February 1991

MINIMIZING DEER DAMAGE TO FOREST VEGETATION THROUGH AGGRESSIVE DEER POPULATION MANAGEMENT

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Abstract: Controlled hunts were used annually between 1976-90 on the Mary Flagler Cary Arboretum in southeastern New York to control deer *(Odocoileus* virginianus) population expansion and prevent over-browsing of forested and landscaped areas. The primary objective of the hunts was to remove sufficient numbers of adult female deer each year to stabilize herd growth and minimize browsing pressure. Hunters had to register early, attend a preseason meeting, pass a shooting proficiency test, apply for a deer management permit, and pay a fee. Spring browse-use surveys, using several tree species as an index to browsing pressure, showed low use through 7 winters. Participating hunters strongly supported the controlled hunts citing safety, good access, low hunter numbers, and a quality experience as the features they enjoyed.

Proc. East. **Wildl. Damage Control Conf. 5:182-186. 1992.**

The impact of white-tailed deer on the growth and development of forest vegetation ranges from little to substantial. It varies geographically with plant species, winter severity and deer density. These impacts have been thoroughly documented with "closure studies, sometimes with conflicting results. The work of Grisez (1960), Tierson et al. (1966), and others describe the negative effects of browsing on regeneration of forest vegetation. The most notable impact deer have on seedlings is in reducing height growth (Marquis and Brenneman 1981, Healy and Lyons 1987). This damage usually results in delayed and reduced stocking rates of seedlings in the 3' to 5' range. It has been observed that deer browsing can: (1) reduce the number of seedlings being recruited into the sapling size class; (2) reduce the abundance of tree seedlings and shrubs >1' in height; and (3) affect the development and composition of stems in unprotected areas (Gottshalk 1987, Healy and Lyons 1987).

This paper examines the use of an annual controlled hunt to stabilize the deer population on the Mary Flagler Cary Arboretum in an effort to minimize the negative effects of deer to both natural and cultivated areas. I acknowledge the staff of the Institute of Ecosystem Studies and the participating hunters for their cooperation and assistance.

STUDY AREA AND METHODS

The 778-ha Mary Flagler Cary Arboretum is located in Dutchess County in southeastern New York. The property is post-agricultural with approximately 50% of the area in upland hardwood and mixed hardwood-conifer forests, 28% in open meadows, 20% in overgrown brush fields, and 2% in swampma,rsh. Dutchess County is essentially a post-agricultural landscape with an expanding residential component and a growing deer population.

Controlled deer hunts have been used on the Cary Arboretum since 1970, with a more focused and comprehensive deer management program beginning in 1976. The goal of the deer management program initially was to reduce, then stabilize, the local deer population at a level compatible with other planned uses. The consistent annual removal of adult female deer was the primary objective of the annual hunts. Hunting was used because it has been demonstrated to be an efficient and costeffective method of managing a deer population (Hesselton et al. 1965).

Hunters who participated had to meet the following requirements to be eligible to hunt: (1) meet a registration deadline; (2) attend a preseason orientation meeting; (3) pass a shooting proficiency test; (4) pay an annual access fee; and (5) apply for a deer management unit (DMU) permit. These DMU permits were either-sex permits (issued by the state), but were used only to take antlerless deer on the Arboretum. Approximately 55-60 hunters participated each year. Hunters were required to check in and out daily, park in designated areas, wear some blaze orange, and present all deer killed to our check station. Hunters were expected to hunt at least 5 days if necessary, comply with all regulations, and harvest adult does. Hunters who failed to meet the doe harvest requirement within a few years' time were required to shoot a doe before shooting a buck, or be dropped from the program. Successful and cooperative hunters were invited back in subsequent years.

