

A Plan to Manage White Tail Deer

The problem with white tail deer has been the subject of discussion in many communities throughout New Jersey. This midterm letter offers a thorough review of the strategies that have been used to reduce and control deer herds. Based on the successes shown in other models, the plan section nicely balances concerns for both humans and deer in one community.

[Address withheld]

October 12, 2000

Mr. Bob McDowell, Director
New Jersey Division of Fish and Wildlife
P.O. Box 400
Trenton, New Jersey 08625-0400

Re: Measures for Deer Population Management in Bridgewater Township

Dear Mr. McDowell:

At this point in time your organization's mission "to protect and manage the state's fish and wildlife resources to maximize their long-term economic, recreational, and biological values for the citizens of New Jersey" is being challenged with the excessive white-tailed deer population that exists in Bridgewater Township. The solution to the deer population problem lies in adherence to your agency's goal to "maintain species diversity and optimum density of the state's fish and wildlife populations." My research indicates that the use of contraception in female deer can aid in the reduction of the population to their optimum density.

The Problem

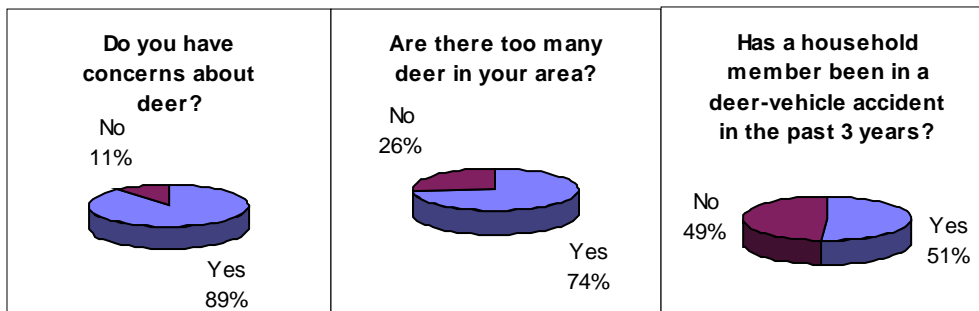
The estimated carrying capacity of an oak forest habitat is in the range of 10 deer/km² (Sams, Lochmiller, Qualls, & Leslie, 1998). The conditions that exist in the majority of Bridgewater Township can be loosely translated as an oak forest habitat. According to the latest published numbers, the deer population in the township is estimated as at least 1,600 deer in the township's 33 square miles (Needham, 1999A). This population density corresponds to at least 19 deer/km² which is almost double the carrying capacity of the habitat. In arriving at the calculated density figure the assumption was made that the deer population is evenly spread over the entire township. Unfortunately, this assumption is not realistic. In reality certain portions of the township may be experiencing deer population densities that are in excess of three times the carrying capacity of the habitat.

The Human Factor

The excessive deer population has taken its toll on the citizens of the township. The increase in deer population has brought a rise in the cases of Lyme disease, which is an inadvertent infection of humans with an animal pathogen (Barbour, 1993). The carrier of this disease is the *Ixodes scapularis* tick for which the deer serve as host. Over the past ten years New Jersey has risen to 4th in the nation in number of reported cases of Lyme disease (Kaplan, 2000). Residents of the township fear for their safety from this potentially debilitating disease. One resident was quoted in the local paper as saying “I have children all around me that can’t play in the backyard. If I get sick or hurt by one of these deer, I’m coming after the township.” (Morella, 2000).

In a study conducted last year at the Flemington Fair, the following attitudes toward deer and deer populations were reported (Needham, 1999B):

Figures 1-3: Deer Attitudes in NJ



Although these figures are not specific to Bridgewater Township, they are representative of attitudes in New Jersey. The problem of deer overpopulation is not unique to Bridgewater Township. It is a problem that persists in much of the state and is impacting the quality of life for residents.

The Deer Factor

In addition to the impact the overpopulation has on human residents, it also has negative effects on the deer residents of the township. Over the past twenty years the portion of the township inhabited by humans has drastically increased. This leaves less and less acreage for the deer to inhabit and decreases their quality of life.

In a study done by Leberg and Smith (1993), the effects of deer population density on deer growth were explored. It was determined that when densities are high enough to reduce the quality or abundance of food, the growth, fecundity, and survival of deer are decreased. Leberg and Smith (1993) determined that most especially for males, as population density increased the length of growth period increased and the asymptotic mass decreased. Sams et al. (1998) conducted a similar study into the effects of population density on deer herds. Their findings were in agreement with Leberg and

Smith (1993). This study concluded that high-density populations suffered from nutrient deficiencies, increased parasitism, and presumably social stress. These factors have a negative impact on growth as well as the survival of the herd. The incidence of tick infections with the Lyme disease tick was increased in the high-density herd studied by Sams et al. (1998) and led to a higher mortality rate in fawns.

Understanding the Problem

Sams et al. (1998) state that “understanding the relationship between density and environment is essential for successful management of white-tailed deer herds.” An understanding of this relationship can be found through literature review. Gill, Thomas, and Stocker (1997) state that “the reliability of deer population management could be improved with good density estimates.” The only unknown factor for the successful management of the herd in Bridgewater Township is an accurate estimate of density throughout the entire township. Previously reported numbers were merely rough estimates.

Gill et al. (1997) conducted a study on the use of portable thermal imaging for estimating deer population density. The findings of the study included the fact that many more deer could be determined through the use of thermal imaging at night as compared to roadside counts in daylight. It was also determined that the use of thermal imaging created little disturbance to the deer. The accuracy of the deer densities determined using thermal imaging was fairly accurate when compared to population models.

