Community Attitudes About Deer Management In the Village of Cayuga Heights, New York

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INTRODUCTION

Located in upstate New York on the southern edge of the Finger Lakes region, the Village of Cayuga Heights is a residential community bordering the City of Ithaca, New York. The population was estimated at 3,273 individuals (2,772 are over the age of 18) in 2000 (U. S. Census Bureau 2000).

Contacts between deer and people and concerns about those contacts are common in Cayuga Heights. In August of 1998, the Cayuga Heights Village Trustees and Mayor established a deer committee to examine the issue of deer in the village and make related recommendations to the village trustees. That committee has worked closely with researchers from Cornell University, who completed studies of the deer population and village residents' beliefs and attitudes toward deer and deer management methods (Chase et al. 1999a, 1999b).

The Cayuga Heights Deer Committee has met regularly since August of 1998 to explore the costs, social acceptability, biological feasibility, and regulatory constraints associated with several potential deer management actions. Their efforts included public meetings in October 1999 and January 2001.

Throughout this time, Cornell Cooperative Extension staff have conducted an outreach program that provided information about deer and deer management. In 2000, Cornell Cooperative Extension initiated a study to measure changes in public attitudes towards deer based on new information extended to community residents via that extension education program. This study was developed to help Cornell Cooperative Extension staff learn more about the effects of their outreach activities related to deer management in Cayuga Heights. The objectives of the study were to:

1. Assess exposure to information materials and educational experiences developed by Cornell Cooperative Extension (CCE) regarding deer management in Cayuga Heights.

2. Assess how residents of Cayuga Heights perceived the credibility of CCE as a source of information related to deer management in Cayuga Heights.

3. Evaluate changes in citizen attitudes toward deer and acceptance of various deer management options following an extension education program, using a 1998 survey in the community (Chase et al. 1999) as baseline information.

4. Evaluate the degree to which providing additional information on costs and expected effectiveness of selected deer management options affects residents' acceptance of those management options.

The objectives above will be addressed more fully in later reports that explore the effects of extension education interventions on attitudes toward deer and deer management approaches in suburban contexts. This report is designed for a more specific purpose: to provide the Cayuga Heights Deer Committee with information about village property owners as the committee develops a set of recommendations to the Cayuga Height Village Trustees. The report summarizes key findings on the experiences residents have had with deer and their attitudes toward deer and deer management.

METHODS

Survey instrument

We developed a questionnaire to assess residents' views about deer and deer management. The questionnaire was designed to provide the following information about study participants: demographic characteristics; experiences with deer; interests, concerns and attitudes toward deer and deer management; sources of information about deer; exposure to local print media coverage of deer management; wildlife-related values; acceptability of deer management options or specific management techniques; exposure to CCE materials and events; and perceptions of CCE as a source of information about deer.

Many questions were left exactly intact between the 1998 and 2001 surveys. Some questions were added, being used only in the second survey in 2001. A few questions were slightly modified. Any modifications that may affect comparisons between years are noted in the following data analysis.

Sampling and survey implementation

During the months of February and March, 2001, we mailed surveys to 895 households in the Village of Cayuga Heights. Recipients were instructed to have the questionnaire completed by the adult in the household with the birthday occurring latest in the year. This instruction was used in both the 1998 and the 2001 surveys to promote completion of questionnaires by a relatively even distribution of men and women.

We sent a reminder letter to all members of the sample one week after the initial mailing. Non-respondents received up to two additional mailings. A total of 549 residents returned questionnaires (542 completed returns and 7 incomplete, unusable questionnaires). The response rate, adjusted for undeliverable questionnaires (n=28) was 63%.

We used a mailing list provided by the Village of Cayuga Heights Clerk as the sampling frame. The listing provided by the Clerk represents all 985 single family and two-family residential properties identified by the Tompkins County Office of Real Property Tax Assessment. Some of the properties in this listing are rented as apartments. However, this listing does not include apartment buildings or homeowner associations (e.g., Kendal at Ithaca), so residents of such households are not represented in our sample.

