

**WHITE-TAILED DEER MANAGEMENT PROGRAM
2010 SUMMARY REPORT**

**WALLENPAUPACK LAKE ESTATES
PAUPACK TOWNSHIP, WAYNE COUNTY, PENNSYLVANIA**

prepared by

**U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Wildlife Services**

**Willard L. Wenner, Wildlife Biologist
Taylor, Pennsylvania**

**Gino J. D'Angelo, Wildlife Biologist
New Britain, Pennsylvania**

August 10, 2010



INTRODUCTION AND BACKGROUND

Wallenpaupack Lake Estates (WLE) is an approximately 900-acre community in Paupack Township located approximately 6 miles east of Hamlin, Wayne County, Pennsylvania. Currently, 1,365 homes exist in WLE on lots averaging one-third of an acre in area. Development of an additional 275 homes is expected in the future. Ordinances were enacted to prohibit hunting in any form on the property when WLE was incorporated in 1971. Reports by residents suggest that the population of white-tailed deer utilizing the property has increased substantially since establishment of the community. Deer have become acclimated to human activity and are commonly encountered along roadsides and near residences seeking food handouts. Within the last 15 years, residents began to complain that overabundant deer prohibited plantings of landscape vegetation. Non-lethal techniques to prevent browsing by deer other than fencing (e.g., repellents, harassment, deterrents) are ineffective because of high deer densities and because deer lack fear of humans. In 2005, an ordinance was enacted to prohibit feeding of deer with provisions for violators to be fined. Residents, mainly laypersons of ecological sciences, recognized that browsing by deer within WLE was preventing natural regeneration within forested areas as evidenced by browse lines. Many residents complain of ticks and the threat of infections of Lyme Disease. Deer-vehicle collisions are rare within the community because of low speed limits and awareness of residents that deer frequent the roadways. However, on state-owned Goose Pond Road, a public thoroughfare bordering WLE, deer-vehicle collisions are common.

USDA APHIS Wildlife Services (WS) was consulted in 2008 by WLE to initiate an integrated white-tailed deer damage management program to reduce damage to forest regeneration, property, and human health and safety. WS recommended determining baseline deer density data prior to discussing detailed management options. Subsequently, WLE requested that WS conduct three deer density surveys during the fall, winter, and spring of 2007-2008. Based on the information collected from the density surveys, the average deer density for WLE was estimated to be 140 deer per square mile. WS determined that a harvest through hunting and/or sharpshooting on WLE would be required in future years to reduce the deer density, and subsequently, reduce deer damage consistent with the goals of WLE.

WS recommended a sharpshooting program to reduce deer damage in a reasonable time frame on the majority of the property. WLE applied to the Pennsylvania Game Commission (PGC) for a municipal deer control permit and requested WS personnel as subpermittees. Based on financial and logistical constraints voiced by WLE, the goal during the first year of management was to reduce the local deer density by 120 deer. WS conducted a lethal deer removal operation during January 2009 and removed 121 deer from WLE.

METHODS

Population Surveys.—Population surveys were conducted to determine deer densities relative to the goals of WLE prior to implementing a deer management program. Surveys were conducted by establishing an evenly distributed 9.3 mile survey route throughout WLE that traversed the majority of the community. WS procured an

aerial photograph of the community, overlaid a geo-referenced 500 meter grid system, and downloaded the survey route from a Global Positioning System unit onto the map (Figure 1).

Survey teams consisted of a driver, data recorder, and two observers in the back of a mobile truck. Surveys were initiated after sunset and concluded at approximately 10:00 PM. Deer observations were conducted utilizing FLIR units, spotlights, and binoculars. Observers recorded number of deer, deer locations (referenced by grid quadrant), distance deer were from the closest point on the survey route, time, behavior, gender, and age class. The survey vehicle moved at approximately 8 to 12 miles per hour, stopping only to accurately record data or for traffic considerations.

Survey data was entered into a WS deer density database that determines area surveyed by factoring the survey route distance and the distance deer were observed from the closest point on the survey route. The database then calculates average observation distances, area surveyed (square miles), deer density estimates (deer per square mile), and buck to doe ratios.

