and agricultural lands, combined.
- 45 dpsm on every square mile of land area within the state – including cities, developed and industrial areas, forest and agricultural lands, parks, golf courses, playgrounds, and roadways.

Looking at the reality of the issue, using two methods that consider predation provides a very different picture. First, when we consider PGC's 2000-01 predation study that indicated that 22.5% of fawns were being taken by coyotes, bears, and bobcats, then there would need to be 1,642,800 deer in Pennsylvania in order to sustain PGC's claimed harvest. However, since 2001 the coyote population has exploded across the state. Studies in other eastern states that surround Pennsylvania have determined that upwards of 50% of fawns are taken by predators. When we apply this scenario to Pennsylvania, then there would need to be 2,122,685 deer in the state. This represents a density of 76 dpsm on all forested lands in the state, or 45 dpsm on every square mile of land area, including the city streets of Harrisburg, Pittsburgh, and Philadelphia, as well as covering the highways, backyards, playgrounds, and ballfields of the Commonwealth.

Table 1. An Independent Assessment of the PGC's Estimated 2016 Deer Harvest

(A) FOUR ANALYSES	(B) PGC-ESTIMATED DEER HARVEST	(C) TOTAL ANNUAL MORTALITY ⁽¹⁾ & RECRUITMENT ⁽²⁾	(D) HERD SIZE NEEDED TO ACHIEVE PGC'S ESTIMATED HARVEST ⁽³⁾	(E) CORRESPONDING AVG. DENSITY OF DEER (dpsm)		
				ON ALL PA FORESTLAND ⁽⁴⁾	AGRICULTURAL +FORESTLAND ⁽⁵⁾	ON ALL PA LAND AREA ⁽⁵⁾
1. Predation IS NOT Considered ⁽⁶⁾						
a. Standard Method ⁽⁶⁾	333,254	469,372	1,341,062	51 dpsm	38 dpsm	30 dpsm
b. Empirical Method ⁽⁷⁾	333,254	N/A	1,333,016	51 dpsm	38 dpsm	30 dpsm
2. Predation IS Considered						
a. PGC 2000-01 Study ⁽⁸⁾	333,254	574,980	1,642,800	62 dpsm	46 dpsm	37 dpsm
b. Eastern States Studies ⁽⁹⁾	333,254	742,940	2,122,685	76 dpsm	57 dpsm	45 dpsm

(1) As stated in PGC's 2009-2018 Deer Management Plan, *hunting represents 71% of mortality of white-tailed deer \geq 6 months of age* (Rosenberry 2009).

(2) As stated in PGC's 2009-2018 Deer Management Plan, recruitment is the number of fawns born in spring that survive until fall. To maintain a population at a stable level, the annual recruitment must equal the annual mortality (Rosenberry 2009).

(3) As published by the Alabama Department of Conservation and Natural Resources (Cook and Gray 2008) and determined from classic research in Michigan (Hickie 1937; Caughley 1977), once a population has reached a stable level, unabated the herd will increase annually by about 35%. With approximately 35% annual mortality, a population will generally remain stable. A deer herd will continue to grow with annual mortality rates of less than 35%. The total population will decline with a 40% or greater annual mortality rate.

(4) There is a total of 16,992,800 acres (26,551 square miles) of forestland (private and publicly-owned) in Pennsylvania, representing 59% of the state's land area (Finley and Jones 1993; and Devlin 2010).

(5) There is a total of 5,736,960 acres (8,964 square miles) of agricultural lands (croplands and pasture lands) in Pennsylvania (USDA Economic Research Service, 2007). Combined with 26,551 square miles of forestlands, forests and agricultural lands represent 79% (35,515 square miles) of Pennsylvania's land area (National Resources Inventory, 2007). Note that nonforested urban and developed areas represent the remaining 21% of Pennsylvania's 44,820 square miles of land area (Finley and Jones 1993). An additional 1,238 square miles of the state's surface area is covered by water.

(6) The PGC does not consider early fawn predation and total fawn mortality <6 months of age (Rosenberry et al 2009). Therefore, this method does not include any impacts caused by predation.

(7) *Sustainable deer harvest compared to deer population* (Downing and Guynn 1985; and Rosenberry et al 2009), calculated a sustainable harvest to be about 25% of a healthy population.

(8) From a 2000/01 PGC/PSU study, the impact of early fawn predation \leq 3 months of age is considered at 22.5% (Vreeland (PGC) et al 2004).

(9) According to recent studies in Eastern states, about 50% of fawns were lost to predation during their first three months of life (Journal of Wildlife Management, May 2014).

**Table 2. Comparison of Recent PGC Claimed Deer Harvests
With Historical Pre-Reduction Harvests**

(A) <u>PERIOD</u>	(B) <u>PGC-ESTIMATED DEER HARVEST</u>	(C) <u>TOTAL ANNUAL MORTALITY ⁽¹⁾ & RECRUITMENT⁽²⁾</u>	(D) <u>HERD SIZE NEEDED TO ACHIEVE PGC'S ESTIMATED HARVEST⁽³⁾</u>
I. Average from 1986-1999	379,137	533,996	1,525,702
II. Yearly from 2011-2016 (Predation IS Considered)			
A. 2011 ⁽⁷⁾	336,200	562,068	1,605,909
B. 2012 ⁽⁷⁾	343,110	573,621	1,638,916
C. 2013 ⁽⁶⁾	352,920	757,038	2,162,966
D. 2014 ⁽⁶⁾	303,973	642,197	1,834,847
E. 2015 ⁽⁶⁾	315,813	667,211	1,906,316
F. 2016 ⁽⁶⁾	333,254	742,940	2,122,685

(1) As stated in PGC's 2009-2018 Deer Management Plan, *hunting represents 71% of mortality of white-tailed deer \geq 6 months of age* (Rosenberry 2009).

