WHITE–TAILED DEER MANAGEMENT PLAN

SAW CREEK ESTATES COMMUNITY ASSOCIATION
BUSHKILL, PIKE COUNTY, PENNSYLVANIA

prepared by

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

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INTRODUCTION

Background

Saw Creek Estates (SCE) is an approximately 2,000–acre community located primarily in Lehman Township, approximately 2 miles northwest of Bushkill, Pike County, Pennsylvania. A small portion of the community is located in Middle Smithfield Township, Monroe County. There are approximately 2,700 homes present in SCE on lots ranging from one–quarter to one–half acre in area. Development of an estimated additional 200 homes is expected in the future. Recently, residents of SCE raised concerns that overabundant deer prohibited plantings of landscape vegetation. Non–lethal techniques to prevent browsing by deer other than fencing (e.g., repellents, harassment, deterrents) provided limited results because of high deer densities and because deer lacked fear of humans. Many residents recognized that browsing by deer within SCE was preventing natural regeneration within forested areas as evidenced by browse lines. Also, residents expressed concerns 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, 10 to 12 deer–vehicle collisions occur annually in SCE. In the past, SCE residents have complained of sick and/or injured deer, some of which may be a direct result of low speed vehicle collisions.

USDA APHIS Wildlife Services (WS) was initially consulted in March 2009 by SCE to develop a white–tailed deer damage management plan 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, SCE requested WS to conduct two deer density surveys during the fall of 2009. WS developed a deer management plan utilizing data from the surveys, as well as additional surveys conducted from 2011-2014. Based on the data collected since 2009, WS determined that a harvest through hunting and/or sharpshooting at SCE would be required in future years to reduce the deer density, and subsequently, reduce deer damage consistent with the goals of SCE.

In January 2015, WS initiated deer removal activities in SCE to begin efforts in reducing the local deer population to approximately 30 deer per square mile. It is important to note that deer removal activities did not take place in 2017 or 2020. The following includes program methodology, results, analysis, and recommendations throughout spring 2020.

Deer Biology

White–tailed deer are found in a variety of habitats throughout most of the United States, Canada, Mexico, Central America and northern South America. Deer almost exclusively consume plants. They have a highly specialized four–chambered stomach, which allows them to digest a wide variety of plant species. Deer choose the most nutritious plants and plant parts available. Deer thrive in areas with young vegetation, especially where the edges of several habitat types converge, such as the suburban/agricultural interface.

Adult white–tailed deer on average weigh between 100 and 300 pounds with males being larger than females. Bucks produce their first set of antlers during their second year of life. Females do not grow antlers. The basic social group is the doe family unit including an adult doe, and her offspring. Outside of the breeding season, or rut, males may form small herds known as bachelor groups. In Pennsylvania, deer breed in the fall, and most fawns are born in

late May and early June. Does generally produce 1 or 2 fawns each year. In ideal habitats, does may breed at approximately 6 months of age and some adult does may produce triplets.

Deer are crepuscular (primarily active near dawn and dusk), with their main movements occurring from daytime bedding areas to and from nighttime feeding locations. Bucks have larger home ranges than does, especially during the rut when bucks travel widely in search of mates. In Pennsylvania, deer home ranges average between 150 and 1,000 acres depending on the availability of local resources.

Winter months in Pennsylvania can be stressful for deer depending on the amount of snow fall, days with freezing temperatures, and availability of food (e.g., browse, mast crops, etc.). Deer populations are normally at their lowest just following the winter months, before birthing. The change in population size from year to year is defined as the growth rate, which is mainly driven by successful recruitment of young into the population.

Deer managers must balance the birth and death rates within a population to maintain herd health, reduce disease risks, protect ecosystems, and reduce damage. In natural settings deer populations eventually reach the biological carrying capacity, which is the point at which deer consume most of the available browse in an area. At this point, the population is unable to sustain growth and reproduction. Each habitat has a different biological carrying capacity, which is dynamic and may even change seasonally.

