

**FARMERS' ESTIMATES OF ECONOMIC DAMAGE FROM  
WHITE-TAILED DEER IN NEW YORK STATE**

**Tommy L. Brown, Daniel J. Decker, and Paul D. Curtis**

**HDRU Series No. 04-3**

**March 2004**

## **ACKNOWLEDGMENTS**

This study was a cooperative effort between the Cornell University Agricultural Experiment Station, New York State Department of Environmental Conservation (DEC), New York State Department of Agriculture and Markets (NYSDAM), New York Agricultural Statistics Service (NASS), and the New York Farm Bureau. Important early commitments to this effort were made by Dan Decker, Director of the Cornell University Agricultural Experiment Station; Gerald Barnhart, Director of DEC's Division of Fish, Wildlife, and Marine Resources; Ruth Moore, First Deputy Commissioner of NYSDAM, and John Lincoln, President of the New York Farm Bureau. An advisory group of John Major, Chief of DEC's Bureau of Wildlife, Jeff Williams of the Farm Bureau's public policy staff, and Stephen Ropel of NASS provided valuable input to the study. Further staff-level input was provided by Richard Henry and Louis Berchielli of DEC.

NYSDAM staff drew the sample and mailed the survey. Steve Roepel and Blair Smith supervised this effort. Karlene Smith of the HDRU provided data entry, Nancy Connelly provided the data analysis, and Margie Peech formatted the final report. Wayne Richter of DEC's Habitat Inventory Unit, and staff Katherine Barnes and Siddharth Pandit prepared maps useful to this effort, including Figure 2 of this report.

## EXECUTIVE SUMMARY

Agriculture is a very significant part of the statewide economy in New York. The New York Agriculture Statistics Service (2003) estimates that agricultural production returned over \$3.4 billion to farmers in 2001. Using a broad definition, New York has approximately 37,500 farms that occupy 7.6 million acres, or about 25% of the state's land area. While dairy and animal production account for 60% of all cash receipts, production of several crops that are vulnerable to deer predation are also important economically. Keeping deer populations within levels that are tolerable to agriculturalists has been a concern to the New York State Department of Environmental Conservation (DEC) and to the agricultural community in New York for several decades.

Growing concerns about deer damage to agricultural crops, including nurseries, and related aspects of deer management led to this study. The study was made possible through funding and assistance from the Cornell University Agricultural Experiment Station, New York State Department of Environmental Conservation, New York State Department of Agriculture and Markets, National Agricultural Statistical Service, and the New York Farm Bureau.

### Objectives

The following objectives were identified for this study:

1. Determine farmers' estimates of deer damage to crops by major crop types statewide and by regions in New York.
2. Assess the use of New York's nuisance permit system, the effectiveness of the system in alleviating negative impacts of deer on agriculture, and farmers' satisfaction with the system.
3. Estimate the ratio of deer damage to total wildlife damage to crops, and identify any other major sources of wildlife damage to crops in New York.

### Methods

The computerized listing of farmers and growers held by the New York National Agricultural Statistical Service (NASS) was used for this study. Because this study focused on deer damage, we eliminated from the statewide listing the following groups of growers: (1) farms with sales of bees and honey only, (2) farms with aquacultural sales only, (3) farms with sales of greenhouse products only, (4) farms with sales of livestock only, and (5) other farmers with < \$1,000 in total sales. These eliminations reduced the total statewide listing of farms from approximately 37,000 to 25,497.

A systematic sample of farmers was then drawn from each region. We sampled 3,908 farmers statewide. That sample was divided into 8 geographic strata of 500 names each, with only 408 names available for Long Island. The NASS regions were used (Figure 1). NASS has

9 regions; we combined NASS regions 70 and 80 to form one Southern Tier region, and used the other regions, shown in Figure 1, without alteration.

The survey was designed by HDRU staff with input from an advisory committee. A four-wave mailing (original questionnaire plus up to 3 reminder notices) was implemented by NASS staff. HDRU staff performed data entry and analyzed the study results.

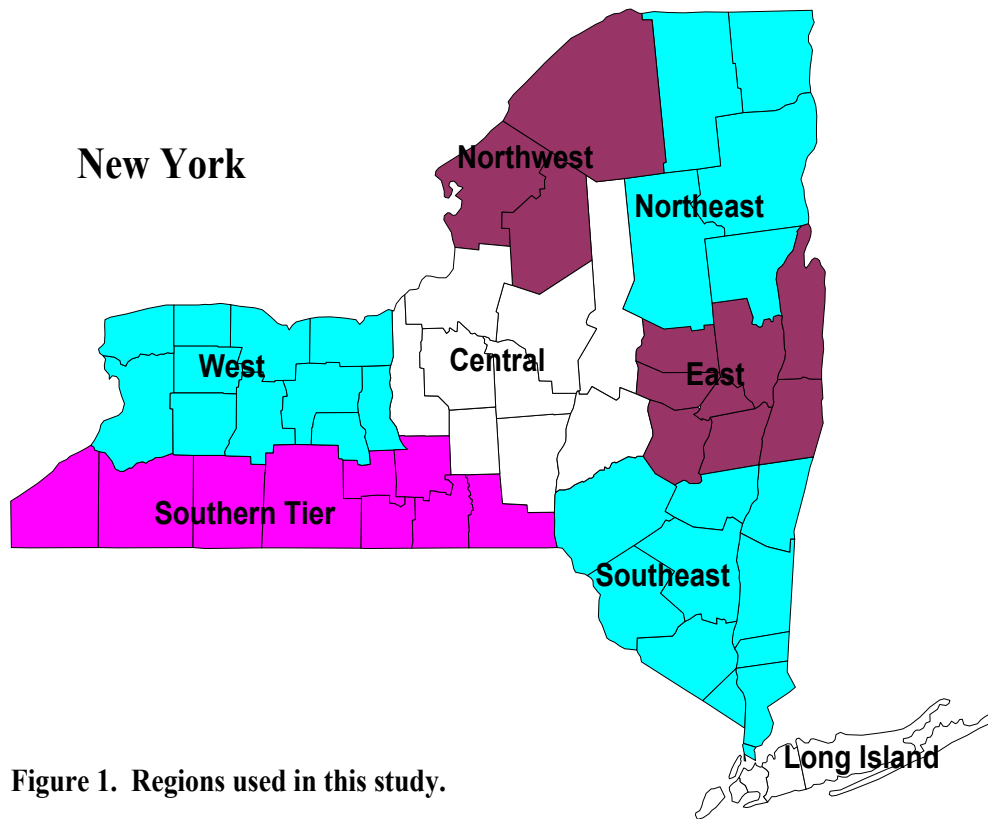


Figure 1. Regions used in this study.

## Results

From the original mailing of 3,909 questionnaires, 101 were undeliverable. Of the 3,808 delivered questionnaires, 1,927 were returned for an adjusted response rate of 50.6%. A random sample of 100 nonrespondents was completed by telephone. Of these nonrespondents, 72.9% reported damage of less than \$100, compared to just 25.1% for respondents. No statistically significant difference was found in the distribution of the value of crops sold between responding farmers and the nonrespondent sample. In extrapolating the results from the respondents to all farmers in our universe, we corrected for the proportion with <\$100 worth of deer damage based on nonrespondent data and assumed that the average amount of deer damage for farms with

>\$100 in deer damage is similar for respondents and nonrespondents. With this assumption, deer damage estimates have been reduced by 31.5% from a straight extrapolation from sample respondent data to account for less damage incurred by nonrespondents.

Responding farmers owned or leased a mean of 268 total acres, 182 acres of which were cropped. Farms on Long Island were much smaller than in upstate regions. Upstate farms did not vary markedly by NASS regions as to crops grown; most farms grew alfalfa or other hay crops, and feed grain for dairy and other livestock operations. Orchards and vineyards occurred in many upstate regions. Farms on Long Island, on the other hand, with smaller acreages, were geared more heavily toward serving suburban markets; nursery products and vegetables are more important in that region, while hay and grain crops are much less prevalent than in upstate regions.

Of farmers who had been in business for at least 5 years (96.9% of all respondents), 55.2% indicated there were more deer now than 5 years ago, 32.6% believed the current population is about the same as five years ago, and 12.2% indicated there were fewer deer now. The perception of increased deer populations in 2002 compared to 1997 was strongest in Long Island and Northwest New York, where about 65% of respondents indicated deer populations had increased.

Statewide, about one-quarter of responding farmers indicated they had little or no deer damage (less than \$100) in 2002. Just over half of respondents (56.7%) estimated damage of \$1,000 or less. However, 13.7% of respondents estimated damage in excess of \$5,000, and 6.8% estimated damage in excess of \$10,000, ranging as high as \$500,000. The mean amount of farmer-estimated deer damage statewide for respondents was \$4,113.

Regionally, mean estimated damage per farm was highest in Southeast New York, almost 2.5 times higher than the statewide mean. Long Island and West regions had the next highest mean damage. Mean reported damage was lightest in the Northeast and East regions, but even there, mean reported damage exceeded \$1,400 and \$1,600, respectively. Mean estimated deer damage per acre of crops was much higher on Long Island (\$111) than elsewhere—5 times the statewide average (Table 1). Mean estimated damage in Southeastern New York was \$68, or about 3 times the statewide average.

The nonrespondent follow-up survey showed that respondents and nonrespondents differed markedly with respect to deer damage. The 25.1% of respondents with reported damage of less than \$100 compares to 72.9% for nonrespondents. When all farmers in the sample are considered (respondents and nonrespondents), the adjusted mean estimated deer damage per farm dropped from \$4,113 (shown in Table 5) to \$2,306, or from \$23 to \$13 per acre.

After adjusting for nonresponse bias, the farmer-estimated total deer damage to crops in New York in 2002 was approximately \$58.8 million. The 95% confidence level around this estimate is + or - \$15.4 million, yielding a 95% confidence interval of \$43.4 to \$74.2 million. This is a rather large confidence interval for data from 1,289 farmers, and reflects the tremendous variation in damage estimates across farms in New York.

About 24%, or \$14.5 million of the total estimated damage, was to hay crops, half of which was to alfalfa fields. A similar amount of damage, 23%, or \$13.6 million, was to grain crops. Damage to nursery products was estimated at nearly \$10.5 million, and damage to tree fruits was approximately \$9.4 million.

Most responding farmers indicated that the amount of deer damage they sustained was either negligible (37.4%) or tolerable in exchange for having deer around (38.7%). However, 23.9% of farmers considered the amount of damage they incurred to be unreasonable. Significantly more farmers reported unreasonable damage in Southeast New York and Long Island than in other regions. Damage was rated as unreasonable by nearly 40% of farmers in Southeast New York and Long Island. On the other hand, in East, Northeast, and Central New York, damage was rated as unreasonable by <17% of respondents.

In addition to the estimates of dollar damage, the study attempted to gain an overall sense of how deer damage to crops compared to other factors that affect profits. The majority of respondents (70.3%) indicated that deer damage had little or no influence on profits. About one-quarter (26.4%) indicated deer damage was one of several significant factors that affect profits, and a small number (3.3%) indicated deer damage was the most significant factor affecting profits.

