

**WHITE-TAILED DEER MANAGEMENT PROGRAM
2009 SUMMARY REPORT**

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

prepared by

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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.

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 04-2009) issued to Paupack Township by the PGC. Deer removal operations consisted of 6 nights from January 12, 2009 to January 28, 2009 (Table 1). All deer were removed from mobile units. A mobile unit consisted of two WS employees and one WLE employee, utilized as a driver. 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 lights.

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. 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.

Collection of Biological Data.—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 Removal Operations.—WS removed a total of 121 deer from WLE (Figure 2). The property was initially searched from approximately 11:00PM to 5:00AM as per the request of WLE. WS removed 16 deer during the first two nights of the project, before adjusting tactics. After the first two nights, WLE allowed WS to adjust the start time to better target peak deer activity. The final four removal nights began at approximately 9:00 PM. WS biologists requested that an additional WS employee assist with the project to prepare bait stations prior to the arrival of the mobile unit. The additional WS employee also monitored deer activity at bait stations throughout the night, allowing the mobile unit to specifically target the sites experiencing the most deer activity. After this adjustment, WS removed an additional 105 deer throughout the remainder of the project.

Removal locations were evenly distributed within WLE. WS identified 13 independent locations for bait sites where deer could be observed and safely removed. An average of 9 deer were removed from each site with the highest number removed from the area of the Beaver Lake docks (24). The southeastern section of WLE, between Deer Lake and Lake Wallenpaupack, lacked sufficient common areas to safely remove deer.

Most deer were picked up directly from WLE by the processor and donated for charitable food distribution. Four deer were retained by the PGC and one deer was not fit

for human consumption. Approximately 4,000 pounds of venison were distributed for charitable food distribution throughout the Wayne County food banks.

Table 1. USDA APHIS Wildlife Services white-tailed deer removal dates for Wallenpaupack Lake Estates, Paupack Township, PA from January 12, 2009 through January 28, 2009.

Deer Removal Operations

Jan. 12:	11:00 PM – 6:00 AM
Jan. 13:	11:00 PM – 6:00 AM
Jan. 14:	9:00 PM – 4:30 AM
Jan. 15:	9:00 PM – 4:00 AM
Jan. 26:	9:00 PM – 4:30 AM
Jan. 27:	9:00 PM – 5:00 AM

Deer Biological Data.—Of the 121 deer removed by WS, 53% were adult females, 38% were juveniles less than 1 year old, and 9% were adult males. Ages to the half year were estimated for all deer removed (Figure 3). Most deer were in fair health with normal body weights and adequate fat reserves for deer in the Pocono Plateau Region of Pennsylvania (Table 2). Malnutrition was noted in one adult female. This deer was behaviorally accommodated to humans and had no other obvious afflictions.

Table 2. Biological data for 121 white-tailed deer removed via sharpshooting by USDA APHIS Wildlife Services in Wallenpaupack Lake Estates, Paupack Township, PA from January 12, 2009 through January 28, 2009.

Age	Gender	No.	Average Weight (lbs.)	Average Kidney Fat Index	Average Tail Fat Score
0.5 years-old	Female	25	63.3 (9.9) ^b	103.6 (40.7)	1.1
1.5+ years-old	Female	63 ^a	113.8 (15.9)	132.7 (63.9)	2.2
0.5 years-old	Male	21	73.9 (11.9)	95.0 (40.0)	0.5
1.5+ years-old	Male	11	109.3 (13.4)	101.8 (42.0)	1.4

^a One adult female 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.

WS examined the reproductive tracts of 88 female deer for the presence of fetuses. Only one doe less than 1 year old carried a fetus. Ninety-four percent of does older than 1.5-years old carried fetuses at an average of 1.33 fetuses per doe. Thirty-seven percent of adult does carried twins, and one adult doe carried triplets. Fetal age

was estimated for fetuses from 59 does. These data indicated that the average date that fawns would be born was 25 May 2009 with 95% being born between 07 May and 12 June 2009. Using an average length of gestation of 200 days, these data suggested that peak breeding occurred on or about 06 November 2008.

Post-removal Population Survey.—WS conducted a post-removal survey on March 9, observing 58 deer along the established survey route (Figure 4). The survey yielded a deer density estimate of 105 deer per square mile. This estimate was below the average of 140 deer per square mile observed during the 2007-2008 season prior to deer removal activities. There was no buck to doe ratio calculated for the final survey because of the inability to differentiate between bucks and does due to the fact that most bucks had shed their antlers.

It is important to understand that Figures 2 and 4 give a graphic overall view of the deer removed and surveyed on WLE property. These figures do not represent exact locations of deer.