It should be noted that individual surveys are snapshots of the deer herd on one particular night. There are many factors affecting deer observations that must be considered when analyzing data. Weather conditions, seasonal movements, and hunting pressure can increase or decrease deer observations on any one night. This data represents trends more than actual densities or population estimates.

Removal of White-tailed Deer.—WS conducted deer removal activities based upon a protocol that was established by the collaborative effort of WLE, the PGC, and WS through a Special Use Permit (NO 07-2010) issued directly to WLE by the PGC. All deer were removed from mobile units. A mobile unit consisted of two WS employees in the back of a truck, one acted as the shooter and one as the spotter. One WLE employee or one WS employee was utilized as a driver and data recorder. Bait sites were placed to draw deer out of dense cover and into common areas to position them for safe shooting. Shooting was conducted with sound-suppressed rifles of two calibers (.223 and .243).

WS utilized a hand-held Forward Looking Infra-red (FLIR) unit to locate and observe deer in complete darkness. These capabilities also further enhanced WS' ability to ensure safe removal operations by detecting people, non-target animals, rocks, and homes located on the property. Nighttime shots were taken using spotlights with filtered light.

Antlerless deer were targeted first. Antlered deer were not selected for removal when they could be distinguished. Remaining deer were removed on a first opportunity basis provided safe shots could be taken. Adult does were targeted when more than one deer was present.

Collection of Biological Data.—Individual deer removed were recorded on data sheets along with their gender, age, time, weight and location. Ages of deer were determined by evaluating tooth wear and replacement to one-half years.

To obtain baseline data on the health of deer at WLE, WS collected information on weight, fat reserves and reproduction of each deer that was removed. Physiological data provide indices to track the health of deer and their balance with the habitat (habitat provides food resources) as deer densities change throughout a management program.

Although baseline data taken during the first year of a management program provides some clues to the health of a deer herd, physiological data are most useful when compared over several years of differing deer densities.

Comparisons of body weights of deer within age and gender classes provide an index of the balance between deer and their habitat. Habitats with greater nutritional resources allow deer to build greater body mass and fat reserves. Deer were weighed at the end of each night and prior to evisceration.

Analysis of the deposition and retention of fat reserves in deer gives an indication of their health and nutrition, especially their preparedness to survive winter. WS selected two fat indices commonly used as physiological gauges of health: 1) Kidney Fat Index, and 2) Tail Fat Score. As deer accumulate surplus nutrition, fat reserves are deposited first around the internal organs (e.g., around the kidneys), next along the inside of the body cavity and finally between the muscle and skin (e.g., along the tail). Fat reserves are used opposite the order of deposition when food resources are limiting.

Tail Fat was scored by palpation at the base of the tail on a scale from 0 to 3. A score of 0 represented no fat under the skin with the bones of the tail readily felt. A score of 3 represented ample fat reserves so that no muscle or bone was readily felt.

To obtain Kidney Fat Index, one kidney was selected randomly from each deer and removed whole with fat attached. Kidney fat index was determined by dividing the mass of the fat surrounding the kidney by the mass of the bare kidney and times 100.

Uteri of female deer were inspected for the presence of fetuses. Fetuses were removed, sexed and aged in estimated days to birth using a fetal aging scale.

Samples of whole blood were collected by WS for external research of blood-borne diseases and DNA by East Stroudsburg University. These samples were used for broader studies and were not taken because disease was suspected in WLE deer.

RESULTS

Deer Surveys.—WS conducted two surveys prior to the start of removal operations to set a target number of deer to be removed (Figures 1-3). Survey 1 was conducted on 14 October 2009 and survey 2 was conducted on 16 November 2009. The average deer density was calculated as 105.6 (Standard Deviation = 14) deer per square mile. It was estimated that approximately 148 deer utilized WLE property. Therefore, the target for deer removal was 78 deer to achieve the goal of 50 deer per square mile.