Statewide, farmers with any type of wildlife damage to crops estimated that a mean of 31.9% of all wildlife damage was deer-related. Growers of tree fruits, vegetables, and nursery products estimated deer as causing 40% to 47% of all wildlife damage. Growers and producers of grain crops, alfalfa, berries, and maple syrup estimated that deer cause 31% to 38% of total wildlife damage.

As another indicator of the magnitude and prevalence of deer damage compared to other wildlife damage, farmers were asked to list the three types of wildlife, including deer, that caused the most damage to crops, and for each of those species to estimate the proportion of total damage caused by each. Of the respondents with damage who answered this question, 83.0% listed deer in their top three species and indicated that deer caused a mean of 48.8% of their total wildlife damage, and 30.3% listed turkeys in their top three species and indicated that turkeys caused a mean of 15.5% of their total wildlife damage. These species were followed by geese, groundhogs, raccoons, and blackbirds, respectively.

In 2002, responding farmers spent a mean of \$144 statewide on deer damage preventative measures (those with at least \$100 in estimated damage spent a mean of \$271). Farmers also spent a mean of \$85 to prevent other types of wildlife damage. Considerable disparity exists in these expenditures by region. Long Island farmers spent over \$1,000 per farmer both on deer and other wildlife preventative measures, and farmers in Southeast New York spent over \$400 on average to prevent deer damage. In contrast, many upstate regions had mean expenditures of less than \$100 per farmer to prevent deer damage and damage from other species.

The vast majority of responding farmers allowed some hunting on their farm; only 16.6% indicated they allowed no hunting. Family members were allowed to hunt by 66.6% of respondents, and friends and neighbors were allowed by 74.0%. A smaller number (30.6%)

allowed strangers to hunt if the farmer thought they were trustworthy, and 7.9% allowed access to a specific sportsman's club.

About two-thirds (67.9%) of responding farmers indicated they were familiar with Nuisance Deer Permits, obtained through DEC, that allow removal of nuisance deer at any time of the year outside of the big game hunting seasons. Of those who were aware, only 11.6% applied for nuisance deer permits in 2002. Statewide, responding farmers who applied for nuisance permits obtained a mean of 8.7 permits, from which 6.2 deer were killed. Use of nuisance permits per farmer was highest in West and Southeast New York.

Just under half of respondents (46.5%) were aware of DMAP permits, available from DEC, which provide additional antlerless deer tags that landowners can give out to licensed hunters for use during the hunting season. Of those who were aware of the permits, 30.8% received a mean of 7.6 permits in 2002, and 5.1 deer were killed.

Responding farmers estimated the total deer kill on their farm in 2002 from all hunting-related sources. Statewide, respondents estimated a mean of 7.1 deer killed per farm. This works out to about 17 deer per square mile on farms statewide, with a range of from 7 deer per square mile in Northeast New York to about 37 deer per square mile on Long Island (Table 13). In all regions except Northeast and Central New York, the estimated harvest of does and antlerless fawns exceeded that of antlered bucks.

Most responding farmers had not sought out a source of information about controlling deer damage in the 2 years preceding the survey, although many may have sought information earlier. About 16% had contacted DEC in the past 2 years, 5% had contacted Cornell Cooperative Extension (CCE), and 5% had contacted a farm supply store. Less than 1% had contacted USDA-APHIS, and about 1% had contacted a private or commercial damage control specialist. Less than 2% had contacted someone else—usually a friend or neighbor.

The majority of responding farmers (79.9%) indicated that a significant number of does must be killed each year to keep the deer population from growing. Farmers were almost evenly split statewide with respect to whether they believed current hunting pressure keeps the deer herd from growing (40.4% believed hunting pressure was sufficient; 38.0% felt it was insufficient, and 21.6% were unsure).

Beyond the use of hunting, which most responding farmers permitted, only a minority had used any other specific deer control method (i.e., deer repellents, deer netting, deer fence, or dogs). Of those who had used any of these techniques, including hunting, the majority failed to find them to be generally effective. The technique most frequently used was to encourage hunters with regular deer permits to hunt on their lands—42.5% had done this, and 30% found it to be generally effective, while another 52.7% found it to be somewhat effective. The DEC nuisance damage permits and DMAP permits each had been used by 15% to 20% of growers, 37% of whom found them to be generally effective, and 45% to 48% of whom found them to be somewhat effective.

The 23.9% of responding farmers who considered their damage to be unreasonable (mean estimated damage of \$11,168) were examined as a group for their use of hunting and awareness of DEC deer permits. Only 7.8% of these farmers indicated they allow no hunting. However, 46% allowed access to strangers who seemed trustworthy and asked to hunt, and 14.7% allowed specific sportsman's groups to hunt on their farms. Of these growers who allowed hunting, only 10.1% required hunters to take does or antlerless deer. Nearly three-fourths of growers (74.2%) were aware of nuisance deer permits, but only 31.1% of those aware of the permits applied for them in 2002. Only half of these farmers (49.4%) with "unreasonable" damage were aware of DMAP permits; about half (54.8%) of those who were aware of them applied for the permits. About 40% of these farmers contacted DEC for information on damage control in 2002; much smaller numbers contacted Cornell Cooperative Extension (12.7%), a farm supplies store (10.7%), or others (<3.0%) about deer damage control methods. Again, it is possible that more growers made such contacts in previous years.

## **Summary and Discussion**

New York's high deer populations are causing significant damage to agricultural crops. Based on growers' estimates from this study, total statewide damage in 2002 was approximately \$58.8 million, with a 95% confidence level of + or - \$15.4 million. The estimated \$58.8 million represents about 1.7% of the value of New York's annual agricultural production of \$3.4 billion (New York Agricultural Statistics Service 2003).

The amount of deer damage to farms varied widely both by regions of the state and within any given region. Statewide, after accounting for nonresponse bias, almost half of farms in the sample (48.7%) experienced little deer damage (<\$100 in 2002). Yet, damage to many farms was so high that the mean damage per responding farm was \$4,113 (\$23 per crop acre), and we estimate the mean damage for all farms (including nonrespondents) to be approximately \$2,306 (\$13 per crop acre).

It is impossible to tell from this study the extent to which the high variation in estimated deer damage from farm to farm is due to differences in deer populations, feeding habits, and other factors such as types of crops raised and proximity of farms to deer refugia (e.g., parks, posted lands), versus measures farmers have taken both in 2002 and cumulatively over time to reduce deer damage. Only a small portion of farmers (20% or less) indicated they had used even one non-hunting deer control method (repellents, netting, deer fence, etc.) in 2002, but 43% had used at least one type of hunting (use of deer management permits).

Deer damage is clearly the leading type of wildlife damage to crops in New York. While firm estimates of damage from other wildlife species were not obtained, it appears from farmers' estimates of percent of damage from various species that deer damage is several times the magnitude of turkey damage, the second leading type of damage identified. Turkey damage was followed in declining order of magnitude by goose, groundhog, raccoon, and blackbird damage.

Additional publicity about the availability of DEC deer permits might increase utilization by farmers. This seems particularly the case for DMAP permits, since about half of all growers



with damage levels they considered unreasonable were not aware of the permits.

Several areas of additional research are suggested by the results of this study:

1. It must be remembered that the results reflect farmers' estimates of damage. Further work is needed to compare actual damage estimates from field research with farmers' estimates of damage.
2. It is important to gain a better understanding of why some farmers in the same general geographic area report substantial damage while other growers of the same crops report little damage. To what extent are these differences due to practices such as fencing that some farmers use, specific location of some farmers near parks, woods, or other deer habitat, or other factors?
3. A further assessment of the DEC permit programs from growers' perspectives seems useful. One-half or less of growers with unreasonable damage and who were aware of the availability of the permits applied for them.
4. More information is needed to evaluate the process of getting information to farmers about damage control techniques. Remarkably few growers indicated they had contacted DEC, Cornell Cooperative Extension, USDA Wildlife Services, farm supply stores, or others in the past year for such information. Have growers taken advantage of what these sources have available in previous years? Are they aware of the information available? Do they have additional unmet informational needs? Or have they evaluated the solutions suggested to be too costly, time consuming, or ineffective?

## TABLE OF CONTENTS

ACKNOWLEDGMENTS .....	i
EXECUTIVE SUMMARY .....	ii
List of Tables .....	x
List of Figures .....	x
INTRODUCTION .....	1
Objectives .....	2
METHODS .....	2
RESULTS .....	5
Response to the mail survey .....	5
Extent of nonresponse bias .....	5
Description of respondents' farms and crops.....	6
Perceived trends in deer population and deer damage.....	6
Estimated deer damage .....	7
Damage to individual farms.....	7
Aggregated farmer-estimated deer damage .....	8
Tolerance and general impact of deer damage .....	13
Regions and areas of intolerable deer damage.....	14
Deer damage compared to other wildlife damage .....	17
Expenditures to control wildlife damage .....	18
Use of hunting and permits to control deer damage .....	18
Information sources about deer damage .....	20
Information and attitudes about deer control .....	20
Effectiveness of deer control techniques .....	21
Use and awareness of damage control options by growers with unreasonable damage.....	22
SUMMARY AND DISCUSSION.....	23
LITERATURE CITED.....	25
APPENDIX A. DEER DAMAGE QUESTIONNAIRE.....	A-1

## LIST OF TABLES

<b>Table</b>	<b>Page</b>
1	Number of farms included in study population and value of sales, by region (from NASS data) .....3
2	Mean acreage of farms and crops produced by responding farmers, by region, 2002 .....6
3	Perceptions of deer population trend in New York: 2002 compared to 1997 .....7
4	Perceptions of deer damage to crops in 2002 compared to 1997 .....7
5	Percent of estimated deer damage by dollar categories, estimated mean total deer damage, and estimated mean damage per acre of cropland in 2002 by responding farmers.....8
6	(6.0 – 6.8): Deer damage summary by crop type statewide and by regions.....10
7	Farmers’ tolerance of deer damage to crops in 2002.....13
8	Regional distribution of deer damage reported by farmers to be “unreasonable” compared to regional distribution of all survey responses.....14
9	Mean estimated damage per crop for farmers who considered total amount of deer damage to be unreasonable, by region, 2002.....15
10	Mean proportion of wildlife damage attributable to deer, by crop type and region, for farmers with any type of wildlife damage in 2002.....17
11	Farmers’ expenses in 2002 to prevent deer and other wildlife damage.....18
12	Awareness and use of Nuisance Permits and DMAP Permits statewide and regionally in 2002.....19
13	Mean reported number of total deer killed per square mile in 2002 on farm properties from regular hunting plus special permits, by region.....20
14	Percent of farmers agreeing versus disagreeing that current hunting pressure is sufficient to control deer populations, statewide and by regions.....21
15	Percent of farmers who have used various types of deer control, and percent of those having used each technique who believe the technique is effective.....22

## LIST OF FIGURES

<b>Figure</b>	
1	Regions used in this study.....4
2	Counties with heaviest deer damage in New York State.....16

## INTRODUCTION

Agriculture is a very significant part of the statewide economy in New York. The New York Agriculture Statistics Service (2003) estimates that agricultural production returned over \$3.4 billion to farmers in 2001. Using a broad definition, New York has approximately 37,500 farms that occupy 7.6 million acres, or about 25% of the state's land area. While dairy and animal production account for 60% of all cash receipts, production of several crops that are vulnerable to deer predation are also important economically. New York ranks first in the nation in production of cabbage; second in apples and snap beans; third in grapes, tart cherries, sweet corn, corn silage, and cauliflower; and fourth in pears and green peas. In addition, the floriculture industry ranks sixth nationally, and about two-thirds of the total square footage used to raise floricultural crops is uncovered outdoor space.