The 1998 survey, to which we compare our current results, was sent to 550 Cayuga Heights property owners, their addresses having been obtained from the same source as the current survey (i.e., the Tompkins County Office of Real Property Tax Assessment). That survey had an adjusted response rate of 81%. A non-response follow-up study was not conducted for either the 1998 or 2001 survey given the acceptable level of the responses and our intended use of the data.

RESULTS AND INTERPRETATION

In general, we found little significant change between years in response to a majority of the repeated questions. The stability of responses is an indication of the reliability of the survey instrument across the two years; such reliability lends additional credence to differences that we did find.

Respondent characteristics

Sixty percent of the respondents to the 2001 survey were female, up from 56% for the 1998 survey. The mean age of respondents to the 2001 survey was 56 years old, whereas in 1998 the mean age was 59.

In 2001, 96% reported owning their residence, while 4% reported renting. In 1998, 99% reported owning and 1% reported renting. This was due to the fact that the mailing list used for the 1998 survey excluded 100 properties that were owned either by a corporation or an institution (e.g., bank, realtor, university), or represented a second property owned by a village resident.

Interests in deer

Interest in and concerns about deer in Cayuga Heights were relatively unchanged between 1998 and 2001. In both years, the majority of community members expressed some interest in watching deer near their home or seeing deer in the village, but no interest in photographing, feeding and hunting deer (Table 1).

Concerns about deer

In both 1998 and 2001, residents expressed the greatest level of concern about deer-related auto accidents. That level of concern remained unchanged between years (Table 2). In both years, the majority of residents expressed some level of concern about deer damage to plantings and Lyme disease. Many residents reported being very concerned about these issues. We found statistically significant differences in the level of concern about plant damage and Lyme disease. However, though statistically significant, these differences were relatively small and may be interpreted as little changed for practical purposes (Table 2).

Experience with deer-related problems

Experiences with deer related problems in Cayuga Heights remained near the same levels between 1998 and 2001. In both years, residents were most likely to report experiencing damage to flower gardens and trees or shrubs. Over 80% of respondents in both years reported experiencing those problems. Personal experience reported with deer-related auto accidents was at or below 25% each year; fewer than 5% reported personal experience with Lyme disease each year (Table 3). The only statistically significant shift between years was a decrease in the proportion of respondents who reported damage to vegetable gardens (from 51% in 1998 down to 43% 2001.[1]

Attitudes toward deer

Attitudes toward deer in Cayuga Heights also remained stable (Table 4). Response to this question was not significantly different in 1998 and 2001 (Chi Sq = 2.54, p = 0.47) with most respondents indicating agreement with the statement, " I enjoy the presence of deer, BUT I worry about problems deer may cause." In both years, fewer than 14% reported no worries

[1] We had surmised that the greater inclusivity of the 2001 sample might influence this estimate. But there was no significant relationship between renting a home and reporting damage to vegetable gardens.

about deer-related problems, while over 30% reported not enjoying the presence of deer and regarding them as nuisances.

Preferences about deer population size

Preference about deer population size in the Village of Cayuga Heights also remained relatively stable (Table 5). In 1998, 81% of respondents desired a decrease in deer population size, 12% wanted no change, 3% desired a deer population increase, and 5% were unsure about their deer population trend preference. In 2001, 75% desired a deer population decrease, 13% wanted no change, 1% wanted a population increase, and 11% were unsure of their preference. This represents a statistically significant difference between years, though the difference is relatively small in a practical sense. The vast majority of respondents in both years wanted a decrease in deer, few wanted no change, and very few wanted more deer.

Acceptability of management actions

Repeated questions between the 1998 and 2001 surveys indicate that the acceptability of various deer management actions has remained about the same (Table 6).

