Town of Greenwich
Conservation Commission

Report on Managing Greenwich's Deer Population
October 7, 2004

Drafted by
Greenwich Conservation Commission Wildlife Issues Committee
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Introduction

Request for Deer Management Strategy

In the summer of 2000, the First Selectman requested the Conservation Commission to examine Greenwich's white-tailed deer (*Odocoileus virginianus*) population and develop a deer management strategy. It had become increasingly evident that there was an over-abundance of deer in the town and that a number of problems had resulted from this burgeoning deer population. Moreover, certain branches of the town's government, numerous neighborhood groups, and others across the town had reached a consensus that Greenwich clearly needed to control and stabilize its deer population.

Background

During the past several decades, a number of trends have combined to create an over-abundance of white-tailed deer in the region. The historical shift in local land use patterns, from agriculture to residential has led to a wooded landscape that provides both ample shelter and forage for deer. The increased residential density has resulted in a change from rural to suburban communities with newer homeowners resulting in different lifestyles and values. Where once hunting was part of everyday life, it is now no longer practiced and in some areas not permitted. While large predators such as the wolf and mountain lion have long been eliminated, fields and old pastures have grown up into mature forest and thickets or been replaced by homes with yards and gardens, all providing plenty of shelter and food for deer.

Need for Management

It is clear that without sufficient checks on the deer population, such as predation, hunting, or food limitations, it will inevitably continue to increase and take its toll on the region. Three major problems related to deer density have been identified in this area: a high incidence of Lyme disease; a dramatic loss of forest biodiversity; and an increase in deer/vehicle accidents. All three problems clearly have major negative impacts on human and environmental health.

Goals for a Deer Management Strategy

The Conservation Commission immediately recognized the need first to understand the population dynamics of the white-tailed deer and then to review the various known management strategies. The Commission also considered it critical to learn about residents' attitudes regarding the choice of management strategies. The Commission therefore developed the

following specific goals: 1) review and evaluate existing resource information on deer management; 2) establish of an ongoing education and outreach program; 3) establish baseline data on the deer herd; and 4) develop and implement a long-range deer management plan based on scientific information and community needs.

Actions Taken to Initiate a Deer Management Strategy

The Commission moved ahead on several fronts simultaneously. By November 2000, the Commission had launched a preliminary education program designed to immediately assist residents and landscape managers with deer problems. Flyers and interactions with the press resulted in an initial flood of information throughout the town regarding various easy methods to manage deer. The Commission also met with a number of established neighborhood groups, and an ad-hoc citizen advisory board was created to serve as a focus group and provide additional input for the Commission's work. Finally, the Commission initiated a cooperative research program that included the Town of Greenwich, Connecticut's Department of Environmental Protection, and the University of Connecticut's Wildlife Conservation and Research Center. With generous support from several neighborhood groups as well as from the Town, a doctoral candidate was provided with funding to develop and implement a study of white-tailed deer population dynamics in Greenwich and recommend strategies for deer management in the town.

The negative impacts of the current deer population in Greenwich, the findings of the deer study, a survey of deer population management strategies, and recommendations for deer management in Greenwich are explored in the balance of this report.

Major Impacts from Deer Over-abundance

The Lyme Disease Connection

In areas where there is an over-abundant white-tailed deer population, three clear and notable impacts on humans and the ecological health of the region are present. First, a high density of deer is correlated with an increased incidence of Lyme disease (caused by the bacterium, *Borrelia burgdorferi*,carried by some deer ticks). While white-tailed deer are not themselves carriers of Lyme disease, the presence of these large herbivores does lead to a greater abundance of ticks in an area, and these in turn are responsible for transmitting Lyme and other diseases to humans. The direct correlation between deer herd size and Lyme disease has been well documented. In Mumford Cove, a neighborhood in Groton, Connecticut, when the deer population was dramatically reduced (>50%), the number of reported cases of Lyme disease directly tracked this reduction and fell from a high of 30 cases to 5 reported cases in just three years (Kilpatrick and LaBonte, 2003). On Great Island in Massachusetts, prior to the removal of all deer, the annual incidence of Lyme was 3 cases per 100 people. After all the deer were removed, the incidence rate dropped to 0.2 cases (Wilson & Childs, 1997). Though mice are usually the principal mammalian carrier of Lyme disease, a high deer population tends to support a higher tick population. Deer also help to distribute ticks over a wide area, and to sites (like fields) where they are more likely to find human hosts.