Deer Removal Operations.—Deer removal operations consisted of 8 nights of operation from January 11, 2010 to February 19, 2010 (Table 1). WS lethally removed a total of 79 deer from WLE during 2010 (Figure 4) to achieve the goal of leaving a residual population of approximately 50 deer per square mile. Removal locations of deer were concentrated in the area of Marina Drive, around Beaver Lake, and near the Main Clubhouse. WS utilized 15 independent locations for bait sites where deer could be observed and safely removed.

Most deer were picked up directly from WLE by the processor and donated for charitable food distribution. Approximately 2,765 pounds of venison were distributed for charitable food distribution through the Wayne County food banks.

Table 1. USDA APHIS Wildlife Services white-tailed deer removal dates for Wallenpaupack Lake Estates, Lake Ariel, PA from January 11, 2010 - February 19, 2010.

Deer Removal Operations	
January 11-12:	9:30 PM – 2:30 AM
January 12-13:	9:30 PM – 2:30 AM
January 13-14:	9:30 PM – 2:30 AM
January 14-15:	9:00 PM – 3:00 AM
February 8-9:	9:30 PM – 3:30 AM
February 9-10:	9:00 PM – 1:30 AM
February 17-18:	9:00 PM – 4:00 AM
February 18-19:	9:00 PM – 3:00 AM

Deer Biological Data.– Of the 79 deer removed by WS, 54% were adult females, 41% were juveniles less than 1 year old, and 5% were adult males (Figure 5). These proportions did not differ substantially from deer removed during 2009. Also, the age distribution of female deer removed in 2009 and 2010 was strikingly similar. The health of deer removed during 2010 was improved from those studied during 2009 (Table 2). While only slight increases in body weights were detected within age and gender classifications, fat reserves were markedly increased.

WS examined the reproductive tracts of 58 female deer for the presence of fetuses. No female deer less than 1 years-old carried a fetus at the time of removal. Ninety-five percent (94% in 2009) of does older than 1.5-years old carried fetuses at an average of 1.68 fetuses per doe (1.33 fetuses per doe in 2009). Fifty-four percent (37% in 2009) of adult does carried twins, and three adult does carried triplets (one in 2009). Fetal age was estimated for fetuses from 59 does. These data indicated that the average date that fawns would be born was 25 May 2010 (same as 2009) with 95% being born between 09 May and 09 June 2010. Using an average length of gestation of 200 days, these data suggested that peak breeding occurred on or about 06 November 2009 (same as 2008).

DISCUSSION

The age structure of deer removed from WLE during 2010 was skewed toward older age classes as was observed in 2009. This corroborates that the population remained at high densities following the deer removal operation conducted in 2009. Otherwise, the population would have been composed mostly of young individuals resulting from reproduction and immigration by young deer dispersing from their native range. WS recommended a population reduction of a minimum of 225 deer in fall through winter 2008-2009. However, financial and logistical constraints of WLE precluded such an extensive removal effort during the first year of the program. Therefore, the higher deer density estimate of 105.6 deer per square mile derived before deer removal operations began in 2010 was expected. Still, WLE administration expressed concerns about reducing the deer population to the target density of 20 deer per square mile, which was mutually agreed upon by WLE and WS prior to initiation of the

deer damage management program. These concerns stemmed from consultation between WLE and neighboring property owners and between WLE administration and some residents of WLE who preferred to see deer more regularly. Therefore, WS targeted a residual deer density of 50 deer per square mile after deer removal operations in 2010.

WS reduced the deer population by 56 deer per square mile by removing 79 deer on 1.4 square miles of WLE property. The residual deer herd was approximately 50 deer per square mile or 69 individual deer remaining on WLE. To maintain this level of deer population density, approximately 30% of the population will need to be removed annually to compensate for reproduction and immigration. Population surveys should be conducted each year to set goals for population reduction and maintenance.

The lowered deer densities achieved in early 2009 appeared to nutritionally benefit the deer herd in WLE. Fat reserves improved drastically, which enables deer to better survive Winter. Further, deer that are less stressed by Winter stave off parasite loads and demonstrate improved reproduction as evidenced by the greater number of fetuses per doe observed in WLE during 2010.