Some marginally significant changes occurred in response to suggestions of promoting use of plants that deer are less likely to eat (slightly less acceptable in 2001), using chemical repellents to keep deer away from property (slightly more acceptable in 2001), allowing regulated firearms hunting by licensed hunters (slightly more acceptable in 2001), using firearms sharpshooters to kill deer at bait sites and donate the meat to food banks (slightly more acceptable in 2001), using archery sharpshooters to kill deer at bait sites and donate the deer meat to food banks (slightly more acceptable in 2001) and drug, capture and killing deer by lethal injection (slightly more acceptable in 2001). Again, these differences were minimal; basic patterns of management acceptability did not change.

In the latter part of the 2001 questionnaire, we provided more information about management alternatives and then asked respondents about acceptability of five management alternatives. Introducing more information did seem to result in responses shifting toward certain management actions. For example, approximately 19% more respondents indicated that selective culling was very acceptable following the series of short descriptive paragraphs on the costs and methods employed in managing deer population. Also, providing more information strengthened the acceptability of educating people about reducing deer-related problems. In fact, that became the most preferred choice among respondents. (See Table 7 for data, See Appendix A for the additional information provided).

Allowable actions on or near property

In 2001, a majority of respondents reported that they would be willing to permit the darting and immobilization of deer on or within 500 feet of their residential property. A majority would be willing to allow deer to be shot with a tranquilizer on or near their property as part of a process to immobilize deer for sterilization. Less than half of respondents were willing to have someone on or near their property shoot deer with a biodegradable bullet that would induce abortion (Table 8).

About 44% of respondents expressed a willingness to permit deer to be shot within 500 feet of their residence, as part of a culling program. About one in three (34%) indicated that they would be willing to permit deer to be shot on their residential property (Table 8).

Summary of results

- There has been little or no change in interest and concerns about deer in Cayuga Heights since 1998. In both years, the majority of community members expressed some interest in watching deer near their home or seeing deer in the village, but no interest in photographing, feeding and hunting deer.

- Experiences with deer related problems in Cayuga Heights were stable between 1998 and 2001. Residents were most likely to report experiencing damage to flower gardens and trees or shrubs. Over 80 percent of respondents both years reported experiencing those problems.

- Attitudes toward deer in Cayuga Heights have remained stable. Most respondents indicated agreement with the statement, " I enjoy the presence of deer, BUT I worry about problems deer may cause."

- Preference about deer population size in Cayuga Heights remained stable. The vast majority of respondents in both years wanted a decrease in deer, few wanted no change, and very few wanted more deer.

- Repeated questions between the 1998 and 2001 surveys indicate that the acceptability of various deer management actions, be that level high or low, has experienced little or no change between 1998 and 2001.

- In the latter part of the 2001 questionnaire, we provided more information about management alternatives and then asked again about the acceptability of five management alternatives. Introducing more information did seem to result in responses shifting in terms of the acceptability of certain management actions. For example, approximately 19 percent more responses indicated that selective culling was very acceptable following a series of short descriptive paragraphs on the costs and methods employed in managing deer population.

- A majority of respondents expressed a willingness to permit the darting and immobilization of deer on or within 500 feet of their residential property. Fewer were willing to allow use of biodegradable bullets to induce abortion.

- About 44 percent of respondents expressed a willingness to permit deer to be shot within 500 feet of their residence, as part of a culling program. About one in three (34 percent) indicated that they would be willing to permit deer to be shot on their residential property.

DISCUSSION

The 2001 survey of Cayuga Heights residents provides information that we hope will be valuable to residents, policy-makers, elected officials, media representatives, extension educators, and other interested parties. The 1998 and 2001 surveys depict stability in the views and experiences of Cayuga Heights residential property owners. These surveys do not provide information about apartment dwellers or residents who live in residences that are part of a homeowner's association. These data do not serve as a referendum on deer management in the village. Rather, they provide a solid foundation for informed deliberation by village residents, their representatives, and the New York State Department of Environmental Conservation.