Impact of Deer on Forest Ecosystems

Almost every gardener in Greenwich now ponders "deer resistant" species for their yard. Yet deer do a lot more than just eat flowers; they are in fact destroying the region's forest

ecosystem. In areas where deer population densities are high, they devour the ground cover and shrubs that comprise the natural understory of our woods. This wreaks havoc on the biodiversity of an area. Lilies, trillium flowers, mayflowers and other forest floor and shrub-layer species are favored by deer, and sites under intense pressure may lose up to 80% of their ground flora (Waller & Alverson, 1997). In a Nature Conservancy reserve in eastern Connecticut, an area was fenced off to exclude deer. Within a few years the percent of the area with shrub cover increased from 0% to almost 90%, the shrub height increased from zero to nearly six feet, and the number of different forest herb species increased from 13 to more than 30 (Metzler, 2003). In such areas, the repercussions are enormous. Not only do the deer destroy the under story, they also consume any new forest in-growth, the small sprouts and tree seedlings which one-day should emerge to replace the current canopy. In an oak forest in central Massachusetts, one area had 26-44 deer/mi^2 (10-17 deer/km^2) and another area had 7.8-15.5 deer/mi^2 (3-6 deer/km^2). The higher density tracts had only 39% of the tree regeneration of the lower density areas and, moreover, heavily grazed areas had a significantly less diverse species composition (Healy, 1997). In fact, the forest tracts with the highest deer density had only 7 species of tree seedlings, while tracts with a low deer density had 13 tree species. Similar findings were made in Pennsylvania where an over-abundance of deer reduced the number of tree seedling species in one forest from 27 to 11, and in another from 41 to 8 (Stout, in Shono, 2003). In the backcountry at Audubon Greenwich, witch-hazel, dogwood, sugar maple and other species have all disappeared from the understory, maple seedlings do not survive the summer, and an entirely new and impoverished forest composition is developing (Shono, 2003).

As the forest is gradually denuded, the impact widens like ripples on a pond. In severely browsed areas, songbirds have no place to forage or nest. Work in Pennsylvania has shown that deer densities above 20.7/mi^2 (8 /km^2) have a significant negative effect on bird populations, particularly on migratory songbirds (McShea and Rappole, 1997). As the report on the Audubon Greenwich property (Shono, 2003) has already documented, such browsing similarly impacts the small forest-floor and arboreal mammals (mice, voles, shrews, chipmunks, flying squirrels) as they too lose their food and homes. In sum, forests heavily browsed by deer soon lose species such as herbaceous wildflowers, shrubs, songbirds, forest insects, and small woodland mammals.

Road Accidents Involving Deer

The number of vehicle/deer impacts has increased in town. Recent data shows that 81 deer died in traffic accidents in Greenwich in 2001 while vehicles killed an estimated 250 in 2003 (Kilpatrick, personal communication). This is certainly a low figure as it represents only known deer fatalities. The actual number of vehicle accidents is most likely larger since it is reasonable to expect that some deer were injured and later perished, and there were presumably accidents due to near misses. Indeed, a state study found that when the reports to local law enforcement officials of deer killed by vehicles are compared with the numbers of deer picked-up by the state Department of Transportation, and then also compared to the number of accidents reported to the state police, the initial estimate of accidents should probably be multiplied six-fold (Kilpatrick, 2004). While we do not have verifiable estimates for a full assessment of the financial and other impacts resulting from deer/vehicle accidents, it is likely they result in significant personal injury and substantive financial losses due to medical leave and/or property damage.

Greenwich Deer Study: Population and Dynamics

Howard Kilpatrick was the lead investigator of our Deer Research Study. The study commenced in late fall 2002 and continued through the spring of 2004. The study was a cooperative effort between the Town of Greenwich, the Connecticut Department of Environmental Protection, and the University of Connecticut's Wildlife Conservation and Research Center. As background, Howard Kilpatrick received his B.S. in wildlife biology from the University of Massachusetts, his M.S. from the University of New Hampshire, and with the data from this study is pursuing a Ph.D. with the University of Connecticut. Professionally, he is also a Supervising Biologist in the Wildlife Division of the Department of Environmental Protection and has been the leader of the state's Deer Management Program since 1994.