White-tailed deer (*Odocoileus virginianus*) populations have increased in abundance across most of their range. According to population estimates provided by state wildlife management agencies, deer populations are at or near historic highs throughout the Middle Atlantic region and most other parts of their range except for Northern New England, Texas, and Florida (Brown et al. 2000). Thus, deer damage to crops, as well as other types of negative impacts associated with deer (e.g., deer-motor vehicle collisions, Lyme disease) is a growing concern.

Keeping deer populations within levels that are tolerable to agriculturalists has been a concern to the New York State Department of Environmental Conservation (DEC) for several decades. The Human Dimensions Research Unit (HDRU) at Cornell University (known before 1985 as the Outdoor Recreation Research Unit) conducted several studies of farmer tolerance of deer damage in the 1970s and 1980s, sponsored by DEC. These included studies of farmers in 83 towns in the Lake Plain in 1975 (Brown et al. 1977), 43 Western New York towns in 1977 (Brown et al. 1978), 68 Central New York towns in 1978 (Brown et al. 1979), 47 towns in Southeastern New York in 1980 (Decker et al. 1981), a resurvey of farmers in 9 deer management units in Western New York in 1982 (Decker et al. 1982, 1984), and a study of fruit growers in 41 towns in the Hudson valley in 1987, as well as landowners adjacent to those growers and deer hunters who hunted in those deer management units (Purdy et al., 1989).

In a further analysis of studies conducted before 1985, Connelly and Decker (1985) developed a preliminary mapping of deer damage severity zones in western and central New York and the Hudson Valley. High damage was defined as towns in which at least 30% of growers reported damage of at least \$10 per acre (approximately \$20 per acre in 2003 dollars) in central and western New York, and in which at least 30% of fruit growers reported damage of at least \$25 per acre (nearly \$50 per acre in 2003 dollars) in the Hudson Valley. According to those definitions, high deer damage was occurring in the late 1970s and early 1980s in grape and other fruit-growing areas of Chautauqua, southern Erie, and northwestern Niagara Counties, in much of Genesee and portions of Wyoming Counties, in both northwestern and northeastern Wayne County, western and southern Cayuga County, and northern Tompkins County. High damage levels to fruit crops in the Hudson Valley were noted in much of Columbia, Dutchess, eastern Ulster County along the Hudson River, and across much of northern Orange County.

During these years, DEC tended to view farmers' tolerance of deer damage as the limiting stakeholder consideration in terms of setting deer population objectives. DEC assumed that recreationists and other groups with an interest in deer would prefer deer populations at least as high, and in most cases higher than farmers would prefer. Thus, these studies were used to help identify deer population levels that farmers would generally tolerate. We believe that these studies encompassed the areas of heaviest deer damage in the 1970s and 1980s, but a statewide survey of deer damage was never conducted.

Starting around 1990 and continuing to the present, DEC instituted the Citizen Task Force concept as the primary mechanism for obtaining stakeholder input in the process of setting deer population objectives. These task forces included farmers in agricultural areas, along with hunters and representatives of other stakeholder interests. While farmers' preferences for deer population levels were still strongly considered by DEC, no surveys of deer damage were conducted after 1990. Thus, it has been approximately 15 years since surveys of growers' estimates of deer damage have been conducted. Moreover, in some areas of the state, such as the Champlain, St. Lawrence, and Mohawk valleys, such studies have never been conducted, to the best of our knowledge, at sample sizes large enough for regional analysis. A 1998 survey of seven major fruit producing states estimated wildlife damage in New York of \$1.6 million to apples and \$1.1 million to grapes (NASS 1999).

Increasing concerns about deer damage to agricultural crops, including nurseries, and related aspects of deer management led to this study. The study was made possible through funding and assistance from the Cornell University Agricultural Experiment Station, New York State Department of Environmental Conservation, New York State Department of Agriculture and Markets, National Agricultural Statistical Service, and the New York Farm Bureau.

## **Objectives**

The following objectives were identified for this study:

1. Determine farmers' estimates of deer damage to crops by major crop types statewide and by regions in New York.
2. Assess the use of New York's nuisance permit system, the effectiveness of the system in alleviating negative impacts of deer on agriculture, and farmers' satisfaction with the system.
3. Estimate the ratio of deer damage to total wildlife damage to crops, and identify any other major sources of wildlife damage to crops in New York.

## **METHODS**

The New York National Agricultural Statistical Service (NASS) possesses the most inclusive listing of New York agricultural crop producers, including horticulturalists and nurserymen. We developed a working agreement with NASS and the NYS Department of Agriculture and

Markets to use that listing as the sample frame for this survey. Confidentiality requirements precluded NASS from releasing this list to the Cornell researchers, so a process was developed in which the HDRU researchers designed the survey, with input from all the other study partners, NASS implemented the survey, and HDRU staff handled the data entry, analysis, and reporting.

We sampled approximately 3,900 farmers statewide. That sample was divided into 8 geographic strata of approximately 500 names each. The NASS regions (Figure 1) were used as the survey strata. NASS has 9 regions; we combined regions 70 and 80 to form one Southern Tier region, and used the other regions shown in Figure 1 without alteration.

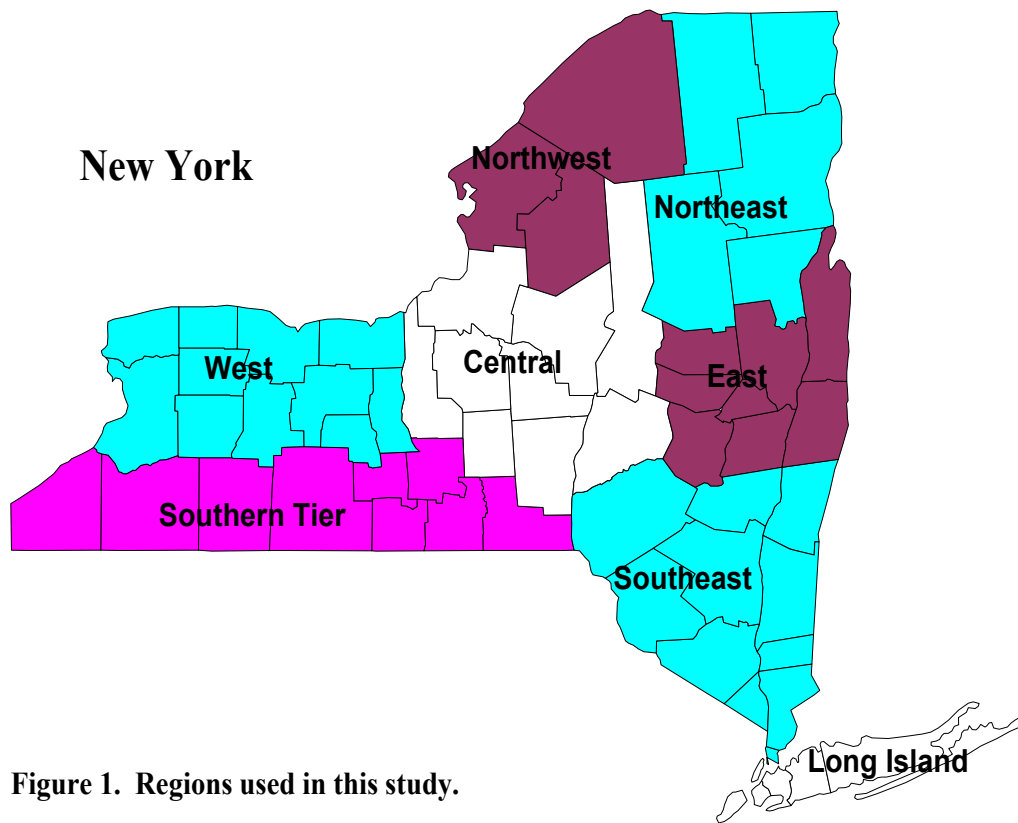
Because this study focused on deer damage, we eliminated from the statewide listing the following groups of growers:

1. Farms with sales of bees and honey only
2. Farms with aquacultural sales only
3. Farms with sales of greenhouse products only
4. Farms with sales of livestock only
5. Other farms with < \$1,000 in total sales

Eliminating farms in the above categories on the NASS list reduced the total number of farms from approximately 37,000 to 25,497 (Table 1).

Table 1. Number of farms included in study population and value of sales, by region (from NASS data).				
Region	Number of Farms	Annual Value of Sales (Percent)		
		\$1K – < \$10K	\$10K – < \$250K	\$250K+
Northwest	2,350	18.8	67.8	13.4
Northeast	987	26.0	60.4	13.6
East	2,853	30.4	59.0	10.6
Central	5,291	27.2	60.6	12.2
Southeast	2,589	29.6	59.6	10.8
Long Island	409	19.3	59.4	21.3
West	5,633	30.0	55.0	15.0
Southern Tier	5,385	32.2	59.8	8.0
<b>Statewide</b>	<b>25,497</b>	<b>26.9</b>	<b>60.2</b>	<b>12.9</b>

NASS staff next arranged the listing of remaining farmers in each region in order from highest to lowest total estimated sales (which growers report to NASS periodically). NASS staff then estimated a sampling fraction for systematically selecting every n<sup>th</sup> grower that would provide a total of approximately 500 growers for each region. Samples were systematically selected from each region. The total number of applicable farmers in each region was noted to allow proper weighting of the regional data to estimate statewide totals of deer damage and other parameters. A total sample of 3,908 was used (only 408 names were available for Long Island).



**Figure 1. Regions used in this study.**

The study was conducted in April, 2003. We used our standard 4-wave mailing approach; HDRU prepared the cover letter and reminders on Cornell letterhead and NASS conducted the mailings. NASS staff also conducted a nonresponse followup survey of 100 nonrespondents by telephone to determine if they were still farming, had deer damage, and related questions. Methods for conducting this survey were approved by Cornell’s University Committee on Human Subjects.

Data were then analyzed using the Statistical Package for the Social Sciences (SPSS Inc. 1994). Results of any nonresponse bias were taken into account and will be noted in the results where applicable.

## RESULTS

### Response to the Mail Survey

From the original mailing of 3,909 questionnaires, 101 were undeliverable. Of the 3,808 delivered questionnaires, 1,927 were returned for an adjusted response rate of 50.6%.

### Extent of Nonresponse Bias

In models developed by HDRU to explain differences between response rates to mail questionnaires on a variety of topics involving over 100 previous surveys, the salience of the topic or focus of the study with respect to the interests of the survey audience has been a key factor affecting response rates (Connelly et al. 2003). Nonrespondents consistently have been less engaged in, are less interested in, or have been less affected by the topic of the study.

Farmers who were contacted but did not respond to this survey were less likely than respondents to be negatively affected by deer. Nonrespondents were less likely to think the deer damage they experienced was unreasonable (6% of nonrespondents versus 25% of respondents). Nonrespondents also were less likely to believe that there were more deer and more deer damage now than 5 years ago. Most respondents (81%) who listed a wildlife species that caused crop damage named deer, compared with less than half of nonrespondents (39%).