DISCUSSION

The age structure of deer removed from WLE was skewed toward older age classes. Thirty-seven percent of adult females were greater than 4 years old. Populations with a high number of does relative to bucks (e.g., greater than 6:1 in WLE) and with an older female age structure are symptomatic of herds that have not been managed for an extended period of time. It appears that sport hunting is having a negligible effect on the deer population utilizing WLE. Bucks are naturally pre-disposed to greater mortality than does because they range farther, are more sought after by hunters, and are more susceptible to deer-vehicle collisions when searching for mates during the fall breeding season. However, adult does and their offspring generally maintain consistent home ranges throughout the year in Pennsylvania. Therefore, the majority of deer utilizing WLE are not susceptible to harvest through sport hunting. To maintain lowered deer densities, an active management program will continue to be necessary.

The health of deer removed from WLE was fair. Most adult deer are achieving sufficient body condition to survive winter. Kidney Fat Indices near 100% indicate that the weight of fat surrounding the kidneys is at a 1:1 ratio with the weight of the kidneys. Fat reserves appear to be sufficient despite the poor quality of forested areas observed by WS. High fat reserves may suggest that food resources at the timing of fat deposition (fall) were seasonally abundant but not available in sufficient amounts to promote body growth or improved reproduction throughout the year. For example, the local acorn crop in fall 2008 may have been plentiful. Body weights of adult females over 100 pounds are acceptable, however average weights over 130 pounds are common in more appropriately managed herds. Reproduction is limited by the health condition of females. In properly managed herds, most does older than 1.5 years-old produce twins, however adult females in WLE carried an average of only 1.33 fetuses per doe. To be reproductively viable, female deer must be at least 6 months of age and 60 pounds in body weight. In deer populations where food resources are sufficient, over 80% of female fawns reproduce. Most females of this age class are bred by late December. Female fawns in WLE during

the January removal averaged 63 pounds in body weight and only one was bred. This suggests that these yearling females are not meeting the physiological requisites to successfully reproduce.

While adequate for survival, consistent food resources for deer appear to be limited in WLE. Deer are habitat generalists consuming the most nutritious plants and plant parts available in their habitats. They primarily eat forbs, such as clover and flowering plants, during the warm months of the growing season. In the fall and winter, deer rely on browse—twigs and buds of trees. When available, deer eat mast—acorns, other nuts and fruits, however mast may only be seasonally available and is not guaranteed to be produced each year. Forests lacking structure and diversity lack the elements of vegetation on which deer rely. Overabundant deer degrade the forest to the point in which few forbs are produced in the understory, the shrub and tree layer within reach of deer is eliminated, and seedling regeneration to replace mature trees is absent. This describes the condition of the forest in WLE. The lowered deer densities resulting from the deer management program should promote improvement of the forested habitat and resulting food resources for deer.

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.

Experience from deer management projects administered by WS in similar communities in the Poconos, suggests that maintaining deer densities near 20 deer per square mile over winter strikes a balance where damage by deer is minimized and adequate recreational viewing opportunities of deer are provided for residents. Deer population surveys in WLE indicated that densities averaged 140 deer per square mile in fall through spring of 2007-2008 and it was projected that the population would grow by 30% by fall 2008. Therefore 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. The goal was to reduce the local deer density by 120 deer to reduce deer damage and begin reduction in deer density.

Growth of the WLE deer population during 2009 will be determined by birth rates, immigration of deer from adjacent properties, mortality, and emigration of juvenile deer from WLE. Given known population factors of the WLE deer population, WS estimates that the population will be approximately 192 deer in fall 2009. Preliminarily, WS recommends removal of a minimum of 165 deer during fall/winter 2009-2010 to achieve an estimated density of 20 deer per square mile. However, pre-removal population surveys should be conducted to more accurately prescribe the number of deer that should be removed.

Once population goals are met, maintenance by lower intensity deer removal actions will continue to be necessary on an annual basis to suppress population growth. Since not all factors regulating changes in population density are known, standardized population surveys should continue to be part of the deer management program. Over

time, understanding of how the WLE deer population responds to management actions will be developed to better guide planning.

RECOMMENDATIONS

- Continue 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.
- Collaborate with properties neighboring WLE to share information on the deer management being conducted on your respective properties and to use this information to refine deer management across a broader scale. Sharing information on deer management will also help to dispel rumors about the deer management occurring on WLE.
- Continue deer removal in fall 2009. Conduct standardized pre-removal surveys to prescribe appropriate reduction of deer to target an over-winter population of 20 deer per square mile.
- Provide access to additional sites, which will enable safe removal of deer in a timely fashion across more of WLE. Encourage WLE residents to allow access to their properties for removal operations if their property is deemed appropriate by WS.
- Shift deer removal activities toward late fall and early winter. An earlier reduction in deer densities would reduce winter stress on remaining deer and the habitat.

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Figure 3. Age of deer harvested by WS at Wallenpaupack Lake Estates during the 2009 deer removal program.