Over-winter woody browse consumption by deer was monitored through spring browse surveys since 1985. Eight commonly browsed tree species (Bramble and Goddard 1953, Healy 1971) have served as an index to trends in the rate of browse consumption. These species included: red maple *(Acer rubrum)*, sugar maple *(Acer saccharum)*, serviceberry *(Amelanchier arborea)*, black birch *(Betula lenta)*, black cherry *(Prunes serotina)*, oaks *(Quercus* spp.), hickories (Carya spp.) and the ashes *(Fraxines* spp.). The browse survey sampling design varied slightly over the years. Before 1987, 38 fixed 5-m-diameter plots were used for data collection. Fixed plots occasionally were void of index species, so a transect sampling method was employed to ensure data were collected at each site. Starting in 1988, the number of sites surveyed was increased to 50, and sites were more evenly distributed across the forested and old field areas of the property. Transects were walked from plot centers in a randomly selected direction until

an index species was sighted. All buds below 2 min height were counted noting the number of browsed buds. A minimum of 100 buds were counted at each site, which frequently included 2 or more species. Data from the browse plots were combined and a total percent browsed was calculated, as was the percent browsed for each individual index species.

RESULTS

The Cary hunts have averaged 36% adult females (age 1.5 yrs. or more) in the annual harvest for the past 18 years (Fig. l). Seventy-two percent of these adult females have been 2.5 yrs. old or older (Fig. 2). The total antlerless harvest (which includes fawns of both sexes) has averaged 59% over this same period. Antlerless harvests at this level should significantly slow and/or stabilize the potential growth of the local herd (Severinghaus 1959, McCullough 1984).

The average annual browse rate for all index species combined for the past 7 years was 8.6% of the available stems. Red maple, which is considered a preferred or staple deer food (Krefting et a1.1955), was used most at an average rate of 14%. Excluding oaks, the other index species showed low use (Table 1), with the highest use coming during winters with the most snow (Fig. 3). Qualitative observations in the Cary forest reveal deer are not inhibiting seedling establishment, and preferred species such as striped maple *(Acer pennsylvanicum)* tN. R. Dickenson, N.Y. Dep. Environ. Conserv., pens. comm.), although not extremely abundant, are lightly browsed. Red cedar *(Juniperus virginiana),* which showed a distinct browse line from past years, is recovering and new seedlings are present.

DISCUSSION

It is necesary to consistently remove a portion of the adult females from the herd to decrease and/or stabilize a local deer population (Severinghaus and Darrow 1976, McCullough 1979). The aggressive orientation and education of hunters (during the prehunt meetings) to be selective in the deer they harvest has helped sustain an excellent harvest of older-age-class females. These animals are more fecund than yearlings (Hessleton and Jackson 1974) so their removal is important for population stabilization. A bucks-only harvest (which is widely preferred by sportsmen) cannot reduce or stabilize a deer population. A successful deer management program requires an adequate number of doe-only or either-sex permits be available to the hunters. Hunters must also be educated and convinced that doe hunting is not detrimental to the deer herd, and does not decrease the buck harvest as many sportsmen believe (McCullough 1984). The Arboretum's controlled hunt demonstrated this by maintaining an annual average buck harvest of 3.5 bucks/kmz (SD = 0.69) over the past 18 years. The buck harvest is important because it keeps hunter interest high and demonstrates that regular doe harvests do not reduce the buck harvest.

A recent survey of Arboretum hunters indicated strong support for the doe harvest requirement. Only 2% of 44 respondents (80% response rate, n = SS questionnaires) felt this policy was detrimental to the herd and only 5% felt this policy was having a negative impact on their hunting (Winchcombe 1990). Educational efforts through the preseason orientation meeting and day-to-day contact during the hunting season