Methods of Control

One of the first methods of deer management explored was the use of hunting. This method was quickly dismissed. The reasons for dismissal included the need for strict safety regulations as well as lawsuits raised by animal rights activists (Thompson, 2000; Tucker, 1999).

The focus has shifted to more animal-friendly methods of deer population management such as contraception. A study conducted by Seagle and Close (1996) used the GAPPS II individual-based population simulation system to model the effects of contraceptive rates and immigration on deer herds. It was determined that population management programs using contraception delivery rates below 50% may be ineffective at either curbing growth or decreasing population size even at low levels of immigration. An inoculation rate above 50% would be needed to effectively manage the deer population at an optimum level.

Types of Contraception

Over the past ten years several types of drugs have been explored for use as deer contraception. Among the drugs explored were porcine zonae pellucidae (PZP), melengestrol acetate (MGA), and levonorgestrel (LNG). Several studies have been conducted to determine the best choice for deer contraception.

White, Warren, and Fayrer-Hosken (1994) conducted a study that focused primarily on the use of LNG rods implanted in deer. The conclusions were that LNG was not effective as a deer contraceptive at the levels tested with three of the five adult females implanted becoming pregnant the first year. The study went on to conclude that the use of LNG also carried health problems in deer such as voluntary reduced food consumption. Plotka and Seal (1989), comparing the use of LNG and MGA, also concluded that LNG was ineffective for deer contraception. This same study indicated that MGA was successful in preventing pregnancy for up to two years. However, MGA had adverse effects on does implanted mid-pregnancy. Only one of five implanted does delivered a live fawn. Considering the fact that a goal of deer contraception is to not interfere with already pregnant does, MGA does not prove to be a valid choice for contraception.

PZP thus far has proven to be the contraceptive of choice for deer. It works by inhibiting fertilization through the blockage of sperm binding sites on the ovum by anti-PZP antibodies (Turner, Kirkpatrick, & Liu, 1996). In the study conducted by Turner et al. (1996) PZP was administered in three methods. None of the does that received the first method of three separate PZP injections produced a fawn in the first year. The same was found for does that received the second method of two separate injections. The third method was a single injection along with implantation of a minipump designed for continuous release. Of the single injection fawns 20% reproduced the first year. In the second reproductive season there was little difference between the control does and treated does in reproductive rates. This finding by Turner et al. (1996) indicates the reversibility of PZP as a contraceptive.

A similar study into the possibility of PZP as a deer contraceptive was conducted by McShea et al. (1997). The results of this study were similar with no offspring production the first year in the two dose group and 78% of the one dose group reproducing. In the second year a booster was given to the one dose group which reduced reproduction rates to 22%. Again the study determined that a one dose method of administering PZP was ineffective as contraception in deer. The two dose method proved to be effective for up to two years.

Research indicates that PZP administered in a two dose method is most effective for use as contraception in deer herds. The PZP did not pose risk to does when administered mid-pregnancy. The methods used in the studies by McShea et al. (1997) and Turner et al. (1996) showed no adverse reaction by the does. The does appeared to be in good physical condition and no differences in breeding were observed between treated and

untreated does (Turner et al., 1996). McShea et al. (1997) did observe that the treated does were more active and bred for a longer cycle.

The Plan

Based upon my research, I propose a two-fold plan for deer population management in Bridgewater Township. The first phase is to accurately determine the extent of the problem. The second phase is to implement a strategy to reduce the deer herd to an optimum level.

For the first phase I call upon the research reported by Gill et al. (1997). The use of portable thermal imaging proved useful in obtaining a fairly accurate estimate of deer population density. The assertion was made that this type of count was only valuable in areas where the deer have become accustomed to human interaction and thus have become quite tame.

With an accurate estimate of deer density, phase two can be implemented. This phase consists of the use of PZP as contraceptive in female deer. PZP was chosen since it has proven most reliable and exhibits no adverse reactions by does (McShea et al., 1997; Turner et al., 1996). The most challenging portion of phase two is determining the number of does to be injected and how often to inject. An inoculation rate of greater than 50% has been suggested in an effort to obtain results in a reasonable amount of time (Seagle & Close, 1996). A several-injection method consisting of two injections has proven most effective when compared with single injections or pump implantation (McShea et al., 1997; Turner et al., 1996).

According to reports in the local paper, Bridgewater Township is in the process of determining the need for an Animal Control Office (Yang, 1999). It is obvious that there is a need for animal control as shown by the excessive deer population. The establishment of an office for this purpose is a logical move. The new office can be merged with the already existent Wildlife Management Advisory Committee that was formed in November 1999 (Morella, 2000). The combined office should consist of the volunteers from the Wildlife Management Committee along with trained professionals who are familiar with deer population management procedures. The staff of the animal control office should be well able to implement the deer management plan proposed for the township.

This deer management plan has all the elements of a successful plan as outlined through research. The deer benefit from a more abundant and high quality diet due to less competition for food. The deer will experience less parasitic infections and a lower mortality rate (Sams et al., 1998). The decrease in deer population will help restore the quality of life for residents as well. A successful deer management plan has been proven to aide in the reduction of Lyme disease (Barbour & Fish, 1993).

In the End

I hope that at this point you have a better understanding of the deer population problem in Bridgewater Township and. On November 13, 2000 I will be giving an oral presentation concerning this issue in room 324 of Hickman Hall at Rutgers University. I would like to invite you to be in attendance. If you have any questions or need directions, please contact me at the above address. Thank you for your attention to this matter.

Sincerely,

Name deleted at request of student

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