The consistency in attitudes expressed in 1998 and 2001 is not surprising. While the Deer Committee has made extensive efforts to encourage community-based decision making in Cayuga Heights, there has not been the kind of singular event that often drives large shifts in attitudes. There was a relatively large number of deer in Cayuga Heights in 1998 and that population has not changed much since then, according to Cornell University extension wildlife biologist Dr. Paul Curtis. Neither, we note, has there been any great change in the characteristics of the residents of the Village of Cayuga Heights.

The high acceptability for the management option of educating village residents about how to reduce deer-related problems is worthy of note. The proximity of Cayuga Heights to Cornell University gives the village relatively good access to Cornell Cooperative Extension staff with expertise in areas such as wildlife biology, wildlife damage management, and citizen participation in wildlife management. We encourage village leaders to take advantage of these technical resources and to maintain the relationships with CCE staff started through the work of the Cayuga Heights Deer Committee.

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Table 1. Interests in deer in Cayuga Heights.

Deer-related interests	Survey year	n	Mean[2]	% Expressing level of interest[1]					
				Not at all interested				Very interested	Don't know
				1	2	3	4	5	
Watching deer near your home.	2001	540	2.8	28.9	16.3	17.4	15.4	21.9	0.2
	1998	431	2.8	30.2	14.2	18.3	18.3	18.8	0.2
Seeing deer in Cayuga Heights.	2001	539	2.5	38.2	18.6	16.1	11.1	15.4	0.6
	1998	433	2.4	39.5	14.8	21.2	10.4	13.6	0.5
Photographing deer.	2001	537	1.6	69.6	13.0	9.7	3.7	3.5	0.4
	1998	433	1.6	66.7	14.5	11.5	4.6	2.3	0.2
Feeding deer near your home.	2001	537	1.3	86.6	6.1	3.9	0.9	2.2	0.2
	1998	432	1.2	86.6	6.5	3.7	0.9	1.6	0.7
Hunting deer.	2001	538	1.2	91.8	2.4	1.1	1.3	3.2	0.2
	1998	435	1.2	93.6	0.9	1.1	1.1	3.0	0.2

[1] Totals may not equal exactly 100% due to rounding.
[2] 1 = Not at all interested, 5 = Very interested.

Table 2. Concerns about deer in Cayuga Heights.

Deer-related concerns	Survey year	N	Mean[2]	% Expressing level of concern[1]					
				Not at all concerned				Very concerned	Don't know
				1	2	3	4	5	
Deer auto accidents.	2001	540	4.3	3.9	5.2	10.9	19.1	60.4	0.6
	1998	432	4.3	2.8	4.4	12.0	17.8	62.7	0.2
Damage to trees and shrubs in yards.	2001	541	3.9[b]	10.7	8.1	13.1	19.2	48.6	0.2
	1998	434	4.2[a]	4.6	6.2	11.5	17.1	60.4	0.2
Deer damage to flower gardens.	2001	541	3.8[b]	10.5	9.2	14.4	19.6	46.0	0.2
	1998	435	4.2[a]	5.7	7.1	11.7	15.2	60.0	0.2
Deer damage to vegetable gardens.	2001	536	3.4[b]	18.5	11.6	14.0	15.9	39.4	0.7
	1998	426	3.8[a]	14.1	9.2	13.8	12.7	49.8	0.5
Lyme disease.	2001	541	3.7[b]	9.6	10.0	17.4	17.4	43.6	2.0
	1998	433	4.0[a]	6.7	8.8	15.5	15.5	52.0	1.6

[1] Totals may not equal exactly 100% due to rounding.
[2] 1 = Not at all concerned, 5 = Very concerned.
[a] Mean "a" (1998 data) significantly higher than mean "b" (2001 data) at $P \leq 0.05$.

Table 3. Experience with deer-related problems in Cayuga Heights.