Kilpatrick's Objectives

The Town of Greenwich and the University of Connecticut Wildlife Conservation and Research Center, decided that the primary objective of the research project would be to develop deer management recommendations for Greenwich. This, Kilpatrick proposed to do by:

- Collecting data on the movement patterns and population dynamics of deer
- Surveying attitudes and perceptions of homeowners
- Surveying attitudes and perceptions of bow hunters

Deer Population – Findings and Implications

In order to estimate Greenwich's deer population, detail herd movement, and understand population dynamics, Kilpatrick relied upon aerial surveys, nocturnal spotlight surveys, radio telemetry (56 deer were fitted with radio collars and tracked over a period of 2 years), harvest data and field observations. He found that in the backcountry (north of the Merritt Parkway) there were roughly 68.1 deer/mi^2. From the Merritt Parkway south to Putnam Avenue (mid-country) there were 52.3 deer/mi^2 and south of Putnam Avenue there were hardly any deer.

What does this mean? It means that in Greenwich the deer population is clearly well above that in any balanced ecosystem. Interestingly, the first attempt to gauge historical figures for a naturally balanced deer population was undertaken by Greenwich's own Ernest Thompson Seton. He believed that in 'primitive times', the density of white-tailed deer in our region was approximately 10/mi^2 (4/km^2) (Seton, 1909). More recently, an extensive quantitative analysis independently supports this estimate, and McCabe and McCabe (1997) surmised that there were 8-11 deer/mi^2 (3.1- 4.2/km^2) in pre-colonial America. What is an appropriate density? Studies in the Allegheny National Forest in western Pennsylvania have shown that when density rose above 20-30 deer/mi^2 (8-12 deer/km^2) there was a significant impact to the forest (Decalesta, 1997). These studies coupled with studies such as Healy (1997) and Metzler (2003) above, which investigated the effects of deer on plant numbers and diversity, have led some states to focus on ecological goals for deer management. For example, the State of Virginia has identified 25 deer/mi^2 (9.7/km^2) as an ideal carrying capacity (Knox, 1997) and Pennsylvania has set a deer density goal of 12-21 deer/mi^2 (4.6-8.1/km^2) (Palmer et al., 1997).

Additional Findings

Kilpatrick's findings allow us to estimate that there could be as many as 3,000 deer in Greenwich. As adult deer eat between five and ten pounds of forage every day, this means that deer are consuming approximately 15 tons of vegetation daily which explains the lack of forest under story in much of the town. As noted by Shono (2003) adult female white-tailed deer produce one or two fawns annually. In the absence of natural predation, this means the population can double in two to three years.

Kilpatrick also found that deer in Greenwich, as elsewhere, are homebodies and range, on average, over an area of 220 acres. Most in fact stay within a core area of only 30 acres. This has important implications with respect to management strategies.

Deer Management Strategies

In recent times, a number of strategies have been employed for controlling deer:

Limiting Deer Access

Historically, there have been a number of strategies employed for controlling deer. Most of these methods simply manage deer access to a particular site. Landowners often reduce or eliminate those things that attract deer, such as food, water, or cover. Managers and farmers have historically shifted crop species, quickly harvested apples or other fruits, or covered water sources – all to discourage deer. Landowners have reduced or eliminated access to certain areas by fencing. Indeed many town residents now fence their property so that deer are excluded. While fencing can be an effective way to control deer access, there are some drawbacks. Most importantly, fencing does not immediately reduce deer herd size; rather, it displaces deer onto other properties. Fencing may inhibit access to properties for emergency response and also channels deer movement onto roadways.

Although fencing and the elimination of attractions are two valid strategies for managing deer access to property, they do not address the real issue of over-abundance of deer. There are four widely recognized management strategies for reducing deer heard size: predator introduction, relocation, hunting, and birth control.

Natural Predators

The oldest 'strategy' for controlling a prey population, is of course Mother Nature's. This is the maintenance of an adequate predator population. In some parts of the country, natural predators are effective in controlling deer herd size. However, large predators no longer roam in Greenwich and re-introducing cougars or other large mammals in a suburban environment is certainly inappropriate.