Although the biological carrying capacity is important to deer population dynamics, the social carrying capacity is more relevant in urban areas. The social carrying capacity is the level at which deer populations can coexist with the human population without negative impacts. Negative impacts on humans can include increased deer–vehicle collisions, deer damage to landscaping, biological damage, disease threats, and the emotional fear of interaction between the deer and humans. Deer populations can also experience negative impacts in urban settings including stress, trauma from encountering dogs, pools, large glass windows, vehicle traffic, and the lack of adequate habitat. Given these factors, the social carrying capacity may be lower or higher than the biological carrying capacity. It is important to understand that neither the biological or social carrying capacity is static.

History of Deer in Pennsylvania

It is estimated that white–tailed deer have been in existence for some 4.5 million years. Yet, with the exception of the Ice Ages, never before have deer populations seen such change in their habitat as those created by urbanization in the last several decades. Deer have adapted well to this change, and their numbers throughout the U.S. are estimated to be higher than at any other time in history. Today, highly developed woodland communities in Pennsylvania present an ideal combination of food resources, few natural predators, and sanctuary from hunting in close proximity to human development, which enabled the deer population to grow overabundant.

Within the last 10,000 years, growth of white–tailed deer populations was controlled by predators including wolves, mountain lions, and bears; natural mortality such as starvation and disease; and harvest by Native Americans. Deer were also limited by the productivity of their habitat. Prior to European settlement, much of southeastern Pennsylvania was virgin forests with few openings to offer deer young nutritious vegetation. Although Native Americans cultivated agricultural crops, it was documented that they reduced damage by deer through persistent harvest of deer in the vicinity of their crops and by non–lethal means including fencing.

Although it is difficult to determine at what densities deer historically occupied Pennsylvania, studies which have examined deer remains at Native American encampments suggest that deer densities were far lower than we see today–perhaps less than 10 deer per square mile. Even at presumably lower densities, deer were an important component of the Native American culture. Pennsylvania's founding father, William Penn, once noted that Native American men attained esteem among their tribesman "...by a good return of [deer] skins...".

By the turn of the 20th century in Pennsylvania and throughout much of its range, the white–tailed deer was nearly driven to extinction primarily by unregulated market hunting and habitat loss via commercial logging. The reestablishment of white–tailed deer populations has been regarded as one of the greatest successes in the history of wildlife conservation. In Pennsylvania restocking of deer began in 1906 and continued into the 1920's with deer relocated from areas within the State and from stock animals brought from other states including Virginia, Wisconsin, and Texas, among others. The population increase of deer was also enabled by the burgeoning growth of young forests after logging, with soft mast available during warm months and ample woody browse in the winter. By 1923, the Pennsylvania Game Commission began receiving complaints of widespread crop damage due to deer. To better manage deer populations in balance with the habitat and to reduce damage to agriculture, harvest of antlerless deer (i.e., female deer and males with antlers less than 3 inches) became an annual strategy in the wildlife management regime of Pennsylvania by the late 1950's.

Deer continue to be valued by humans as an important big game animal hunted for recreation and a favorite of wildlife watchers. With their voracious consumption of vegetation, however, deer have a tremendous impact across the landscape. Deer are the keystone herbivores in most ecosystems in which they exist. The shaping of the plant species composition and the physical structure of plants by deer determines the ability of other wildlife species to subsist in the same habitat.

Deer–human conflicts occur when overabundant deer threaten human livelihood, health and safety, property; and natural resources. These conflicts are common to communities throughout the whitetail's range–especially along the eastern seaboard. Controversy often arises at the community level when lethal management is proposed to reduce deer densities and associated damage. However, in the absence of natural sources of mortality, managers have a responsibility to properly regulate deer populations for the good of humans and deer alike.