Deer-related problems	Survey year	n	% of respondents who had experienced problems[1]
	2001	452	84.1
Damage to flower gardens.	1998	375	83.2
Damage to trees and shrubs in yards.	2001	452	85.0
	1998	375	82.1
Deer damage to vegetable gardens.	2001	452	42.9[b]
	1998	375	51.2[a]
Deer-car collisions.	2001	452	23.2
	1998	375	25.1
Lyme disease.	2001	452	3.5
	1998	375	4.5

[1] Respondents could report experiences with more than one problem.
[a] Mean "a" (1998 data) significantly higher than mean "b" (2001 data) at $P \leq 0.05$.

Table 4. Attitudes toward deer in Cayuga Heights.

Attitude statement	% Agreeing with statement[1] 2001 survey (n=538)	1998 survey (n=434)
I enjoy the presence of deer, AND I do not worry about problems deer may cause.	13.9	11.1
I enjoy the presence of deer, BUT I worry about problems deer may cause.	49.8	53.5
I do not enjoy the presence of deer and regard them as nuisances.	34.7	34.3
I have no feelings about deer in Cayuga Heights.	1.3	1.2

Chi Sq = 2.54 p = 0.47

[1] Totals may not equal exactly 100% due to rounding.

Table 5. Preference for deer population size in Cayuga Heights.

Preference for deer population size	% Agreeing with statement 2001 survey (n=538)	 1998 survey[1] (n=435)
Decrease	74.9	80.7
No change	13.0	11.5
Increase	1.3	2.8
Don't know	10.8	5.1

[1] Means from 1998 and 2001 survey significantly different at $P \leq 0.05$.

Table 6. Acceptability of management actions in Cayuga Heights.

Management actions	Survey year	n	Mean[2]	% Expressing level of acceptability[1]					
				Not at all acceptable				Very acceptable	Don't know
				1	2	3	4	5	
Educate people about how to live with deer.	2001	524	3.1	26.5	14.1	13.2	8.8	36.1	1.3
	1998	427	3.2	25.1	11.2	15.9	12.2	32.8	2.8
Promote use of plants on private property that deer are less likely to eat.	2001	532	3.4[b]	19.4	11.7	15.4	11.5	41.0	1.1
	1998	430	3.8[a]	12.1	8.8	15.8	16.7	45.1	1.4
Use fences to keep deer away from property.	2001	515	3.2	29.9	13.4	14.6	11.8	35.0	1.4
	1998	409	3.0	26.4	14.7	16.6	9.8	30.8	1.7
Use chemical repellents to keep deer away from property.	2001	529	2.8[b]	26.3	14.7	21.9	14.7	19.8	2.5
	1998	429	3.2[a]	19.8	15.2	16.1	17.9	27.7	3.3
Let nature take its course without human interference from now on.	2001	522	2.0	52.3	14.0	14.6	6.3	9.4	3.4
	1998	430	2.0	51.4	17.4	14.0	7.4	5.8	4.0
Sterilize deer or use contraception (birth control).	2001	527	3.9	10.1	5.3	12.9	13.3	55.0	3.4
	1998	428	3.9	13.6	5.6	9.6	12.4	54.9	4.0

[1] Totals may not equal exactly 100% due to rounding.
[2] 1 = Not at all acceptable, 5 = Very acceptable.
[a] Mean "a" data significantly higher than mean "b" data) at $P \leq 0.05$.

Table 6. Acceptability of management actions Cayuga Heights (continued).