Trapping and Relocating

The concept of trapping and relocating "surplus" deer appeals to many, however the logistics and costs of such an initiative present problems. Costs can range from $400 upward per animal, but more critically there are no suitable places for deer to be relocated to and released. At this time there are no known local or state jurisdictions that will accept relocated deer.

Further, even if a jurisdiction eventually offered to accept surplus deer, the DEP notes that "studies have shown that about half of all deer trapped and relocated die from capture-related stress and from wandering extensive distances after release, resulting in road mortality" (Department of Environmental Protection, CT, 2003).

Hunting

Hunting is currently the most cost-effective and widely used strategy employed to manage populations of white-tailed deer. In more rural regions of the state where hunting is common, the level and number of problems associated with an over-abundant deer population are negligible. As is the standard across the nation, the state (through the Department of Environmental Protection) regulates hunting. In Connecticut, deer may be taken with certain firearms or bows as defined in Connecticut hunting regulations. However, in densely populated Greenwich, bow hunting accounts for between 85 and 98 percent of the deer harvest. This is because firearms may not be used within 500 feet of a structure with no such requirements for bow hunting.

Birth Control

The newest strategy in population control is birth control (see review in Shono, 2003). Most frequently employed to date are the sterilization of individual females within a population, and immunocontraception. The first technique involves capturing animals, surgery resulting in permanent sterilization and subsequent population monitoring. This technique is still in the early stages of field-testing in New York and Connecticut. The second strategy is the use of immunocontraceptive drugs. Such programs also necessitate long term monitoring of a population and an annual or semi-annual administration of a temporary immunocontraceptive drug to specific does.

To date, immunocontraceptive programs are still considered experimental, and research has been largely limited to captive or essentially isolated deer herds. Programs are underway using immunocontraceptives to control wild ponies on Assateague Island, deer on Fire Island, NY, and, previously, the deer population on Long Point in Groton. While this strategy appears to have some promise and the Conservation Commission will closely follow research and work in this area, the use of drugs on wildlife to regulate birth control has not been approved by the United States Food & Drug Administration (FDA) at this time. Foremost the FDA has not approved any contraceptive agent for 'commercial' use because of the potential for birth control drugs to enter the food chain and ultimately contaminate the human food supply. In addition, there are concerns over the efficacy of birth control in non-isolated populations such as in Greenwich. While research will be expanded in the near future, it is estimated that a commercially available contraceptive vaccine will not be on the market for 6-7 years (Kilpatrick, personal communication).

In addition to birth control still being experimental and unavailable, costs for immunocontraceptive programs vary widely; both as a function of real costs, accounting methods, and the fact that marginal costs inevitably increase for 'capturing' the last deer. In other words, while trying to administer a dose to the first deer, any doe will do. Trying to dose the final deer may be extra-ordinarily time consuming. Generally though, estimates range between $500/deer (Groton) and $664/deer (Fire Island) for essentially captive herds.

It should also be noted that while sterilization and immunocontraception can hold a population steady, they do not reduce populations per se. Reduction takes place by attrition as deer die off as a result of old age, disease or accident

Greenwich Homeowners' and Hunters' Attitudes to Deer Management

In 2002, Kilpatrick conducted a homeowner survey in Greenwich. The survey was mailed to three hundred and ninety randomly selected homeowners, and all sixty-six homeowners owning property of 12 acres or more. Sixty-three percent of the randomly selected homeowners contacted completed the survey, and sixty-six percent of the large landowners responded. Results of the survey show that 74% of residents support lethal control of deer. If given an option, 79% would prefer non-lethal methods of control, however, they did not prefer non-lethal controls when there were substantial costs involved. In addition, not only is cost a major factor but so is time. Most residents would like immediate relief from deer issues and expect to see results from any town program within three to five years.

Residents did prefer bow hunting to sharp shooting, but again understood that sharp shooting might be appropriate in certain locations. This is important, as bow hunting is the predominant means of hunting in town. Among *all* respondents, only 10% allowed hunting on their property, but when the responses were filtered to reflect solely backcountry residents, then 44% allowed hunting.

When the percent of respondents permitting hunting and the size of their lots is averaged, then effectively 26% of the land in Greenwich is accessible to hunters. Of note is that the nine golf courses were surveyed and all responded. Only 4 of the 9 reported experiencing problems with deer, and while one course allowed hunting and one expressed interest, seven stated they had no interest in permitting hunting.

