

# Farmers' perceptions of white-tailed deer damage to row crops in 20 Georgia counties during 2016.

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White-tailed deer (*Odocoileus virginianus*) are perhaps the most abundant large game mammal in the United States and the most popular game species in Georgia (Figure 1). The 2011 US Fish and Wildlife Service Hunting, Fishing & Wildlife Watching survey suggests that hunting may generate nearly one billion dollars in economic activity in Georgia. However, deer are capable of inflicting severe damage to crops, property, and people. The National Agricultural Statistics Service (NASS) estimated that losses to field crops, vegetables, fruits, and nuts exceeded \$765 million USD in 2001. White-tailed deer were responsible for 58% of field crop losses and 33% of losses to vegetables, fruits, and nuts. In other studies, NASS estimated that wildlife caused 10 million dollars in damage to crops in Maryland in 2011 and deer were responsible for 77% of the damage. A 2006 survey of crop producers in North Central Indiana by Purdue University Extension reported total losses to corn by deer at \$90,000 - highest of any wildlife species. Insurance company statistics suggest there are over 52,000 deer vehicle collisions (DVC) annually in Georgia at an estimated average cost of \$3,995 per DVC in 2015. However, we know little about the economic impact of deer to row-crop agriculture in Georgia.

By July 2016, the problem of deer depredation in at least one Georgia County prompted several producers to contact the county agent and state wildlife specialist. Producers were experiencing what they perceived as unacceptable levels of deer damage to row crops. Some producers sought relief from Georgia Department of Natural



Figure 1. White-tailed deer are a popular big-game animal but can cause severe economic hardship to Georgia farmers and citizens.

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Resources Wildlife Resources Division (GaWRD) through the deer damage permit system, commonly referred to as a “depredation permit.” The GaWRD District Biologist can issue a crop depredation permit to help agriculture producers reduce local deer damage through targeted harvest of nuisance deer outside the regular statewide deer-hunting season. Conditions specified on the permit can include - number of deer, sex of deer, permit dates, persons authorized to conduct or assist with the harvest, and other relevant information.

A potential conflict can arise when local hunting clubs or individual hunters oppose out-of-season harvest by agriculture producers. Producers worry that hunting clubs or individuals will inflict retribution on the producers' land or property in protest over depredation permits. Some producers are reluctant to accurately report the results of their control activities out of fear that their

names and/or addresses could be released to the public, and this could result in negative feelings among individuals in the local community. These concerns are very important to individual producers and can lead to human-human conflict. Individual anecdotes suggest that producers are underreporting deer harvested on depredation permits.

In December 2016, we visited two affected row-crop producers in Emanuel County to hear directly about the problems they face from overabundant deer, crop damage, and local relationships with hunters and hunting clubs. As an initial strategy to address this problem, we designed a survey to gather information about crop damage across multiple counties, approaches to resolving crop damage, use of depredation permits and other means for addressing crop damage, as well as comments from area agriculture producers. The Human Subjects Office at UGA reviewed the survey and assigned a determination of “Not Human Research”. We then obtained permission of the SE Extension District Program Development Coordinator (PDC), and we distributed the survey to extension agents in the SE Extension District.

## Methods

County agents distributed copies of the survey to producers during January/February county production meetings. Producers completed the survey at the production meeting or took the survey home for completion and then returned it to the county extension office. County agents collected the completed surveys and sent them to the University of Georgia for data entry and analysis. County agents distributed an unknown number of surveys at local production meetings, and we did not attempt to distribute surveys to a random subset of producers.

Response rates and non-response bias cannot be determined.

To estimate the economic impact of deer damage, we used the self-reported crop loss per acre in yield (bushels/acre, pounds/acre, etc.) and multiplied by an estimate of crop market value and acres affected. Based on the current (2016) market price for commodities, we used \$0.71 per pound for cotton, \$11.00 per bushel for soybeans, \$0.175 per pound for peanuts, and \$4.50 per bushel for corn to estimate crop losses. For other crops, we used currently available data from NASS reports, Georgia 2014 Farm Gate reports, or published internet sources from commodity groups (See “Further Reading” section for details).

Deer inflict damage not only in lost yield, but also in replanting cost. We used self-reported data from respondents on total replanting cost per acre multiplied by acres replanted then added that result to the economic value of lost yield to arrive at an estimate of total impact due to deer damage. Frequencies, means, cross tabulations for numeric data, and summaries for comments inserted by respondents were analyzed using IBM SPSS version 24.0. We re-coded string variables as numeric variables to facilitate quantitative analysis.