Management actions	Survey year	n	Mean[2]	% Expressing level of acceptability[1]					
				Not at all acceptable				Very acceptable	Don't know
				1	2	3	4	5	
Allow regulated archery hunting by licensed hunters to control the deer population.	2001	532	2.4	49.8	10.2	9.0	8.6	21.1	1.3
	1998	423	2.3	51.8	9.0	10.4	7.3	18.9	2.6
Allow regulated firearms hunting by licensed hunters to control the deer population.	2001	532	2.0[a]	59.4	10.3	7.7	6.4	14.7	1.5
	1998	421	1.8[b]	64.4	10.5	8.6	4.3	10.5	1.9
Use firearms sharpshooters to kill deer at bait sites and donate the meat to food banks.	2001	532	2.7[a]	41.4	10.3	9.6	9.0	28.2	1.5
	1998	428	2.4[b]	49.8	8.2	10.3	8.9	20.6	2.3
Use archery sharpshooters to kill deer at bait sites and donate the deer meat to food banks.	2001	532	2.7[a]	41.4	9.4	8.6	10.0	29.3	1.3
	1998	429	2.6[b]	43.4	7.5	12.8	9.3	24.9	2.1
Drug, capture and kill deer by lethal injection.	2001	534	2.6[a]	43.1	9.7	9.4	10.3	24.5	3.0
	1998	427	2.3[b]	48.9	10.5	11.0	5.6	19.7	4.2

[1] Totals may not equal exactly 100% due to rounding.
[2] 1 = Not at all acceptable, 5 = Very acceptable.
[a] Mean "a" data significantly higher than mean "b" data at $P \leq 0.05$.

Table 7. Acceptability of management actions Cayuga Heights - pre vs. post information 2001 survey

Management actions	Survey year	n	Mean[2]	% Expressing level of acceptability[1]					
				Not at all acceptable				Very acceptable	Don't know
				1	2	3	4	5	
Use contraception (chemically induced birth control) for deer	Pre[3]	527	3.9[a]	10.1	5.3	12.9	13.3	55.0	3.4
	Post	507	3.1[b]	23.5	12.2	14.2	16.8	29.4	3.9
Surgically sterilize deer	Pre[3]	527	3.9[a]	10.1	5.3	12.9	13.3	55.0	3.4
	Post	507	3.1[b]	23.3	12.2	12.2	19.1	28.8	4.3
Use contragestation (chemically induced abortion) for deer	Pre[3]	527	3.9[a]	10.1	5.3	12.9	13.3	55.0	3.4
	Post	503	2.3[b]	38.0	17.3	17.3	8.7	13.5	5.2
Selectively cull deer	Pre[4]	532	2.0[b]	59.4	10.3	7.7	6.4	14.7	1.5
	Post	511	3.0[a]	29.7	7.8	11.4	14.3	33.3	3.5
One time cull combined with surgical sterilization of deer	Pre[4]	532	2.0[b]	59.4	10.3	7.7	6.4	14.7	1.5
	Post	506	2.8[a]	32.6	11.7	11.1	10.1	29.2	5.3
Educate people about reducing deer-related problems	Pre	524	3.1[b]	26.5	14.1	13.2	8.8	36.1	1.3
	Post	511	3.6[a]	18.2	11.0	10.2	10.0	49.5	1.2

[1] Totals may not equal exactly 100% due to rounding.
[2] 1 = Not at all acceptable, 5 = Very acceptable.
[3] Response to question 10, "Sterilize deer or use contraception (birth control) for deer.
[a] Mean "a" data significantly higher than mean "b" data at $P \leq 0.05$.
[4] Response to question 10, "Allow regulated firearms hunting by licensed hunters to control the deer population."

Table 8. Allowable actions on property or near property.

Would you allow	Number and Percent Expressing agreement[1]			
	n	Allow within 500 feet of residence	n	Allow on property
Shooting deer with a dart as part of a deer contraception program	495	67.1	486	58.8
Shooting deer with a tranquilizer to immobilize them for sterilization	485	70.7	481	60.5
Shooting deer with a biodegradable bullet to induce abortion	490	48.8	478	42.9
Shooting deer as part of a culling program	500	44.2	498	34.3

[1] Totals may not equal exactly 100% due to rounding.

Table 9. Summary statistics for respondents to the 1998 and 2001 surveys.

Summary statistics	1998	2001
Sex	56% female	60 % female
Age	Mean - 59 years old	Mean - 56 years old
Years in village	19 years	19.45 years
Residence type	99 % own home	96 % own home
	1 % rent home	4 % rent home

Appendix A. Additional information provided about five management options.