(2) As stated in PGC's 2009-2018 Deer Management Plan, recruitment is the number of fawns born in spring that survive until fall. To maintain a population at a stable level, the annual recruitment must equal the annual mortality (Rosenberry 2009).

(3) As published by the Alabama Department of Conservation and Natural Resources (Cook and Gray 2008) and determined from classic research in Michigan (Hickie 1937; Caughley 1977), once a population has reached a stable level, unabated the herd will increase annually by about 35%. With approximately 35% annual mortality, a population will generally remain stable. A deer herd will continue to grow with annual mortality rates of less than 35%. The total population will decline with a 40% or greater annual mortality rate.

(4) Deer population metrics if predation were not considered in calculations.

(5) From a 2000-01 PGC/PSU study, the impact of early fawn predation \leq 3 months of age is considered at 22.5% (Vreeland (PGC) et al 2004).

(6) According to recent studies in Eastern States, about 50% of fawns were lost to predation during their first three months of life (Journal of Wildlife Management, May 2014).

(7) Predation is considered at 18.7% with specific reference to predation intensity on forested, agricultural, and developed land areas (Vreeland et al 2004).

B. ASSOCIATED CONSIDERATIONS

1. Comparison of Recent PGC Claimed Deer Harvests with Historical Harvests

As presented in Table 2, after essentially collapsing the statewide deer herd with excessive antlerless permits from 2000 through 2006, during the following years PGC has claimed that hunters have been harvesting appreciably the same number of deer as had been annually harvested during the heydays of deer hunting from 1986-1999. Prior to herd reduction in 2000, PGC had estimated that about 1.5 million deer existed in the state. The author of this report concurs, in that this number had been calculated by the author as having been necessary in order to sustain the high annual harvests from 1986-1999 – an average annual harvest of 379,137 deer. Statistical verification of a population of 1.5 million deer indicates that prior to the onset of herd reduction in 2001, PGC was accurately reporting population and harvest metrics to sportsmen, the agency's Board of Commissioners, and State Legislators (see Table 2, analysis I).

However, while the bear population has remained fairly stable from 1999 to the present, the coyote population has increased from tens-of-thousand of animals to an estimated 250,000-500,000 coyotes today. Therefore, while fawn predation by bears has likely remained rather stable for decades, coyote predation on fawns has increased dramatically. Considering the annually increasing impacts of coyote predation, there would need to be about 2.1 million deer in the state in order for PGC to achieve their claimed high annual harvest figures (see Table 1 and Table 2, analysis II).

2. Socioeconomic Impact of PGC's Deer-Reduction Program

From a 2012 legislative committee report and further calculations in January 2017, the Pennsylvania Legislative Budget and Finance Committee (LB&FC) determined that as of 2011, the Game Commission's deer-reduction program had resulted in serious social and economic impacts to the Commonwealth:

- the loss of about 120,000 hunters (which could now be counted in the hundreds of thousands).
- the loss of \$501.6 million per year in Commonwealth economic activity, especially to rural communities which prompted the Director of the Cameron County Chamber of Commerce to declare, "The Game Commission's deer program is economic suicide for the county."
- the loss of \$40 million per year in government tax revenue -- \$25 million in annual lost state taxes and \$15 million per year in lost local tax revenue.

It has also been determined that PGC's deer-reduction program is costing the agency \$8.1 million in lost hunting-license fees. Considering that the Commission is claiming an \$8 million annual budget deficit, then it is apparent that PGC is causing its own budget deficit from mismanagement of the deer herd.

3. 2017/18 Antlerless License Allocation

Although LB&FC reports indicate that since 2001 the Game Commission's deer-management program has devastate rural communities by several billions-of-dollars in lost economic activity and continues at an impact rate of over \$500 million per year, and further considering that since 2001 PGC's deer-reduction program has cost state and local governments about a billion dollars in lost tax revenue, for the upcoming 2017/18 hunting season PGC has increased antlerless allocations by 56,000 -- from 748,000 in 2016 to 804,000 for this coming season. There will be significant increases in doe-license allocations in all four corners of the state – northwest WMUs, the extreme southwest, northeast, and southeast. However, increases will also occur in especially hard-hit areas in northcentral and central

WMUs where deer numbers have been as low as 1-2 dpsm in some regions (as reported by the agency in private conversation) and where family businesses and rural communities have been economically devastated, including 2F, 2G, 2H, 3A-C, 4C, and 4E. It is evident that PGC has little to no intention of easing up on the deer herd, sportsmen, or rural communities.

IV. CONCLUSION

Three principal conclusions are drawn from this independent, scientific harvest assessment:

- (1) It is virtually impossible that the PGC's estimated 2016 deer harvest is accurate.
- (2) The Commonwealth's deer herd and deer harvests are significantly lower than the PGC indicates.
- (3) Predation is dramatically impacting fawn recruitment and significantly hindering herd growth.

Considering that 76 dpsm would be required on all forested lands within the state in order for the PGC to have harvested their claimed 333,254 deer in 2016, or 45dpsm on every square mile of land within the Commonwealth, it is highly unlikely that PGC's harvest estimates are even close to being accurate.

As has been concluded regarding the author's past deer-harvest assessments, the PGC's improbably high 2016 harvest estimate of 333,254 deer cannot be justified by scientific analysis, and can, therefore, only be explained by PGC incompetence or deception. This circumstance stresses the need for change and accountability regarding PGC's deer management program – passage of a new bill for deer management, wildlife habitat, and Game Commission accountability.