## Results

### *Economic Loss*

We received 109 usable surveys containing information on 221 farms or parcels of land. Forty-eight percent (n=52) of respondents manage one parcel, 26.6% (n=29) manage two parcels, followed by four parcels (11.9%), three parcels (9.2%), six parcels (2.8%), and five parcels (1.8%). Twenty counties were represented in the survey, and nine surveys did not list the county. Emanuel (n=36; 16.3%), Screven (n=26; 11.8%), and Johnson (n=24;

10.9%) were the top three counties based on number of responses (Table 1).

Respondents planted 94,560 acres in 2016 with 19,536 acres (20.5%) damaged by deer. The average number of acres planted per farm was 473.9 acres (SD = 764.9; range = 5-5000 acres) with a reported damage per farm of 98.2 acres (SD=296.6; range = 0.25-3800 acres) that included 20 different crops. Corn, cotton, peanuts, and soybeans accounted for 91.6% of the acreage damaged (Table 2), with an average loss of \$33,786 (SD=\$52,954; range = \$355-\$256,500) per farmer. We estimated that deer caused \$2,770,439 in economic damage to the

respondents in this survey. Respondents reported replanting 2,521 acres damaged by deer. Respondents reported total replanting costs of \$315,346 ( $\bar{x}$ =\$8,086; SD=\$9,560; range = \$600 - \$40,000). Our estimated combined economic impact for lost yield and replanting costs was \$3,005,528 in 2016.

When asked if they avoided planting one crop because of anticipated deer damage and instead planted an alternate crop, 92 respondents replied, and 54.3% said “YES” they avoided planting a particular crop or crops. Soybeans were avoided by 44.9 % (n=22) respondents, 14.3% (n=7) avoided planting cotton, 10.2% (n=5) respondents avoided soybean/cotton, and another 10.2% (n=5) avoided soybean/peanut crops. The estimated lost revenue from the 23 respondents who provided dollar estimates totaled \$375,575 or \$16,329 (SD = \$22,943) per respondent.

Table 1. Number of responses from each county in the 2016 deer depredation survey.

County	Frequency	Percent
Emanuel	36	16.3
Screven	26	11.8
Johnson	24	10.9
Burke	21	9.5
Jefferson	21	9.5
Laurens	18	8.1
Jenkins	16	7.2
Dooly	14	6.3
Washington	7	3.2
Jeff Davis	6	2.7
Taylor	5	2.3
Peach	4	1.8
Candler	3	1.4
Toombs	3	1.4
Coffee	2	0.9
Montgomery	2	0.9
Bullock	1	0.5
Effingham	1	0.5
Telfair	1	0.5
Treutlen	1	0.5
Unknown	9	4.1

#### *Dealing with Deer Damage*

Forty respondents (44.4%) said that they took action to address deer damage. Of the 40 respondents, the majority (n=29; 72.5%) contacted GaWRD (Table 3). When asked if the outside sources helped reduce the damage, 35 people responded and 16 (45.7%) said it did help, 13 (37.1%) said it did not help, and six (17.1%) were unsure if the agency helped reduce the damage.

In the next question, we asked survey respondents if they took any action to correct the deer damage problem. Seventy-nine respondents (86.8%) reported that they took one or more actions (Table 4). Numbers on the diagonal are the number of responses to a single option choice. Numbers off the diagonal are the number of respondents who reported taking at least two actions.

Table 2. Crop acres planted and damaged by deer during 2016 as self-reported by farmers in the 20 Georgia Counties surveyed during January/February 2016.

Crop	Number Reporting	Acres Planted	Acres Damaged	Percent of Crop
Corn	26	10,583	4,844	45.8
Cotton	61	43,448	5,021	11.6
Peanuts	40	11,488	2,471	21.5
Soybeans	54	19,927	5,554	27.9
Other Crops	19	9,814	1,644	16.8
Total		95,260	19,535	20.5

*Deer Depredation Permits*

Forty-seven respondents received a GaWRD deer depredation permit. Typically, permittees are allowed to harvest up to 10 deer on a depredation permit, and they can request additional permits. Thirty-six permit holders reported having collective approval to remove 344 deer. Respondents culled 339 deer (98.5%). Eight respondents received a second

permit allowing them to remove an additional 82 deer; they harvested 63 deer (76.8%). Two respondents got third and fourth permits allowing them to remove an additional 10 deer per permit, and they eliminated the maximum allowed on these additional permits. For all permits, respondents were allowed to remove up to 466 deer, and they successfully removed 442 deer (94.8%).

Table 3. Actions taken by agriculture producers to address deer damage problems in 20 southeast Georgia counties.