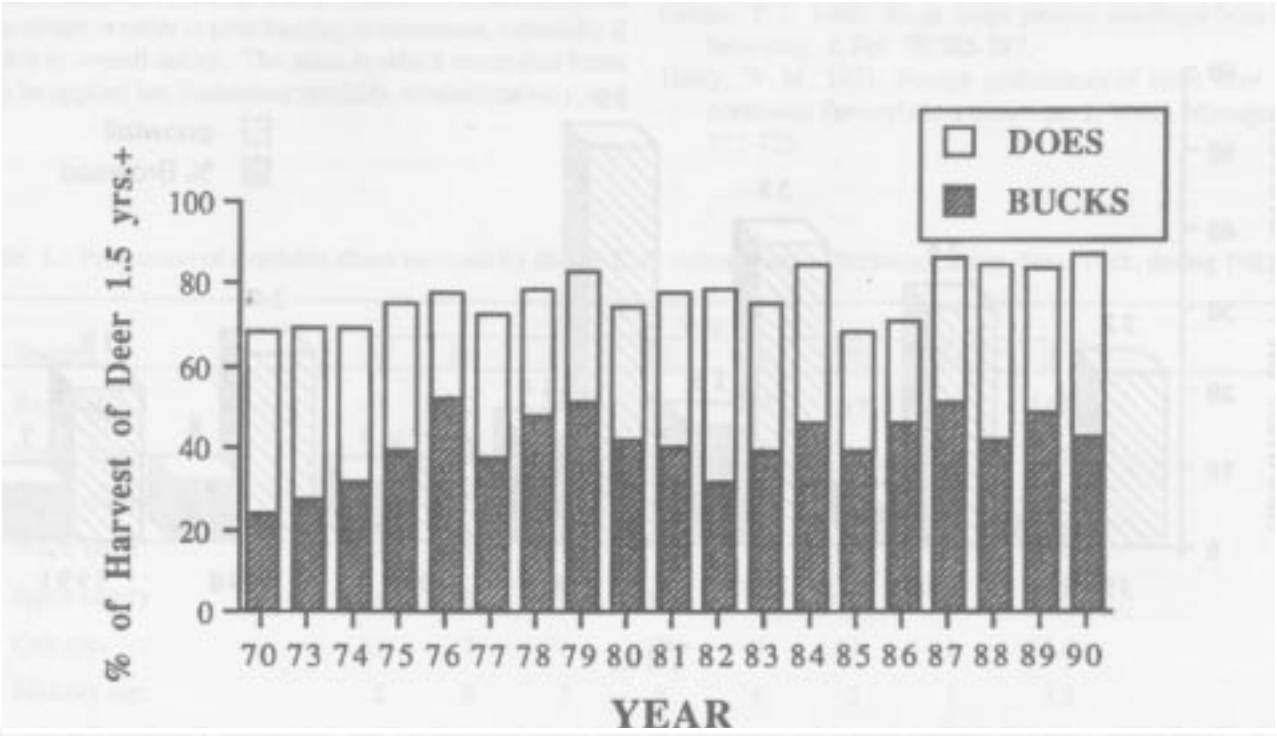

Fig. 1. Proportion of females (1.5 yrs. or more) versus antlered bucks in the annual Cary deer harvest, 1970-90, Dutchess County, New York.