As a community, WLE should discuss further reducing deer densities toward a goal of 20 deer per square mile. While benefits will be observed at 50 deer per square versus the 140 deer per square mile observed by WS in WLE during 2007, the condition of the habitat is not likely to improve drastically. Research has demonstrated that deer densities must be less than 10 deer per square mile to fully stimulate forest regeneration. Improved habitat not only benefits deer, but also other wildlife species, the forest, water resources and improves the natural aesthetic of communities.

As part of the deer control permit, WLE is bound to enforce a strict no feeding of wildlife policy. Supplemental feeding should be eliminated in WLE. Deer require a well-balanced diet of plants rich in vitamins and minerals. Corn and other artificial food sources are highly used by deer in the absence of adequate natural forage, however these foods are not easily digested by deer. Supplemental feeding creates reliance of deer on humans, and may increase transmission of diseases at feeding sites. A deer herd in balance with its habitat promotes proper health of deer and the forest ecosystem.

Also as part of the deer control permit, WLE must provide opportunities for some form of sport-hunting for deer to occur on the property. WS has in past recommended that archery hunting be allowed in the area of the ski slope and the baseball field. Prior to WS applying for future deer control permits on behalf of WLE, WLE must show documentation of an active sport-hunting program on the property. WLE should consult with the local Wildlife Conservation Officer from the Pennsylvania Game Commission to establish such a program.

RECOMMENDATIONS

- Establish recreational hunting and using the DMAP program. Hunting should be implemented to the fullest extent possible where it can be conducted safely.
- Aggressively enforce the ordinance which prohibits feeding of deer.
- Continue to educate residents about deer management and biology. Provide information about the negative effects of supplemental feeding of deer. Utilize non-lethal techniques to reduce damage by deer to landscape plants. Monitor the effects of deer on forested areas. Call upon WS to assist with educational materials and programs.
- Continue deer density surveys in Fall 2010. Initiate deer removal if deer densities warrant action be taken. It is expected that annual deer removal operations will be necessary to maintain the population.

ACKNOWLEDGEMENTS

Wildlife Services would like to thank John Carney, Norman “Rocky” Kizer, Brian Schan and their staff for their outstanding contributions to a safe and efficient project.

Table 2. Biological data for 200 white-tailed deer removed via sharpshooting by USDA APHIS Wildlife Services in Wallenpaupack Lake Estates, Paupack Township, PA during 2009-2010.

Age (years)	Gender	Number		Average Weight (lbs.)		Average Kidney Fat Index		Average Tail Fat Score	
		2009	2010	2009	2010	2009	2010	2009	2010
0.5	Female	25	15	63.3 (10) ^b	65.7 (10)	103.6 (41)	138.6 (127)	1.1	1.3
1.5+	Female	63 ^a	43	113.8 (16)	115.3 (10)	132.7 (64)	195.3 (92)	2.2	2.2
0.5	Male	21	17	73.9 (12)	75.2 (8)	95.0 (40)	100.1 (51)	0.5	1.4
1.5+	Male	11	4	109.3 (13)	131.0 (19)	101.8 (42)	50.9 (4)	1.4	1.5

^a One adult female during 2009 was removed from analyses due to poor health and malnutrition.

^b Numbers in parentheses denote standard deviation, the variance of the data relative to the average.

Figure 1. Standardized route used by USDA APHIS Wildlife Services to survey white-tailed deer by infrared camera in Wallenpaupack Lake Estates, Paupack Township, PA during fall 2010.



Figure 2. Locations by grid quadrant of white-tailed deer surveyed by infrared camera by USDA APHIS Wildlife Services in Wallenpaupack Lake Estates, Paupack Township, PA on October 14, 2009.



Figure 3. Locations by grid quadrant of white-tailed deer surveyed by infrared camera by USDA APHIS Wildlife Services in Wallenpaupack Lake Estates, Paupack Township, PA on November 16, 2009.



Figure 4. Locations by grid quadrant of white-tailed deer removed via sharpshooting by USDA APHIS Wildlife Services in Wallenpaupack Lake Estates, Paupack Township, PA during January and February 2010.



Figure 5. Age distribution of female white-tailed deer removed via sharpshooting by USDA APHIS Wildlife Services in Wallenpaupack Lake Estates, Paupack Township, PA during 2009-2010.