Source	Number	Percent
<i>State/Federal Agencies contacted</i>		
Georgia Wildlife Resources Division (GaWRD)	29	72.5
Cooperative Extension Service (CES)	3	7.5
CES & GaWRD	3	7.5
Contacted CES, GaWRD & USDA WS	1	2.5
<i>Private actions taken by producers</i>		
Private Deer Hunter	3	7.5
Purchased a hunting license	1	2.5

Respondents reported a total harvest of 783 deer in 2016. Respondents removed 341 deer (43.6%) while hunting and 442 deer (56.5%) were taken on deer depredation permits. The officially reported 2016-2017 deer hunter harvest for the 20 counties covered by this survey was 30,660 deer (<https://gamecheckresults.gooutdoorsgeorgia.com/DeerByCounty.aspx>). Therefore, deer removed on depredation permits (n=442) in 2016 represent 1.5% of the total 2016 deer harvest in these 20 counties. The 2016 total reported deer harvest in Georgia was 182,784 deer. The number harvested on depredation permits in the 20 counties covered by this survey represent 0.24% of the total statewide harvest. Our survey suggests that the number of deer removed by producers using the depredation permit system is an extremely small number. We know vehicle collisions claim at least 52,819 deer in Georgia each year (<https://newsroom.statefarm.com/state-farm-releases-2016-deer-collision-data>). Combining reported hunter harvest and reported highway mortality results in over 235,000 deer killed in

Georgia. Deer removed on depredation permits in this study accounted for less than two-tenths of one percent (< 0.2%) of deer mortality in Georgia in 2016.

#### *Perceived Deer Population Trends*

Eighty-eight of 109 survey respondents (80.7%) answered the question about deer population trends. We asked if respondents felt the current deer population on land they owned, leased, or rented was lower, the same, or higher compared to 2015, three years ago, and five years ago. Compared to last year (2015), 54.5% of respondents felt the deer population was higher (Table 5). Additionally, 66.3% and 65.5% believe the deer population was higher compared to 3- and 5-years ago, respectively.

#### *Responses to Opinion Questions About Deer Damage*

Question number 7 on the survey stated, “If white-tailed deer are increasing, what do you think is/are the reasons?” Respondents could select multiple answers. The most frequently chosen response was “Local hunt clubs will not shoot female deer” (Table 6).

When only two answers were selected, respondents selected “Local hunt clubs will not shoot female deer” 13 times and was most often selected with “My crops are their only food source.” When three answers were selected, respondents selected “Local hunt clubs will not shoot female deer” 19 times; “Lack of hunting pressure” 17 times; and “My crops are their only food source” 15 times. When four answers were selected, respondents selected “Local hunt clubs will not shoot female deer” 18 times; “My crops are their only food source” 15 times; and “Lack of hunting pressure” 14 times. “Neighbor’s management



practices.” and “Wildlife Department Policy” were each selected 10 times.

Responses to open-ended responses are more difficult to interpret. Twenty-five respondents selected the choice “Wildlife Department Policy (please explain),” and 12 offered explanations. All 12 respondents who supplied ‘reasons’ to the explanation of Wildlife Department Policy are shown in Table 7. For Question 7, respondents could simply select a generic “other” category and supply their own explanation. Only seven respondents selected “other” on Question 7. Respondents expressed the view that local hunt clubs did not harvest adequate numbers of antlerless deer and local hunt clubs may have stopped planting food plots because deer have adequate access to row crops on neighboring properties (Table 6).

The final question on the survey allowed respondents to supply their own comments on the general subject matter covered in this survey. There were 42 responses to Question 8. The responses spanned a range of topics. Farmers felt that deer were an economic burden. Many comments suggested a need to review the deer depredation system, increase

legal harvest limits for hunter, extend the hunting season, provide financial compensation to farmers who had deer damage, discourage trophy hunters, and kill more does. All responses are summarized in the final report available from the senior author on this paper.

## Summary

While we cannot extrapolate our results to all agriculture producers in the area, we assume the results are a reasonable representation of actual damage incurred by affected producers. We acknowledge that our estimates (and calculations from the estimates) are subject to any error due to self-reporting inaccuracies by the survey respondents. We acknowledge that there are other costs besides lost yield and replanting costs. Nevertheless, these estimates are the only data available at this time.

One hundred nine farmers from 20 counties responded to this survey. They farm or manage 221 parcels of cropland. These 109 individuals planted 95,260 acres of crops in 2016 and reported damage on 19,536 acres (20.7%). Producers reported damage to 20 different crops in this survey. Based on the calculated

Table 4. The number of times one (diagonal) or two (off-diagonal) actions taken by agriculture producers to correct the deer damage problems on their farms in 20 southeast Georgia counties.

	Hunted Myself	Leased My Land for hunting	Allowed Hunters Access	Got a Depredation Permit
Hunted myself	51			
Leased my land for hunting	13	22		
Allowed hunters access	18	7	30	
Got a depredation Permit	27	14	14	47

value of lost yield and replanting costs, these farmers suffered \$3,005,528 in damages. In addition, respondents who reported planting a crop of lesser value lost \$375,575 or \$16,329 per respondent (n=23). Seventy two percent of respondents contacted GaWRD for assistance with the deer depredation problem.