Two years ago, the Village Trustees and Mayor established a Deer Committee to study the deer situation in the village. The Deer Committee studied the deer population, deer management approaches, and village residents' attitudes toward deer. The following are brief sketches of six potential approaches currently being explored by the Deer Committee as approaches for managing the impacts of deer in the Village of Cayuga Heights.

Deer Contraception -- Contraception, or birth control, for female deer is in the experimental stage, so any decision to use contraception has to be part of a research project. Each deer must receive three treatments (two doses of an anti-fertility agent in year one and a third booster treatment in year two). The estimated cost of contraception is around $1,000 per deer to administer all three treatments. Contamination of the food chain and deer meat used by hunters is possible. There are a couple of vaccines used and they are generally administered to deer with a dart gun. If any darts miss their mark and go unrecovered, they could be hazardous to humans. Effectiveness at reducing population levels using this method is uncertain, but estimated to result in between 80 and 90 percent reduction in fawning for treated females. At least 70% of all females in a local population must be treated every year for this technique to effect population reduction.

Surgically Sterilize Deer -- Deciding to surgically sterilize female deer is another possible means to attempt to reduce the population of deer. The cost of this method is estimated to range between $200 and $400 per deer – depending on the success rate and the method used to capture deer – after an initial outlay of around $20,000 for equipment. The long-term effects of this method on deer behavior and genetics are unknown. The sterilization itself is usually successful in over 90 percent of the cases, but in some instances the reproductive tissues have been observed to grow back. Individual deer only need to be treated once, but at least 70 % of all females in the local population must be treated for this technique to effect population reduction.

Deer Contragestation -- This method is very dependent upon successful timing. Essentially, a chemical is administered as an abortion drug to female deer early in pregnancy. Consequently, this technique must be repeated every year. The cost of this method is estimated to be very similar to contraception, around $1,000 per deer for two years of treatment. The drugs administered have received FDA permits to be used in food animals. At least 70 % of all females in a local population must be treated every year for this technique to effect population reduction.

Selectively Cull deer -- The deer population could be immediately reduced by selectively shooting deer attracted to a carefully designed bait site. The meat from a deer cull can be donated to charitable organizations. Deer could be culled by professional sharpshooters or village police. Sharpshooters could use shotguns or archery equipment (bow and arrow) to shoot deer. The cost of this technique is estimated to be around $300 per deer. Wildlife scientists say this technique is effective for reduction of deer numbers in small areas. However, this technique may be difficult

in Cayuga Heights because of the density of buildings and houses and because of safety concerns. Also, some village residents may object to this technique because it involves killing deer. This technique would have to be repeated periodically (e.g., every 1-3 years) to maintain the deer population at a desired level.

One time Cull Followed by Sterilization -- Another possibility is using culling and sterilization in combination (both methods are described above). This approach would involve using a culling procedure once to reduce the overall deer population, followed by a program of surgically sterilizing remaining female deer. This approach is estimated to range between $200 and $400 per deer after an initial outlay of around $20,000 for equipment. An initial cull of deer would reduce the number of deer that require sterilization to reach a desired population level. Since population reduction would then be maintained through sterilization, a smaller number of deer would be killed than if culling were used as the only management method. This approach still involves killing some deer and most (70%) females in the local population must be sterilized for this technique to prevent population growth.

Educate People About Reducing Deer-related Problems -- One possible decision is to do nothing to reduce the deer population but try to teach people to reduce problem interactions by changing their own behavior or the behavior of deer. The village costs for this approach would depend on how much, if any, of an education campaign was funded by the village. Methods that could be promoted include: installing deer fencing, planting unpalatable landscape plants, using deer repellents, discouraging residents from feeding deer, and hazing or frightening deer. Village ordinance prohibits installing fences over 4 feet in height within the first 15 feet of one's property. Most methods of problem prevention have various levels of effectiveness and none are considered fool-proof.