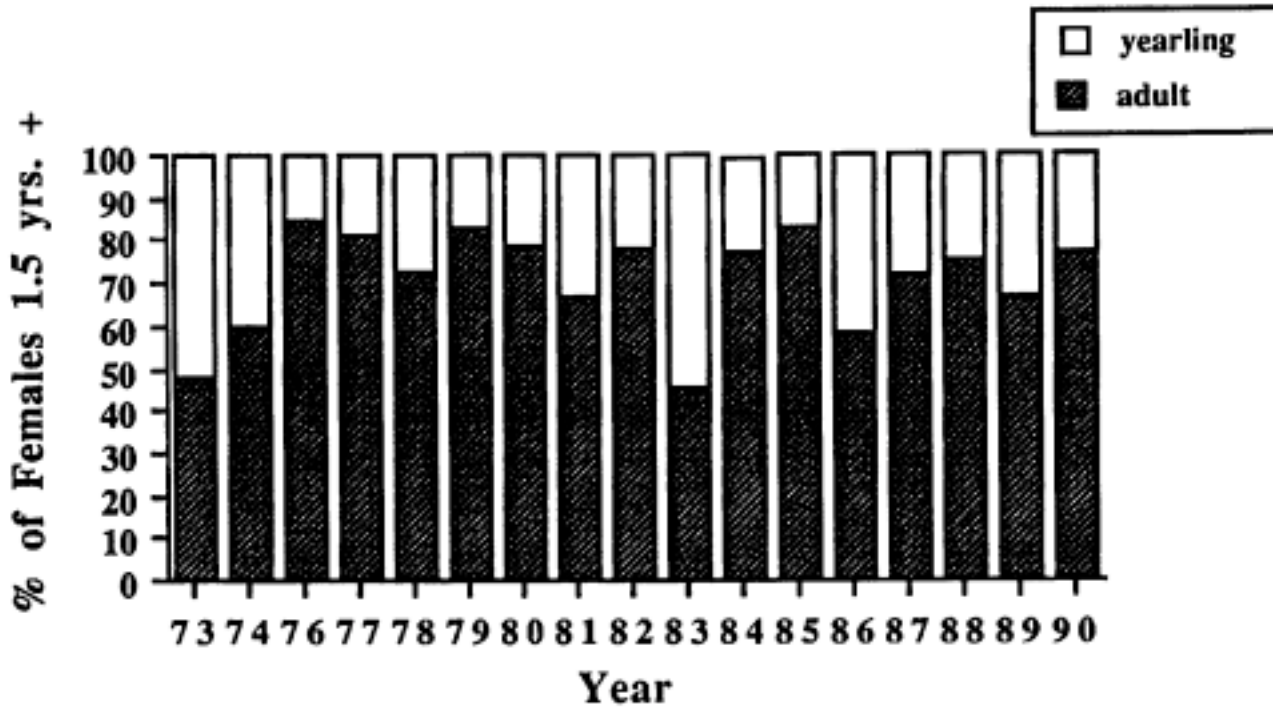

Fig. 2. Proportion of yearling versus adult females in the annual Cary deer harvest, 1973-90, Dutchess County, New Yo