Forty-seven respondents had GaWRD deer depredation permits in 2016. They removed 442 deer on the depredation permits. This represents 1.5% of the total reported hunting harvest for these 20 counties and approximately 0.24% of the total statewide hunter harvest for 2016. All respondents believed that deer populations were increasing in the past year, 3-years, and 5-years. In general, respondents believed that a major reason for the increasing deer populations is that surrounding hunters/hunt clubs will not shoot enough female deer. The farmers in this survey are frustrated with continuing deer depredation problems and the economic losses they bear due to a perceived overabundant deer herd. This frustration lead directly to this survey. This survey presents data on the self-reported economic losses to row-crop a sample of row-crop farmers that can be attributed to deer depredation.

#### *Future Management Options for Consideration*

Future solutions will need to include modifications to the depredation permit

system, additional use of these permits by producers, and increased hunter harvest. Solutions will require that producers work with GaWRD and local hunting clubs, as well as increase their personal harvest to reduce deer herd numbers in localized areas where problems are most intense. Additionally, fencing or other non-lethal solutions may be implemented. From a practical view, multiple management actions involving all partners will likely be required.

## **Further Reading**

Commodity Pricing – Oats, Onions, Pecans, Sorghum, Watermelon, and Wheat – see 2014 Georgia Farm Gate Value Report.  
<http://caes2.caes.uga.edu/center/caed/pubs/annual.html>.  
Accessed on 31 May 2017.

Commodity Pricing – Sunflower. 2015 USDA NASS Crop Value Report.  
<https://www.usda.gov/nass/PUBS/TODAYRPT/cpv10216.pdf>.  
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Economic Importance of Hunting in America. 2001. International Association of Fish and Wildlife Agencies.  
[www.fishwildlife.org/files/Hunting\\_Economic\\_Impact.pdf](http://www.fishwildlife.org/files/Hunting_Economic_Impact.pdf).  
Accessed on 15 May 2017.

LOOK OUT! Deer Damage can be Costly! 2016. State Farm Insurance Company.  
<https://newsroom.statefarm.com/state-farm-releases-2016-deer-collision-data>. Accessed on 15 May 2017.

Table 5. Responses (%) from Georgia row-crop farmers to a question about perceived trends in deer population status compared to 2015. The survey was distributed during January/February 2016.

Time Frame	Sample Size	Lower	Same	Higher	Unsure
Compared to 2015	88	4.5	36.4	54.5	4.5
Compared to 3 years ago	83	7.2	20.5	66.3	6.0
Compared to 5 years ago	84	4.8	17.9	65.5	11.9

Table 6. Agriculture producers' responses to a survey question about the perceived reasons for increases in local white-tailed deer populations in 20 counties in southeast Georgia. The number of responses to each answer choice is shown. Not all possible response combinations are shown. There were 109 useable surveys used in this summary.

Answer choice <sup>1</sup>	Number of times respondents <sup>2</sup> selected this response
Local hunt clubs will not shoot female deer	62
My crops are their only food source	53
Lack of hunting pressure	46
Neighbor's management practices	28
Wildlife Department Policy	25
Timber management is changing	17
Natural causes	16
Other	7

<sup>1</sup> Respondents could select multiple responses.

<sup>2</sup> Each response could be selected alone or with one to 7 other responses.



Table 7. These are the responses to the open-ended response “Wildlife Department Policy” answer choice and to the open-ended response “Other (please explain)” for Question 7 on the Georgia Deer Depredation Survey.

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*Please explain Wildlife Department Policy*

Allow to kill more

Deer season should stay in until middle or end of January

DNR allows only antlerless deer taken on permits. Bucks eat just as much as does.

Limited to only shooting nuisance deer also having to keep data on tagging for processor.

Limits on deer kill.

Need bigger limits in areas.

Need more doe days.

Need to allow more deer killed per hunter.

Need to up limit and you should have to kill 3 does after first buck to be eligible to kill next buck then must kill 5 does to be able to kill your first buck following season.

Reduction in antlerless deer days and changes in doe dates to reduce (sic) the number of deer harvested in certain locations.

Restrictive hunting laws.

You could open seasons for high concentration/damage areas.

*Please state ‘Other’ reason and explain*

2016 was a hot dry year, this led to more deer eating in row crops.

Expense of processing deer.

Farms around and land around my land has been cleared up or all timber cut.

Hunter out for large bucks only

Hunters are not planting their own food plots.

Hunters killing only bucks.

The clearing of land does not allow room to help feed deer all hardwood trees.

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