Of the nonrespondents reached by telephone who were actively farming in 2002, 72.9% reported damage of less than \$100, compared to just 25.1% for respondents. No statistically significant difference was found in the distribution of the value of crops sold between responding farmers and the nonrespondent sample. Thus, in extrapolating the results from the respondents to all farmers in our universe, we corrected for the proportion with <\$100 worth of deer damage based on nonrespondent data and assumed that the average amount of deer damage for farms with >\$100 in deer damage is similar for respondents and nonrespondents. Even with this assumption, deer damage estimates have been reduced by 31.5% from a straight extrapolation from sample respondent data to account for less damage incurred by nonrespondents.

Nonrespondents had smaller farms than respondents, on average (67 acres versus 268 acres). However, the distribution of types of crops grown was similar between respondents and nonrespondents. Across all nonrespondents, no difference was found between respondents and nonrespondents with respect to proportions falling within the 3 “value of sales” categories (the value of sales category is a part of the NASS data base for all farmers).

Nonrespondents were less likely than respondents to allow hunting on their property and more likely to agree that “current hunting pressure is sufficient to keep the herd from growing.” Nonrespondents were less likely than respondents to allow hunting and believe that does must be killed to keep the population under control. Nonrespondents were no more likely than respondents to be aware of deer nuisance permits or apply for them if they were aware of their availability.



## Description of Respondents' Farms and Crops

Responding farmers owned or leased a mean of 268 total acres, 182 acres of which were cropped (Table 2). Farms on Long Island were much smaller than in upstate regions. Upstate farms did not vary markedly by NASS regions as to crops grown; most farms grew alfalfa or other hay crops, and feed grain for dairy and other livestock operations. Orchards and vineyards occurred in many upstate regions, in specific areas. Farms on Long Island, on the other hand, with smaller acreages, were geared more heavily toward serving suburban markets; nursery products and vegetables are more important in that region, while hay and grain crops are much less prevalent.

Region	Total acres (Mean)	Crop acres (Mean)	Percent of Farmers Growing the Following Crops							
			Alfalfa	Other Hay	Grain Crops	Vegetables	Tree Fruits	Berries	Grapes	Nursery Products
Northwest	365	225	38.2	67.3	37.4	8.7	4.3	2.4	0.4	3.9
Northeast	284	180	30.7	58.4	24.8	10.4	6.4	5.0	0.0	7.9
East	235	141	34.2	51.3	27.9	13.8	10.0	--	--	--
Central	274	157	39.0	55.4	37.5	8.2	--	--	--	--
Southeast	262	150	30.6	49.4	25.7	16.7	10.2	--	--	--
Long Island	78	71	--	6.0	6.5	28.6	6.0	--	9.5	38.1
West	316	262	37.5	44.1	42.1	16.5	12.6	--	--	--
Southern Tier	201	150	24.6	50.4	28.5	11.3	--	--	11.3	--
<b>Statewide</b>	<b>268</b>	<b>182</b>	<b>33.2</b>	<b>51.2</b>	<b>33.4</b>	<b>12.6</b>	<b>7.9</b>	<b>4.2</b>	<b>4.5</b>	<b>8.7</b>

<sup>1</sup> Blank cells occur for crops/regions where the sample size is too low for an accurate estimate.

## Perceived Trends in Deer Populations and Deer Damage

Respondents, whose farms averaging 268 acres statewide, reported an average of 21 deer as the largest number they had seen on their property at one time in the past 12 months. Of farmers who had been in business for at least 5 years (96.9% of all respondents), 55.2% indicated there were more deer now than 5 years ago, 32.6% believed the current population is about the same as five years ago, and 12.2% indicated there were fewer deer now than 5 years ago. The perception of increased deer populations in 2002 compared to 1997 was strongest in Long Island and Northwest New York, where about 65% of respondents indicated deer populations had increased (Table 3). Only in the Eastern region was there an even split between proportions of respondents who believed that populations had decreased versus increased.

Of those respondents who had been farming for at least 5 years (97.0% of the total), similar numbers indicated deer damage had increased (43.5%) versus remained the same (42.1%) over the 5-year period. Less damage in 2002 than 5 years ago was reported by 14.3%. Thus, fewer farmers reported increases in crop damage than reported perceived increases in deer populations. In no region did a majority of farmers report more damage in 2002 compared to 1997 (Table 4).

On the other hand, only a minority of farmers (12.2% - 22.0% by region) have experienced less damage from deer populations (which were high by 1997), despite the DEC's DMAP program and the availability of multiple antlerless deer hunting permits in many areas.

Table 3. Perceptions of deer population trend in New York: 2002 compared to 1997.			
	Perception of Deer Population Trend		
Region	Increased	About the Same	Decreased
Northwest	64.9 %	11.3%	23.8%
Northeast	51.1	9.2	39.7
East	43.0	12.7	44.3
Central	57.1	11.8	31.1
Southeast	58.6	13.5	27.8
Long Island	65.2	5.9	28.9
West	55.7	10.2	34.1
Southern Tier	53.5	15.1	31.4
<b>Statewide</b>	<b>55.2</b>	<b>12.2</b>	<b>32.6</b>

Table 4. Perceptions of deer damage to crops in 2002 compared to 1997.			
Region	Greater	About the Same	Less
Northwest	48.5 %	39.2%	12.2%
Northeast	39.4	48.8	11.8
East	33.3	47.3	19.3
Central	39.1	49.0	11.9
Southeast	49.3	35.6	15.1
Long Island	49.6	28.3	22.0
West	46.3	39.6	14.2
Southern Tier	45.5	39.5	15.0
<b>Statewide</b>	<b>43.4</b>	<b>42.1</b>	<b>14.3</b>

## Estimated Deer Damage

### Damage to Individual Farms

Statewide, about one-quarter of responding farmers indicated they had little or no deer damage (less than \$100) in 2002 (Table 5). Just over half of respondents (56.7%) estimated damage of \$1,000 or less. However, 13.7% of respondents estimated damage in excess of \$5,000, and 6.8% estimated damage in excess of \$10,000. Five respondents estimated damage in excess of \$100,000, ranging upward to \$500,000.

The mean amount of farmer-estimated deer damage statewide for respondents was \$4,113. However, with one-fourth of farmers experiencing essentially no damage and a few farmers reporting damage in six figures, the standard deviation of the mean was a very high \$19,738. Regionally, mean estimated damage per farm was highest in Southeast New York, almost 2.5 times higher than the statewide mean. Long Island and West regions had the next highest mean damage. Mean reported damage was lightest in the Northeast and East regions, but even there, mean reported damage exceeded \$1,400 and \$1,600, respectively (Table 5).

Mean estimated deer damage per acre of crops was much higher on Long Island (\$111) than elsewhere—5 times the statewide average (Table 5). Mean estimated damage in Southeastern New York was \$68, or about 3 times the statewide average.

The nonrespondent follow-up survey showed that respondents and nonrespondents differed markedly with respect to deer damage. The 25.1% of respondents with reported damage of less than \$100 compares to 72.9% for nonrespondents. When all farmers in the sample are considered (respondents and nonrespondents), the adjusted mean estimated deer damage per farm dropped from \$4,113 (shown in Table 5) to \$2,306, or from \$23 to \$13 per acre.

Region	<\$100	\$101- \$250	\$251- \$500	\$501- \$1,000	\$1,001- \$2,500	\$2,501- \$5,000	\$5,001- \$10,000	Over \$10,000	Mean Total Damage	Mean Damage per acre of crop
Northwest	26.7	9.9	12.2	13.4	14.5	10.5	7.6	5.2	\$ 3,110	\$ 13
Northeast	48.4	10.5	4.8	8.9	11.3	5.6	7.3	3.2	1,478	10
East	36.0	8.7	12.7	10.7	15.3	8.0	5.3	3.3	1,635	12
Central	27.2	11.0	11.0	8.4	18.8	15.7	3.1	4.7	2,461	16
Southeast	12.3	4.9	14.1	12.3	17.8	12.3	10.4	16.0	10,106	68
Long Island	28.6	3.4	4.2	5.9	8.4	16.8	11.8	21.0	7,927	111
West	23.3	11.1	6.7	11.7	15.0	17.2	7.8	7.2	6,051	23
Southern Tier	20.3	14.3	12.6	9.3	16.5	12.6	8.2	6.2	2,641	18
<b>Statewide</b>	<b>25.1</b>	<b>10.6</b>	<b>10.6</b>	<b>10.4</b>	<b>16.1</b>	<b>13.5</b>	<b>6.9</b>	<b>6.8</b>	<b>4,113</b>	<b>23</b>

### Aggregate Farmer-estimated Deer Damage

After adjusting for nonresponse bias, the farmer-estimated total deer damage to crops in New York in 2002 was approximately \$58.8 million (Table 6). The 95% confidence level around this estimate is + or - \$15.4 million, yielding a 95% confidence interval of \$43.4 to \$74.2 million. This is a rather large confidence interval for data from 1,289 farmers, and reflects the tremendous variation in damage estimates across farms in New York. Data used in the following discussion and in Tables 6.0 – 6.8 have been adjusted for nonresponse bias, thereby representing our best general estimates for all farmers from the population sampled (described on page 3).

About 24%, or \$14.5 million of the total estimated damage was to hay crops, half of which was to alfalfa fields. A similar amount of damage, 23%, or \$13.6 million, was to grain crops. Damage to nursery products was estimated at nearly \$10.5 million, and damage to tree fruits was approximately \$9.4 million.

Farmers' estimates of deer damage in Northwest New York, whose primary agricultural area is the St. Lawrence valley, totaled approximately \$4.33 million. Most of this damage was to grain and hay (Table 6.1). Northeast New York is not heavily farmed except for the Lake Champlain valley. Deer damage there was estimated at \$780,615 (Table 6.2), and also occurred primarily to grain and hay. Damage occurred to a variety of other farm and nursery crops (30% of total damage), but the sample size was too small to break out the data by individual types.

In the East region, aggregate estimated deer-related crop damage totaled over \$2.5 million. Damage to hay and grain crops amounted to 72% of total damage, but notable damage also occurred to tree fruits and vegetables (Table 6.3). Central New York experienced estimated damage of approximately \$7.4 million. About two-thirds of total damage was to hay and grain, but over \$2.5 million in damage occurred to nurseries and other crops, including tree fruits (Table 6.4). Low sample size prohibits a precise breakout of this \$2.5 million, but damage to nurseries was the largest single component of the total damage.

Southeast New York experienced an estimated \$14.6 million in deer damage, second highest of any region. The largest single component, tree fruits, accounted for \$6.6 million, or 45% of total estimated damage (Table 6.5). Damage to hay and grain crops accounted for over \$5 million, or one-third of total estimated damage. Estimated damage to vegetables and also to nursery products was \$1.4 million.

Estimated damage to crops on Long Island exceeded \$1.75 million, which is notable considering the smaller area of crops there compared to other regions. The largest single component, nursery products, had estimated damage of about \$945,000. Approximately \$487,000 in damage was also reported for vegetables (Table 6.6).

The West region, which includes all but the Chautauqua County portion of the Lake Erie plain, had approximately \$19.9 million in estimated damage, largest of any region in the state. Horticultural crops plus grapes and berries, with sample sizes too small to be broken out separately, accounted for \$7.4 million; damage to nurseries comprised the largest single component of this damage. Damage to grain crops exceeded \$4.2 million, and damage to vegetables and tree fruits each amounted to over \$2 million. The combination of alfalfa and other hay experienced estimated damage of about \$3.9 million.