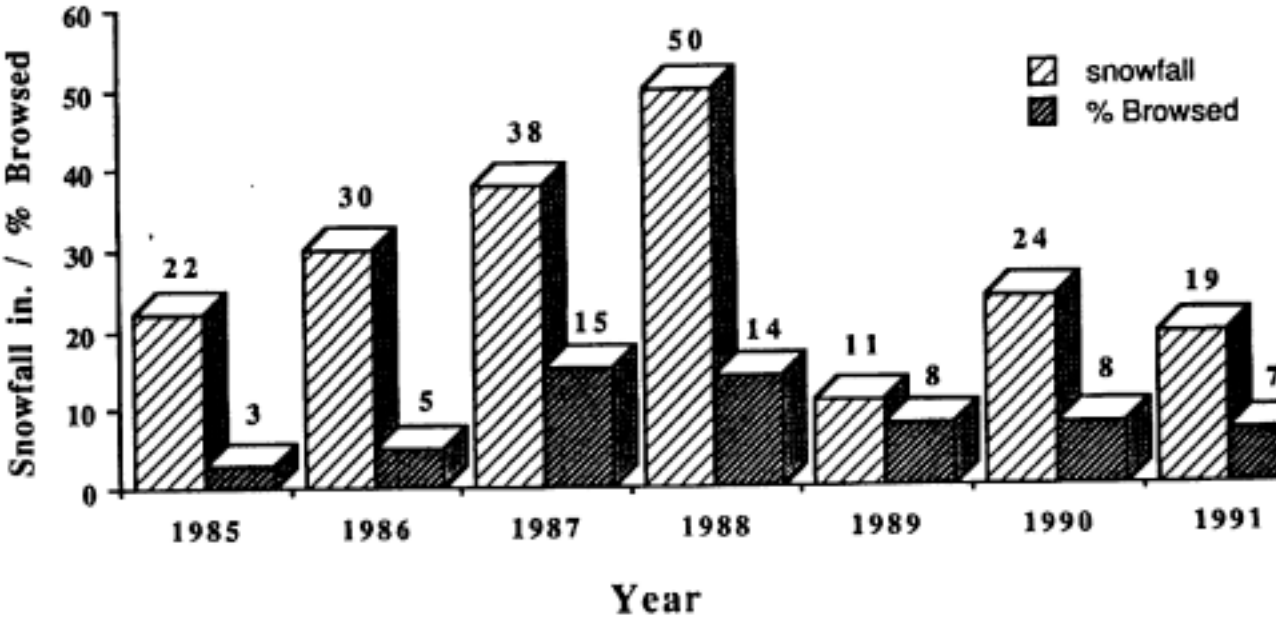

Fig. 3. Total winner snowfall (inches) versus the proportion of total stems browsed at Cary Arboretum, Dutchess County, New York, during 1985-91.

appears to be effective. The survey indicated overwhelming support for the program with its many restrictions. Safety was an important issue with many hunters, and 93% of the respondents said they hunted at the Arboretum because they felt it was a safe place to hunt. Hunters also felt the chance of success was high, and the program provided a quality hunting experience. Mosby (1952) reported similar results regarding the acceptance of controlled hunts by the hunting public. Keeping hunters informed of program goals and results was important in gaining cooperation and acceptance of the controlled hunt model.

Results of the browse surveys revealed low wrote- browsing rates, no doubt partly the result of mild winters and availability of grazing areas. These levels of browsing are considered light (Aldous 1944), and contrast with the severe overbrowsing and starvation documented on the Arboretum property inpastyears (Davis 1975). Abrowse survey conducted in 1978 (a year with heavy snows) revealed a browsing rate of 33% (compared to the current rate of 8.6%), using the same index species. The aggressive use of DMU permits to harvest does has significantly slowed, if not stabilized, the growth of the local deer population. Without the consistent harvest of does, recent browse survey results probably would be quite different.

MANAGEMENT IMPLICATIONS

Annual controlled hunts can be very effective in controlling a local deer population if they include females as a regular part of the harvest. The results of such hunts should lead to a reduction in human/deer conflicts. Control implies additional restrictions, and these would vary according to site specific requirements and concerns. Many hunters welcome some form of structure or order in their hunting environment, especially if it adds to overall safety. The scale in which controlled hunts may be applied has limitations spatially, administratively, and economically, but their use can address deer population man agement concerns in many situations.

Access to the deer resource is ultimately controlled by landowners, who need to be informed of the role they play in deer population management. Landowners with a concern for a healthy balance between deer numbers, available food re sources, and conflicting land uses should require hunters (where legal) to shoot female deer as a condition for access privileges.

An added value of controlled hunts is the opportunity for increased interaction between landowners and sportsmen, and ideally, the wildlife management agency. This would provide an excellent educational opportunity for all parties and may lead to a better understanding and support of agency deer management programs and the concerns of landowners and hunters.

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Table 1. Proportion of available stems browsed by deer at Cary Arboretum in Dutchess County, New York, during 1985-91.

	•			Year				
Species	85	86	87	88	89	90	91	3E
Red maple	<1	12	24	18		17	17	9
14.0								
Sugar maple	<1	3	11 13			3	1	2.5
4.9								
Serviceberry	2	0	10	2		< 1	< 1	1.5
2.5								
Black birch	NP'	1	13	4		7	11	8.5
7.4								
Black cherry	0	NP	NP	20		5	7	NP
8.0								
Oak spp.	13	7	15	23		9	10	11
12.6								
Hickory spp.	2	6	7	8		4	2	1
4.3								
Ash spp.	3	5	5	0		< 1	< 1	1
2.3								

' NP- species not present in survey this year.

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