Kilpatrick also surveyed the deer hunters in town. He felt that a survey of the bow hunters was needed in order to understand the issues associated with hunting as a management strategy. In particular he was interested in how the take per hunter might be increased. Greenwich is fortunate in that 62% of the bow hunters have over 6 years of experience and 35% have over 10 years experience. Only 9% of the hunters were 22-33 years old, 64% were 34-48 and 27% were older. There were no hunters under age 21. This indicates an experienced but older bow hunting population, a fact that might be a concern for long-term management.

The bow hunters in Greenwich did express concerns themselves about how to recover deer when hunting on small lots and also about the attitudes of neighbors. When asked about how one might help increase the hunters' annual take, 99% of the hunters would like to expand hunting to include Sundays and 69% were in favor of an incentive buck tag program (that is in return for taking additional does, they would get a permit to take an additional buck).

Kilpatrick's Recommendations for Deer Management in Greenwich

Based on this information, in May 2004, Howard Kilpatrick presented to the Conservation Commission the following preliminary recommendations:

- Identify all large landowners in Greenwich (parks, golf courses, water company, private) for deer management.
- Initiate deer management on town-owned land.
  - Lead by example
  - Bow hunting as minimum, but know that sharp shooting may be appropriate in some areas.
  - Focus on largest areas
- Continue Public Education
  - About impacts of deer.
  - About management options and chosen strategy.

Greenwich Conservation Commission's Recommendations

Subsequent to presentations by Kilpatrick to the Conservation Commission, and after additional research and discussion, the Conservation Commission reached a consensus to support the preliminary recommendations made by Kilpatrick. The Commission firmly believes that for reasons of public health and safety and for the retention of the town's ecological heritage and biodiversity, the town's deer population must be drastically reduced in size and that a long-range deer management plan should be implemented which includes population management, monitoring and assessment, and education/outreach. It is the Conservation Commission's belief that the most cost-effective, morally defensible, and operationally practical population management program would involve two phases: 1) immediate herd reduction by increased hunting within the hunting regulations and/or culling of the herd by means of managed sharp shooting on both public and private lands; and 2) long-term population management through hunting (and/or birth-control when and if it gets state and federal approval). Specifically, the first phase would begin this year, with a goal of reaching a deer herd size of less than 26/mi^2 across Town within three to five years. The second phase would begin once an acceptable herd size is realized.

In order to gauge the effectiveness of the population control strategies in Greenwich, studies measuring key indicators such as recovery of vegetation/biodiversity, and decline in Lyme disease and deer caused traffic accidents should be implemented as an integral part of the plan. In addition, an ongoing education/outreach program about the natural history of deer and the need for deer management will be put in place.

Specific Recommendations to consider in the plan:

- Reduce Greenwich's deer population to an environmentally and socially acceptable size estimated at less than 26 deer per square mile within three to five years. Undertake census periodically to monitor herd size.
- Encourage private landowners in town to open their properties to hunting.
- Take the lead by opening up appropriate town-owned parcels to controlled hunting and actively work with other large landowners (golf courses, water company) to encourage the same.
- Encourage local hunting associations: 1) to recruit new members in order to broaden their pool, and 2) to promote high standard with regards to safety, humane techniques, and proficiency among all its members.
- Help local hunting associations by providing limited but critical operational and financial support that would directly encourage hunters to increase their take (i.e., providing coolers, underwriting transport and preparation of carcasses). Encourage hunters' participation in the Hunters for the Hungry program.
- Support legislative or regulatory changes that will affect key deer management regulations needed to achieve goals.
- Put in place an ongoing education/outreach program about the natural history of deer, the need for deer management and management updates.
- Continue to work with other jurisdictions in the area, such as through the Fairfield County Municipal Deer Management Alliance, to help coordinate a regional approach to deer management.
- Continue to look out for, and monitor progress in, management strategies alternative to hunting.
- Monitor effectiveness of the deer management program by carrying out studies measuring recovery of vegetation diversity and structure in woodlands, and changes in the incidence of Lyme disease and deer related traffic accidents.
- Continue to work with Howard Kilpatrick, DEP, UCONN, and other outside experts in order to obtain advice for Greenwich regarding its efforts.
- Budget the financial resources necessary for a long-term deer management strategy; including research, monitoring, hunter support, and an education campaign.

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