The 9-county Southern Tier region, which runs from Chautauqua County east to Broome County, does not have large expanses of intensively cropped acreage except for the Lake Erie plain. Nevertheless, farmers in those counties reported damage totaling over \$7.5 million (Table 6.8). About half of this damage was to hay and grain. Estimated damage to grapes (primarily in Chautauqua County and the southern Finger Lakes) approached \$1.1 million, and damage to nursery products was estimated at almost \$1.0 million.

Table 6.0. Deer damage summary by crop type statewide.

<u>Crop</u>	<u>% of Farmers Growing Crop</u>	<u>% of Growers with Damage</u>	<u>Mean Damage for those with Damage</u>	<u>Total Damage</u>	<u>Mean Damage per Acre for All Growers</u>
Alfalfa	33.2	55.3	\$1,570	\$ 7,351,603	\$ 12
Other hay crops	51.2	46.6	1,172	7,132,448	6
Grain crops	33.4	60.4	2,637	13,560,575	10
Vegetables	12.6	54.5	3,505	6,164,381	29
Tree fruits	7.9	50.2	9,318	9,379,871	136
Berries	4.2	45.5	2,207	1,066,144	152
Grapes	4.5	51.3	3,022	1,769,877	59
Nursery Products	8.7	51.5	9,121	10,471,248	146
Other					
Timber	1.4	42.7	6,421	983,087	41
Maple syrup	0.8	50.7	336	33,916	3
Other	1.5	46.2	4,972	884,899	24
TOTALS			5,219	\$58,798,049	23

Table 6.1. Deer damage summary by crop type for Northwest New York.

Alfalfa	38.2	59.2	\$1,686	\$ 888,636	\$13
Other hay crops	67.3	46.3	1,068	789,160	3
Grain crops	37.4	58.3	4,600	2,353,549	21
Vegetables	8.7	51.7	1,225	128,327	18
Other	15.4	50.7	1,008	172,727	14
TOTALS			\$3,933	\$ 4,332,399	\$14

Table 6.2. Deer damage summary by crop type for Northeast New York.

Alfalfa	30.7	45.6	\$1,235	\$169,253	\$ 8
Other hay crops	58.4	31.4	1,055	192,438	4
Grain crops	24.8	43.5	1,327	140,600	6
Vegetables	10.4	42.7	1,190	51,921	21
Other	16.3	42.3	3,548	226,403	37
TOTALS			\$2,546	\$ 780,615	\$10

Table 6.3. Deer damage summary by crop type for East New York.

<u>Crop</u>	<u>% of Farmers Growing Crop</u>	<u>% of Growers with Damage</u>	<u>Mean Damage for those with Damage</u>	<u>Total Damage</u>	<u>Mean Damage per Acre for All Growers</u>
Alfalfa	34.2	47.3	\$ 949	\$ 434,631	\$ 6
Other hay crops	51.3	36.4	860	462,121	3
Grain crops	27.9	58.5	1,959	910,790	12
Vegetables	13.8	50.7	1,142	226,156	91
Tree fruits	10.0	39.1	2,573	287,321	76
Nursery products	8.3	45.1	1,355	145,138	8
Other	6.7	40.6	772	55,817	12
<b>TOTALS</b>			<b>\$ 2,358</b>	<b>\$2,521,974</b>	<b>\$ 12</b>

Table 6.4. Deer damage summary by crop type for Central New York.

Alfalfa	39.0	53.0	\$1,034	\$1,121,469	\$ 8
Other hay crops	55.4	45.7	1,297	1,753,265	7
Grain crops	37.5	60.0	1,326	1,572,551	6
Vegetables	8.2	57.9	1,731	435,134	29
Nursery products	16.9	45.6	6,517	1,052,042	143
Other	8.6	51.4	6,698	1,472,813	48
<b>TOTALS</b>			<b>\$3,198</b>	<b>\$7,407,274</b>	<b>\$ 16</b>

Table 6.5. Deer damage summary by crop type for Southeast New York.

Alfalfa	30.6	60.2	\$2,546	\$1,206,845	\$ 22
Other hay crops	49.4	59.1	1,573	1,198,572	10
Grain crops	25.7	66.3	6,061	2,669,381	34
Vegetables	16.7	58.2	5,566	1,397,075	52
Tree fruits	10.2	53.3	46,963	6,617,371	367
Nursery products	10.2	61.5	8,592	1,394,936	452
Other	18.4	60.1	5,735	104,115	31
<b>TOTALS</b>			<b>\$11,283</b>	<b>\$14,588,295</b>	<b>\$ 68</b>

Table 6.6. Deer damage summary by crop type for Long Island.

<u>Crop</u>	<u>% of Farmers Growing Crop</u>	<u>% of Growers with Damage</u>	<u>Mean Damage for those with Damage</u>	<u>Total Damage</u>	<u>Mean Damage per Acre for All Growers</u>
Grain crops	6.5	50.7	6,193	84,089	\$ 57
Vegetables	28.6	54.7	7,614	486,909	59
Tree fruits	6.0	52.6	5,423	69,435	166
Grapes	9.5	67.6	5,980	157,464	64
Nursery products	38.1	48.6	2,472	944,931	105
Other	6.5	27.0	1,850	14,087	167
TOTALS			\$10,968	\$1,756,915	\$ 111

Table 6.7. Deer damage summary by crop type for West New York.

Alfalfa	37.5	55.3	\$ 2,046	\$2,376,285	\$ 13
Other hay crops	44.1	45.1	1,386	1,564,440	7
Grain crops	42.1	62.1	2,878	4,233,640	7
Vegetables	16.5	54.1	5,389	2,691,825	20
Tree fruits	12.6	52.6	5,495	2,058,293	47
Other	20.3	49.9	13,037	6,968,488	176
TOTALS			\$7,512	\$19,892,971	\$ 23

Table 6.8. Deer damage summary by crop type for the Southern Tier.

Alfalfa	24.6	61.2	\$1,430	\$1,154,298	\$ 14
Other hay crops	50.4	52.2	821	1,171,754	5
Grain crops	28.5	61.5	1,695	1,596,155	11
Vegetables	11.3	55.1	2,253	749,327	217
Grapes	11.3	48.7	3,680	1,086,787	67
Nursery Products	9.9	54.6	3,421	991,956	74
Other	8.8	53.3	3,245	767,329	76
TOTALS			\$3,204	\$ 7,517,606	\$ 18

## Tolerance and General Impact of Deer Damage

Most responding farmers indicated that the amount of deer damage they sustained was either negligible (37.4%) or tolerable in exchange for having deer around (38.7%). However, 23.9% of farmers considered the amount of damage they incurred to be unreasonable. Damage was rated as unreasonable by nearly 40% of farmers in Southeast New York and Long Island (Table 7). On the other hand, in East, Northeast, and Central New York, damage was rated as unreasonable by <17% of respondents.

Region	Negligible	Tolerable in Exchange for Presence of Deer	Unreasonable
Northwest	64.9 %	11.3%	23.8%
Northeast	51.1	9.2	39.7
East	43.0	12.7	44.3
Central	57.1	11.8	31.1
Southeast	58.6	13.5	27.8
Long Island	65.2	5.9	28.9
West	55.7	10.2	34.1
Southern Tier	53.5	15.1	31.4
<b>Statewide</b>	<b>55.2</b>	<b>12.2</b>	<b>32.6</b>

Farmers who described their damage as negligible had a mean of \$662 in estimated damage. Those who indicated the amount of damage was tolerable in exchange for having deer around had mean damage of \$1,857. Those who classified the damage as unreasonable had mean estimated damage of \$11,168. We compared the tolerance data from this study with those of 3 previous surveys conducted in 1978-80 in western, central, and southeastern New York. In constant 2002 dollars, the mean damage reported by farmers from those studies was \$1,233. Such a comparison between previous surveys and the present one needs several caveats—the study areas are not identical, the criteria for selection of farms was not identical, and there has been some consolidation of farms as well as increased production over the past 2 decades. However, these data suggest that generally, farmers today are willing to sustain about 50% more in crop damage and consider it tolerable than was the case 20 to 25 years ago.

A small number of farmers (11.3%) indicated they had stopped farming a particular field because of the amount of deer damage to crops grown on that field. Most frequently, the crop grown on this field was corn (41.3% of cases).



In addition to the estimates of dollar damage, the study attempted to gain an overall sense of how deer damage to crops compared to other factors that affect profits. The majority of respondents (70.3%) indicated that deer damage had little or no influence on profits. About one-quarter (26.4%) indicated deer damage was one of several significant factors that affect profits, and a small number (3.3%) indicated deer damage was the most significant factor affecting profits.

### Regions and Areas of Intolerable Deer Damage

This section focuses on responding farmers who had deer damage that they considered to be unreasonable (mean estimated damage of \$11,168). Remembering that the data are sample and not population data, we first characterize the geographic distribution of damage reported to be unreasonable (Table 8). Unreasonable damage was reported in each region of the state (Table 8). For Northwest New York, West New York, and the Southern Tier, the incidence of reported unreasonable damage was not statistically different ( $p < 0.05$ ) from other areas of the state. In the Northeast, East, and Central New York regions, significantly fewer farmers reported damage than in the rest of the state. Significantly more farmers reported unreasonable damage in Southeast New York and Long Island than in other regions.

Region	Farmers Reporting Unreasonable Damage	Distribution of Survey Responses	p Value
Northwest	12.3%	13.5 %	<.415
Northeast	5.7	10.0	<.001
East	6.1	12.4	<.001
Central	9.9	14.3	<.002
Southeast	20.3	12.9	<.001
Long Island	13.2	8.1	<.001
West	15.6	13.9	<.260
Southern Tier	17.0	14.8	<.157
Totals	100.0%	100.0%	NA

For farmers with total deer damage that they considered to be unreasonable, mean damage estimates per crop type are reported in Table 9. Much of this damage upstate was to alfalfa, other hay, and grain crops. Some farmers in each region who reported unreasonable damage cited damage to vegetable crops. Damage to tree fruits were cited by some of these farmers except in Northwest, Northeast, and East New York; 10 respondents from Southeast New York estimated mean damage to fruit trees of \$67,740. Very large damage estimates to nursery products were provided by 4 farmers with unreasonable damage in West New York (mean of \$86,187) and 19 farmers on Long Island (mean of \$20,444).

Table 9. Mean estimated damage per crop for farmers who considered total amount of deer damage to be unreasonable, by region, 2002.

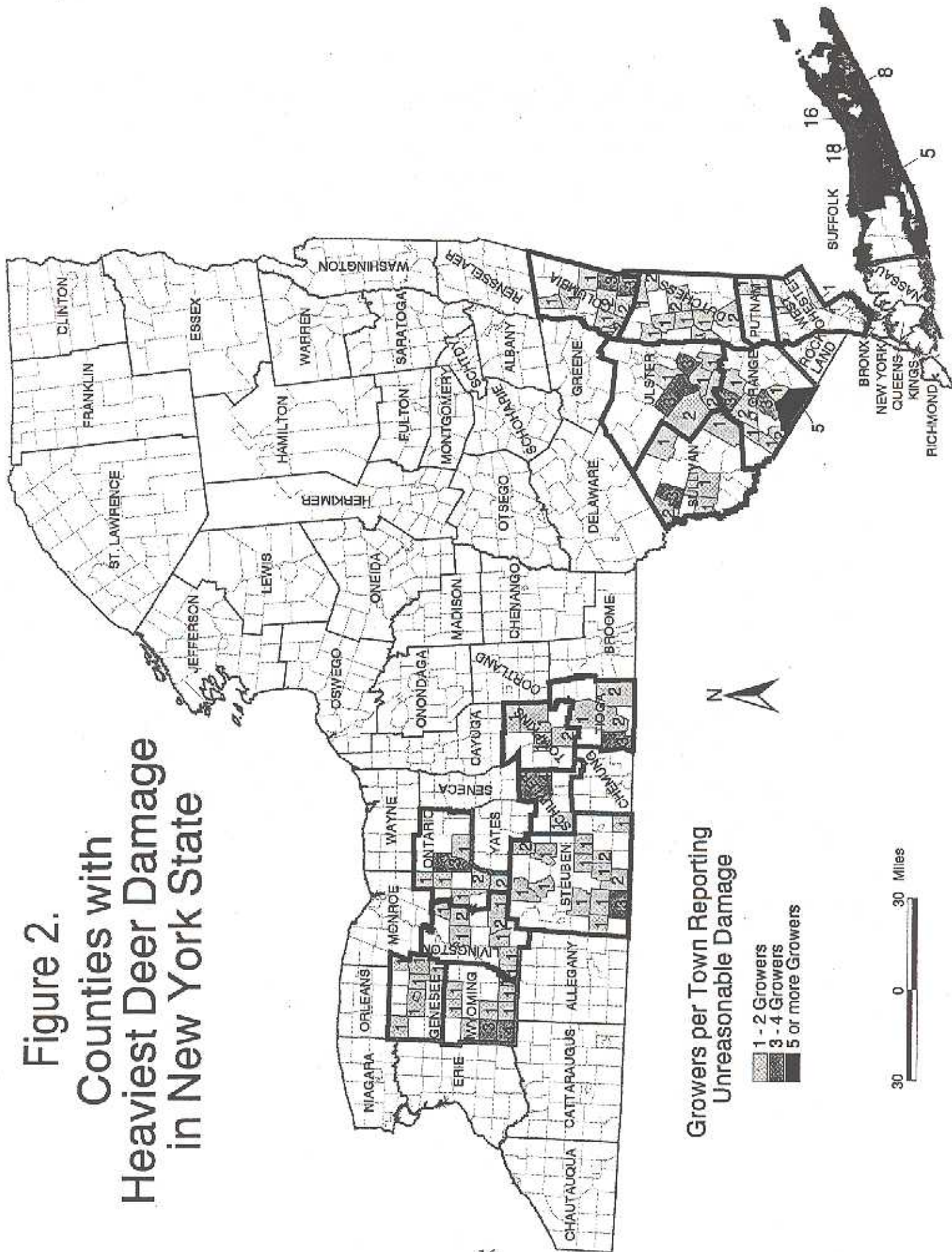
Region	Alfalfa	Other Hay Crops	Grain Crops	Vegetables	Tree Fruits	Berries	Grapes	Nursery Products
Northwest	\$2,821 (28) <sup>1</sup>	\$1,613 (32)	\$6,396 (22)	\$1,944 ( 5)	-- <sup>2</sup>	--	--	--
Northeast	2,639 ( 9)	1,922 (11)	2,441 (11)	2,179 ( 5)	--	--	--	--
East	2,149 ( 9)	2,139 ( 9)	4,905 (10)	2,206 ( 6)	--	--	--	--
Central	1,762 (19)	1,728 (19)	1,628 (16)	1,796 (11)	3,808 ( 5)	--	--	--
Southeast	4,482 (24)	2,100 (38)	11,914 (19)	6,268 (17)	67,740 (10)	862 (7)	--	14,811 ( 9)
Long Island	--	--	--	8,511 (25)	5,917 ( 6)	--	10,253 ( 6)	20,444 (19)
West	3,675 (20)	2,547 (24)	5,825 (22)	8,055 (17)	9,007 (10)	3,480 (5)	3,069 ( 9)	86,187 ( 4)
Southern Tier	2,152 (19)	1,169 (27)	1,873 (23)	4,295 ( 9)	1,378 ( 7)	--	6,876 ( 9)	3,352 ( 6)

<sup>1</sup> Number of respondents is in parentheses.

<sup>2</sup> Estimates are not provided for less than four respondents per cell.

To further identify areas of concentrated deer damage, given the sample size available to work with, we first identified counties where over one-third of responding farmers reported what they considered to be unreasonable amounts of deer damage. We then listed and mapped towns in those counties where unreasonable damage was reported. The areas of concentrated high damage, shown in Figure 2, included portions of the central Southern Tier, West New York, Southeast New York, and Long Island.

**Figure 2.**  
**Counties with**  
**Heaviest Deer Damage**  
**in New York State**



## Deer Damage Compared to other Wildlife Damage

While it was beyond the scope of this study to obtain dollar estimates of crop damage from wildlife species other than deer, we did attempt to gain some sense of the extent of deer damage in relation to total wildlife damage, in two different formats. First, farmers estimated what proportion of their total wildlife damage to each crop type was caused by deer. Statewide, farmers with any type of wildlife damage to crops estimated that a mean of 31.9% of all wildlife damage was deer-related. Growers of tree fruits, vegetables, and nursery products estimated deer as causing 40% to 47% of all wildlife damage (Table 10). Growers and producers of grain crops, alfalfa, berries, and maple syrup estimated that deer cause 31% to 38% of total wildlife damage.

	North-west	North-east	East	Central	South-East	Long Island	West	Southern Tier	State-wide
Alfalfa	39.9	34.6	29.5	26.7	44.4	--	43.6	52.1	<b>37.9</b>
Other hay crops	29.3	25.6	24.6	27.7	38.4	20.0	27.3	29.4	<b>29.0</b>
Grain crops	37.5	24.9	37.1	26.4	46.5	34.4	39.3	43.7	<b>36.9</b>
Vegetables	35.0	22.5	42.6	46.3	54.8	45.9	44.3	44.7	<b>44.9</b>
Tree fruits	--	--	41.1	--	52.3	49.4	44.9	--	<b>40.8</b>
Berries	--	--	--	--	--	--	--	--	<b>36.3</b>
Grapes	--	--	--	--	--	36.0	--	17.8	<b>19.0</b>
Nursery products	--	--	54.5	30.4	47.3	34.8	--	52.6	<b>46.3</b>
Other	37.3	21.9	27.7	26.7	30.5	9.3	45.4	31.5	<b>45.6</b>

<sup>1</sup> Blank cells occur for crops/regions where the sample size is too low for an accurate estimate.

As another indicator of the magnitude and prevalence of deer damage compared to other wildlife damage, farmers were asked to list the three types of wildlife, including deer, that caused the most damage to crops, and for each of those species to estimate the proportion of total damage caused by each. This question was answered by 73.5% of respondents, who listed at least one wildlife species that they identified as causing wildlife damage. Of these respondents:

- 83.0% listed deer in their top three species and indicated that deer caused a mean of 48.8% of their total wildlife damage;
- 30.3% listed turkeys in their top three species and indicated that turkeys caused a mean of 15.5% of their total wildlife damage;
- 21.3% listed geese in their top three species and indicated that geese caused a mean of 16.9% of their total wildlife damage;
- 19.8% listed groundhogs in their top three species and indicated that groundhogs caused a mean of 15.1% of total wildlife damage;
- 15.4% listed raccoons in their top three species and indicated that raccoons caused a mean of 17.1% of total wildlife damage; and

- 10.2% listed blackbirds in their top three species and indicated that blackbirds caused a mean of 20.7% of total wildlife damage;

Several additional species were listed by smaller numbers of respondents.

### Expenditures to Control Wildlife Damage

In 2002, responding farmers spent a mean of \$144 statewide on deer damage preventative measures (those with at least \$100 in estimated damage spent a mean of \$271). Statewide, after adjusting for nonresponse bias, New York farmers spent a total of approximately 2.7 million on deer damage preventative measures. Farmers also spent a mean of \$85 to prevent other types of wildlife damage. Considerable disparity exists in these expenditures by region. Long Island farmers spent over \$1,000 per farmer both on deer and other wildlife preventative measures, and farmers in Southeast New York spent over \$400 on average to prevent deer damage (Table 11). In contrast, many upstate regions had mean expenditures of less than \$100 per farmer to prevent deer damage and damage from other species.

Table 11. Farmers' expenses in 2002 to prevent deer and other wildlife damage.		
Region	Average expenditures to prevent:	
	Deer damage	Other wildlife Damage
Northwest	\$ 47	\$ 43
Northeast	57	26
East	97	66
Central	56	50
Southeast	406	136
Long Island	1,382	1,031
West	144	89
Southern Tier	98	72
<b>Statewide</b>	<b>\$ 144</b>	<b>\$ 85</b>

### Use of Hunting and Permits to Control Deer Damage

The vast majority of responding farmers allowed some hunting on their farm; only 16.6% indicated they allowed no hunting. Family members were allowed to hunt by 66.6% of respondents, and friends and neighbors were allowed by 74.0%. A smaller number (30.6%) allowed strangers to hunt if the farmer thought they were trustworthy, and 7.9% allowed access to a specific sportsman's club. Of those farmers who did not allow any hunting, 52.7% indicated the liability is too great, 40.6% indicated that hunters cause too many problems, and 13.6% indicated they don't believe in hunting. An additional 8.3% indicated their lands were too near to homes. Most farmers who allowed hunting did not restrict the sex of deer that hunters could take (79.5%). A small minority (9.2%) required some does or antlerless deer to be taken, and 6.3% indicated they allow only bucks to be taken.

About two-thirds (67.9%) of responding farmers indicated they were familiar with Nuisance Deer Permits, obtained through DEC, that allow removal of nuisance deer at any time of the year outside of the big game hunting seasons. Of those who were aware, only 11.6% applied for nuisance deer permits in 2002 (Table 12). Of those who applied for nuisance deer permits, 15.4% indicated they had difficulty finding designated shooters to kill the deer. Statewide, responding farmers who applied for nuisance permits obtained a mean of 8.7 permits, from which 6.2 deer were killed. Use of nuisance permits per farmer was highest in West and Southeast New York.

Just under half of respondents (46.5%) were aware of DMAP permits, available from DEC, which provide additional antlerless deer tags that landowners can give out to licensed hunters for use during the hunting season. Of those who were aware of the permits, 30.8% received a mean of 7.6 permits in 2002, and 5.1 deer were killed (Table 12).

Table 12. Awareness and use of Nuisance Permits and DMAP Permits statewide and regionally in 2002.

Region	Nuisance Permits				DMAP Permits			
	Farmers Aware of	Applied for (% Aware of)	Permits Obtained (Mean per farmer)	Deer Killed <sup>1</sup> (Mean per Farm)	Farmers Aware Of	Applied for (% Aware of)	Permits Obtained (Mean per Farmer)	Deer Killed <sup>1</sup> (Mean per Farm)
Northwest	81.6%	12.2%	7.1	5.4	56.8%	34.1%	5.4	4.4
Northeast	45.8	13.4	2.1	1.5	34.4	14.8	3.0	1.4
East	65.2	3.5	2.5	2.0	43.4	22.6	8.6	3.6
Central	55.6	5.6	3.6	1.7	35.8	26.4	3.7	2.2
Southeast	72.8	18.8	17.3	13.5	54.7	29.8	10.5	8.9
Long Island	87.7	26.4	6.7	3.4	62.0	14.3	3.7	1.3
Southern Tier	75.3	13.9	11.1	7.9	54.8	35.5	9.2	6.1
West	68.3	12.6	5.7	3.4	48.9	34.1	9.1	5.5
<b>Statewide</b>	<b>67.9</b>	<b>11.6</b>	<b>8.7</b>	<b>6.2</b>	<b>46.5</b>	<b>30.8</b>	<b>7.6</b>	<b>5.1</b>

<sup>1</sup> Some respondents interpreted “deer killed” as total number killed rather than number killed with permits. Respondents who reported a number of deer killed in excess of the number of permits obtained were removed from the analysis.

Responding farmers estimated the total deer kill on their farm in 2002 from all hunting-related sources. Statewide, respondents estimated a mean of 7.1 deer killed per farm. This works out to about 17 deer per square mile on farms statewide, with a range of from 7 deer per square mile in Northeast New York to about 37 deer per square mile on Long Island (Table 13). In all regions except Northeast and Central New York, the estimated harvest of does and antlerless fawns exceeded that of antlered bucks.

Table 13. Mean reported number of total deer killed per square mile in 2002 on farm properties from regular hunting plus special permits, by region.

Region	Total Deer Killed per Square Mile	Ratio of Antlered Bucks to Does and Antlerless Fawns (buck: doe/fawn)
Northwest	10.7	1.00 : 1.36
Northeast	7.0	1.00: 0.81
East	12.0	1.00 : 1.04
Central	11.2	1:00 : 0.97
Southeast	24.7	1:00 : 1.50
Long Island	36.9	1:00 : 2.20
West	17.4	1:00 : 1.51
Southern Tier	26.7	1:00 : 1.66
<b>Statewide</b>	<b>17.0</b>	<b>1:00 : 1.38</b>

### Information Sources about Deer Damage

Most responding farmers had not sought out a source of information about controlling deer damage in the 2 years preceding the survey, although many may have sought information earlier. About 16% had contacted DEC in the past 2 years, 5% had contacted Cornell Cooperative Extension (CCE), and 5% had contacted a farm supply store. Less than 1% had contacted USDA-APHIS, and about 1% had contacted a private or commercial damage control specialist. Less than 2% had contacted someone else—usually a friend or neighbor.

By region, within the past 2 years, DEC contacts reported by responding farmers were greatest on Long Island (30.1%), Northwest New York (24.4%), Southeast New York (19.4%), and West New York (19.2%). CCE inquiries were greatest on Long Island (15.4%); less than 10% of farmers of other regions requesting information from CCE. Inquiries to farm supply stores were greatest on Long Island (11.9%). Few farmers in any region had contacted USDA-APHIS or a private control specialist.

### Information and Attitudes about Deer Control

The majority of responding farmers (79.9%) indicated that a significant number of does must be killed each year to keep the deer population from growing. Farmers were almost evenly split statewide with respect to whether they believed current hunting pressure keeps the deer herd from growing (40.4% believed hunting pressure was sufficient; 38.0% felt it was insufficient, and 21.6% were unsure). Views on this topic differed significantly by region; most respondents

from Long Island, and a majority of growers in Southeast New York who had an opinion disagreed that current hunting pressure is sufficient to control deer populations (Table 14).

Table 14. Percent of farmers agreeing versus disagreeing that current hunting pressure is sufficient to control deer populations, statewide and by regions.			
Region	Agree	Disagree	Uncertain
Northwest	40.9	39.3	19.8
Northeast	56.8	23.2	20.0
East	51.8	25.4	22.8
Central	41.9	35.3	22.9
Southeast	27.0	50.0	23.0
Long Island	14.2	60.4	25.4
West	38.9	38.1	23.1
Southern Tier	39.3	42.3	18.4
<b>Statewide</b>	<b>40.4</b>	<b>38.0</b>	<b>21.6</b>

Most respondents (60.6%) disagreed that local ordinances against the discharge of firearms were limiting their ability to control deer numbers (10.4% agreed; 29.0% were unsure). Most growers did not think the lack of willingness of hunters to take does was a factor that significantly limited control of the deer herd (20.5% thought this was a factor; 44.0% disagreed; 35.5% were uncertain). The one exception regionally was in Southeast New York, where almost as many respondents with an opinion agreed (48.0%) as disagreed (52.0%).

### Effectiveness of Deer Control Techniques

Beyond the use of hunting, which most responding farmers permitted, only a minority had used any other specific deer control method (i.e., deer repellents, deer netting, deer fence, or dogs). Of those who had used any of these techniques, including hunting, the majority failed to find them to be generally effective. The technique most frequently used was to encourage hunters with regular deer permits to hunt on their lands—42.5% had done this, and 30% found it to be generally effective, while another 52.7% found it to be somewhat effective (Table 15). The DEC nuisance damage permits and DMAP permits each had been used by 15% to 20% of growers, 37% of whom found them to be generally effective, and 45% to 48% of whom found them to be somewhat effective.



Table 15. Percent of farmers who have used various types of deer control, and percent of those having used each technique who believe the technique is effective.				
Technique	Percent who have used	Perceived Effectiveness		
		Generally Effective	Somewhat Effective	Not Effective
Deer repellents	20.5	6.5	51.4	42.1
Deer netting	7.4	27.3	44.4	28.3
Deer fence	12.3	35.2	42.0	22.8
Electric fence	17.2	14.4	32.1	53.5
Dogs	18.2	29.8	40.6	29.6
DEC nuisance damage permits	14.6	37.4	47.8	14.9
DEC DMAP permits	19.5	37.2	45.2	17.6
Encouraging hunters with regular deer management permits	42.5	30.0	52.7	17.3

### Use and Awareness of Damage Control Options by Growers with Unreasonable Damage

The 23.9% of responding farmers who considered their damage to be unreasonable, with mean estimated damage of \$11,168, were examined as a group for their use of hunting and awareness of DEC deer permits. These growers are concentrated in the areas of the state shown in Figure 2.

Only 7.8% of these farmers indicated they allow no hunting. However, 46% allowed access to strangers who seemed trustworthy and asked to hunt, and 14.7% allowed specific sportsman's groups to hunt on their farms. The latter statement does not imply that most farmers disallowed sportsmen's groups; it is possible that many growers have not been approached by sportsmen's groups. Of these growers who allowed hunting, only 10.1% required hunters to take does or antlerless deer.

Many of the farmers with "unreasonable" damage are not aware of DEC deer permits, and smaller numbers applied for them in 2002. Nearly three-fourths of growers (74.2%) were aware of nuisance deer permits, but only 31.1% of those aware of the permits applied for them in 2002. Only half of these farmers (49.4%) were aware of DMAP permits; about half (54.8%) of those who were aware of them applied for the permits. About 40% of these farmers contacted DEC for information on damage control in 2002; much smaller numbers contacted Cornell Cooperative Extension (12.7%), a farm supplies store (10.7%), or others (<3.0%) about deer damage control methods. Again, it is possible that more growers made such contacts in previous years.

## SUMMARY AND DISCUSSION

New York's high deer populations are causing significant damage to agricultural crops. Based on growers' estimates from this study, total statewide damage in 2002 was approximately \$58.8 million, with a 95% confidence level of + or - \$15.4 million. The estimated \$58.8 million represents about 1.7% of the value of New York's annual agricultural production of \$3.4 billion (New York Agricultural Statistics Service 2003). Farmers spent an estimated \$2.7 million statewide on deer damage preventative measures in 2002.

The amount of deer damage to farms varied widely both by regions of the state and within any given region. Statewide, after accounting for nonresponse bias, almost half of farms in the sample (48.7%) experienced little deer damage (<\$100 in 2002). Yet, damage to many farms was so high that the mean damage per responding farm was \$4,113 (\$23 per crop acre), and we estimate the mean damage for all farms (including nonrespondents) to be approximately \$2,306 (\$13 per crop acre). Mean damage per responding grower varied from \$1,478 in Northeast New York to \$10,106 in Southeast New York.

It is impossible to tell from this study the extent to which the high variation in estimated deer damage from farm to farm is due to differences in deer populations, feeding habits, and other factors such as types of crops raised and proximity of farms to deer refugia (e.g., parks, posted lands), versus measures farmers have taken both in 2002 and cumulatively over time to reduce deer damage. Only a small portion of farmers (20% or less) indicated they had used even one non-hunting deer control method (repellents, netting, deer fence, etc.) in 2002, but 43% had used at least one type of hunting (use of deer management permits). Mean expenditures per grower to prevent deer damage was only \$144 in 2002, but additional expenditures likely were made in previous years for fencing and other items that can be used for more than one year. Small proportions of growers sought information on deer control methods in 2002, but many may have done so in previous years.

Deer damage is clearly the leading type of wildlife damage to crops in New York. While firm estimates of damage from other wildlife species were not obtained, it appears from farmers' estimates of percent of damage from various species that deer damage is several times the magnitude of turkey damage, the second leading type of damage identified. Turkey damage was followed in declining order of magnitude by goose, groundhog, raccoon, and blackbird damage.

Additional publicity about the availability of DEC deer permits might increase utilization by farmers. This seems particularly the case for DMAP permits, since about half of all growers with damage levels they considered unreasonable were not aware of the permits.

Several areas of additional research are suggested by the results of this study:

1. It must be remembered that the results reflect farmers' estimates of damage. Further work is needed to compare actual damage estimates from field research with farmers' estimates of damage.
2. It is important to gain a better understanding of why some farmers in the same general geographic area report substantial damage while other growers of the same crops report little

damage. To what extent are these differences due to practices such as fencing that some farmers use, specific location of some farmers near parks, woods, or other deer habitat, or other factors?

3. A further assessment of the DEC permit programs from growers' perspectives seems useful. One-half or less of growers with unreasonable damage and who were aware of the availability of the permits applied for them.

4. More information is needed to evaluate the process of getting information to farmers about damage control techniques. Remarkably few growers indicated they had contacted DEC, Cornell Cooperative Extension, USDA Wildlife Services, farm supply stores, or others in the past year for such information. Have growers taken advantage of what these sources have available in previous years? Are they aware of the information available? Do they have additional unmet informational needs? Or have they evaluated the solutions suggested to be too costly, time consuming, or ineffective?

## LITERATURE CITED

- Brown, T. L., C. P. Dawson, and D. J. Decker. 1977. Deriving social indices of farmer attitudes toward deer management levels. Outdoor Recreation Research Unit, Department of Natural Resources, Cornell University, Ithaca, NY.
- Brown, T. L., D. J. Decker, W. F. Siemer, and J. W. Enck. 2000. Trends in hunting participation and implications for management of game species. Pages 145-154 *in* Gartner, W. C. and D. W. Lime, editors. Trends in outdoor recreation, leisure, and tourism. CABI Publishing, New York, NY.
- Brown, T. L., D. J. Decker, and D. L. Hustin. 1978. Deriving farmer indices to deer populations in 43 Western New York Towns. Outdoor Recreation Research Unit, Department of Natural Resources, Cornell University, Ithaca, NY.
- Brown, T. L., D. J. Decker, and D. L. Hustin. 1979. Deriving farmer indices to deer populations in 68 Central New York Towns. Outdoor Recreation Research Unit, Department of Natural Resources, Cornell University, Ithaca, NY.
- Connelly, N. A., T. L. Brown, and D. J. Decker. 2003. Factors affecting response rates to natural-resource-focused mail surveys: empirical evidence of declining rates over time. *Society and Natural Resources* 16:541-549.
- Connelly, N. A. and D. J. Decker. 1985. Preliminary identification of deer damage severity zones. Human Dimensions Research Unit, Series 85-2. Department of Natural Resources, Cornell University, Ithaca, NY.
- Decker, D. J., T. L. Brown, and D. L. Hustin. 1981. Deriving farmer indices to deer population levels in 47 Southeastern New York Towns. Outdoor Recreation Research Unit, Department of Natural Resources, Cornell University, Ithaca, NY.
- Decker, D. J., T. L. Brown, N. Sanyal, R. A. Smolka Jr., and N. A. Connelly. 1982. Reanalysis of farmer willingness to tolerate deer damage in Western New York. Outdoor Recreation Research Unit, Department of Natural Resources, Cornell University, Ithaca, NY.
- Decker, D. J., T. L. Brown, N. Sanyal, R. A. Smolka Jr., and N. A. Connelly. 1984. Reanalysis of farmer willingness to tolerate deer damage in Western New York. Proceedings, First Eastern Wildlife Damage Control Conference:37-45. Cornell University, Department of Natural Resources, Ithaca, NY.
- NASS (National Agricultural Statistics Service). 1999. Fruit: wildlife damage. Spring, Cr. 3. USDA, Washington DC.
- New York Agricultural Statistics Service. 2003. Fact finders for agriculture. <http://www.nass.usda.gov/ny>

Purdy, K. G., T. L. Brown, D. J. Decker, and J. W. Enck. 1989. Deer management in New York's Hudson Valley region: an assessment of the interests and opinions of three key constituencies. HDRU Series 89-1. Cornell University, Department of Natural Resources, Ithaca, NY.

SPSS Inc. 1994. SPSS 6.1 syntax reference guide. SPSS Inc., Chicago IL

# Deer Damage

# Survey

## Appendix A: Deer Damage Questionnaire

Human Dimensions Research Unit  
Department of Natural Resources  
Fennell Hall  
Cornell University  
Ithaca, New York 14853-3001

## DEER DAMAGE SURVEY

Research conducted by the  
Human Dimensions Research Unit  
Department of Natural Resources  
Cornell University

Cooperators in this research study:

Cornell University (Ithaca) Agricultural Experiment Station  
NYS Department of Environmental Conservation (DEC)  
NYS Department of Agriculture and Markets  
New York Farm Bureau

This study focuses on deer damage to crops but also seeks to identify other types of wildlife damage to crops and nurseries. In addition, we want to learn about use of deer damage permits, and give farmers the opportunity to provide other information that will help DEC manage the deer population in your region.

Would the person to whom this is addressed or another household head please complete this questionnaire at your earliest convenience, seal it, and drop it in the nearest mailbox. No postage is needed.

THANK YOU FOR YOUR COOPERATION

1. Your farm is located in the Town(s) of \_\_\_\_\_
2. Counting acres that you lease as well as those you own, how many total acres were in your farm in 2002? \_\_\_\_\_ acres
3. Consider the property immediately bordering your farm on all sides, including that which is across a road, and answer Questions 3a and 3b.
  - a. Roughly what proportion of the land adjacent to your property line is in brush and woodlands? (Please check one.)  
 Less than 15%     45%-59%     85% or more  
 15%-29%     60%-74%  
 30%-44%     75%-84%
  - b. Roughly what proportion of this adjacent land to your farm do you think is hunted for deer (by anyone, regardless of the owners' hunting policies)? (Please check one.)  
 Less than 15     45%-59%     85% or more  
 15%-29%     60%-74%  
 30%-44%     75%-84%
4. What is the largest number of deer you or your family have seen on your farm at one time in the past 12 months?  
\_\_\_\_\_ number of deer
5. Over the past five years, what trend have you seen in the deer population in the area of your farm?  
 more deer now than five years ago  
 fewer deer now than five years ago  
 about the same number of deer now as five years ago  
 don't know

6. How would you compare the amount of deer damage you experienced in 2002 to what you experienced five years ago? (Check one.)

- much less damage in 2002 than five years ago
- somewhat less damage in 2002 than five years ago
- about the same damage in 2002 as five years ago
- somewhat more damage in 2002 than five years ago
- much more damage in 2002 than five years ago
- I was not farming here five years ago

7. In the table below, for each type of crop you grew in 2002, please provide your best estimate of the total acres you grew, the dollar value of deer damage to that crop, and percent of the total value of the crop lost to deer. Then, in the last column, consider all wildlife damage to that crop and estimate the percent of that total that was caused by deer.

Crop	Acres grown, 2002	Estimated dollar loss from deer damage to crop	Estimated percent of total crop value lost to deer damage	Percent of total wildlife damage caused by deer
Alfalfa	_____ acres	\$ _____	_____ % lost	_____ %
Other hay crops	_____ acres	\$ _____	_____ % lost	_____ %
Grain crops	_____ acres	\$ _____	_____ % lost	_____ %
Vegetables	_____ acres	\$ _____	_____ % lost	_____ %
Tree fruits	_____ acres	\$ _____	_____ % lost	_____ %
Berries	_____ acres	\$ _____	_____ % lost	_____ %
Grapes	_____ acres	\$ _____	_____ % lost	_____ %
Nursery products	_____ acres	\$ _____	_____ % lost	_____ %
Other out-door crops:	_____ acres	\$ _____	_____ % lost	_____ %
<b>TOTALS</b>	_____ acres	\$ _____		_____ %

8. Please write in below the three types of wildlife (including deer) that resulted in the **most** damage to your crops (including orchards, vineyards, and plantations) in 2002, in terms of dollar loss. Then estimate the percent of your total wildlife damage to all crops that each type of wildlife caused. For bird damage, please be as specific as possible about the type of bird (e.g., blackbirds, geese).

Type of wildlife causing damage \_\_\_\_\_ % of all wildlife damage in 2002

1. \_\_\_\_\_ %
2. \_\_\_\_\_ %
3. \_\_\_\_\_ %

9. Approximately how much did you spend in 2002 to prevent deer and other wildlife damage?

\$ \_\_\_\_\_ expenditures in 2002 primarily for preventing deer damage  
 \$ \_\_\_\_\_ expenditures in 2002 primarily for preventing other wildlife damage

10. How do you feel about the total amount of deer damage you experienced in 2002?

- negligible damage
- the amount of damage was tolerable in exchange for having deer around
- the amount of damage was unreasonable

11. Have you stopped farming a particular field because of excessive damage by deer to crops on that field?

- No
- Yes ° crop usually grown there \_\_\_\_\_ ; acres \_\_\_\_\_



14. Check below if you place restrictions on the type of deer you allow hunters to take from your property.

- I allow only bucks to be taken
- I require some does or antlerless deer to be taken
- I don't restrict the type of deer hunters can take
- Other: \_\_\_\_\_

12. Consider all of the risks you face in farming each year. This includes weather, insect damage, disease damage, wildlife damage, keeping farm equipment in working order, finding reliable farm labor, and meeting various government regulations. Where does deer damage rate in comparison to these other factors in determining your ability to farm profitably? (Check one.)

- Deer damage has little or no influence on my ability to make a profit.
- Deer damage is one of several significant factors that affects whether I make a profit in a particular year.
- Deer damage is the most significant factor affecting whether I make a profit.

13. Who do you allow to hunt deer on your farm? (Check all that apply.)

- Family members who hunt
- Friends or neighbors
- Strangers who ask, if I think they are trustworthy
- Specific group of sportsmen or sportsman's club
- I don't allow any hunting on my farm.

Why not? (Check all that apply.)

- Hunters cause me too many problems.
- The potential liability is too great to allow hunting.
- I don't believe in hunting.
- Other: \_\_\_\_\_

15. Before reading about the topic here, were you aware of Nuisance Deer Permits, available through DEC, which allow removal of nuisance deer at any time of the year outside of the big game hunting seasons?

- No, I was not aware of these permits ° go to Question 16.
- Yes ° did you apply for any of these permits in 2002?

- No
- Yes: Number of permits obtained: \_\_\_\_\_  
Number of deer killed: \_\_\_\_\_

15A. Have you had difficulty finding designated shooters to kill deer?

- No
- Yes

16. Before reading about the topic here, were you aware of Deer Management Assistance Program (DMAP) permits, available through DEC, which provide additional antlerless deer tags that landowners can give out to licensed hunters for use during hunting season?

- No, I was not aware of these permits ° go to Question 17.
- Yes ° did you apply for any of these permits in 2002?

- No
- Yes: Number of permits obtained: \_\_\_\_\_  
Number of deer killed: \_\_\_\_\_

17. From all hunting sources, including damage permits, approximately how many deer are you aware of that were killed on your farm in 2002?

\_\_\_\_\_ number of antlered bucks

\_\_\_\_\_ number of does and antlerless fawns

\_\_\_\_\_ total number of deer killed

18. Who have you contacted within the past two years for information about controlling deer damage? (Check all that apply.)

- Cornell Cooperative Extension
- Department of Environmental Conservation
- USDA-APHIS wildlife services technician
- Farm supplies store
- Private, commercial damage control specialist
- Other: \_\_\_\_\_

19. Please check whether you agree or disagree with the following statements:

- a. To keep the deer population under control, a significant number of does (female deer) must be killed each year.  
 Agree  Disagree  Uncertain
- b. Current hunting pressure in my area is sufficient to keep the deer herd from growing.  
 Agree  Disagree  Uncertain
- c. My ability to control deer numbers that are impacting my crops is limited by local ordinances that prohibit discharge of firearms.  
 Agree  Disagree  Uncertain
- d. Too many hunters in this area won't take antlerless deer.  
 Agree  Disagree  Uncertain

20. For any of the deer control methods listed below **that you have used**, please check how effective they have been. Check the box in the far right column for methods you have not used.

Deer Control Method	Generally Effective		Somewhat Effective		Not Effective		Have Not Used	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Deer repellents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Deer netting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Deer fence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Electric fence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Dogs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. DEC nuisance damage permits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. DEC DMAP permits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Encouraging hunters with regular deer management permits to hunt on my land	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**The following information is useful in classifying farmers with deer and other wildlife damage. This information is kept strictly confidential and will never be associated with your name.**

21. How many years have you owned or managed your farm? \_\_\_\_\_ years

22. Do you lease any acres of your farm to hunters?

Yes  No

23. Please circle the number below that most closely approximates the percentage of your total net household income that comes from your farming operation.

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

**Use this space to provide any additional comments you wish to make about controlling deer populations on farms.**

**THANK YOU VERY MUCH FOR YOUR COOPERATION.**

To return this questionnaire, simply seal it and drop it in the nearest mailbox. Postage has been provided.