Current Deer Management Conditions in Pennsylvania

Sport–hunting is the primary mechanism to regulate deer numbers in Pennsylvania on an annual basis. The Pennsylvania Game Commission regulates deer harvest via prescription of licenses for harvest of antlerless deer per 23 different Wildlife Management Units (WMU). WMU's were based on land use/habitat, human density, public/private land ownership, and recognizable physical features. The Statewide goals established in the Pennsylvania Game Commission Deer Management Plan include: 1) manage deer for a healthy herd, 2) reduce deer–human conflicts, and 3) manage deer for healthy forest habitat. Allocations of antlerless deer licenses are determined annually to adjust deer densities relative to these goals within each WMU.

In hunting license year 2019-2020, an estimated total of 389,431 deer were harvested in Pennsylvania including 163,240 antlered deer and 226,191 antlerless deer. In WMU 3D, which includes Saw Creek Estates, during the 2019–2020 hunting license year an estimated 4,900

antlerless deer and 6,000 antlered deer were harvested (Table 1). Hunters are permitted one antlered deer per hunting license year, and in WMU 3D, an individual hunter may harvest several antlerless deer provided they possess the appropriate number of valid WMU–specific antlerless licenses (usually 2 per hunter).

Table 1. Summary of white-tailed deer harvests for Pennsylvania and for WMU 3D, which includes Saw Creek Estates, from license year 2008-2009 through license year 2019-2020.

		Statewide		WMU 3D	
License year	Total	Antlered	Antlerless	Antlered	Antlerless
2008 – 2009	335,850	122,410	213,440	3,900	6,900
2009 – 2010	308,920	108,330	200,590	3,100	6,300
2010 – 2011	316,240	122,930	193,310	3,900	5,500
2011 – 2012	336,200	127,540	208,660	4,500	7,200
2012 – 2013	343,110	133,860	209,250	4,000	6,000
2013 – 2014	352,920	134,280	218,640	3,400	5,000
2014 – 2015	303,973	119,260	184,713	4,200	5,200
2015 – 2016	315,813	137,580	178,233	3,500	3,700
2016 – 2017	333,254	149,460	183,794	4,300	4,200
2017 – 2018	367,159	163,750	203,409	4,700	4,200
2018 – 2019	374,690	147,750	226,940	5,200	5,700
2019 – 2020	389,431	163,240	226,191	6,000	4,900

A program provided to landowners wishing to increase harvest of antlerless deer on their property is the Deer Management Assistance Program (DMAP) administered by the Pennsylvania Game Commission. DMAP coupons may be applied for at a rate of one coupon per 50 acres. Additional coupons, greater than the standard allotment rate, may be requested under the auspices of a Pennsylvania Game Commission–approved deer management plan. Landowners may provide DMAP coupons to eligible hunters, who may then apply for DMAP antlerless deer tags. A DMAP program would be appropriate for community–controlled open spaces.

Without specific permission of the occupants, archery hunters must be a minimum of 50 yards from any occupied residence or building to hunt. Around playgrounds, schools, nursery schools or day–care centers, archery hunters must remain a minimum of 150 yards away. Firearms hunters must be minimum 150 yards from any occupied residence or building to hunt. Although hunters are afforded liberal seasons and bag limits for deer, harvest of sufficient numbers of deer is confounded by firearms and safety zone restrictions coupled with limited access to areas to hunt due to extensive division of property ownership.

An Integrated Approach to Managing Damage by Deer

A well–designed deer damage management program is a progressive approach to wildlife management, which includes developing beneficial relationships among the public, landowners, hunters, and wildlife professionals to reach and maintain deer densities at desirable levels; education about wildlife conservation and deer damage management; implementation of non–

lethal deer damage management techniques where practical–fencing, repellents, deterrents; and monitoring the impacts of deer on the environment.

WS recommends that our cooperators adopt an integrated approach to managing damage by white–tailed deer. WS provides leadership in the deer management process by conducting personal consultations with individuals and communities, educational programs, assessments of damage by deer, and direct management in the removal of overabundant deer.

Components of the Integrated Approach

Define Goals.–Those seeking to make deer damage management decisions should involve representatives of all stakeholder groups with an interest in managing deer in the target area. Providing education on basic deer biology and damage management techniques is integral to the process, so that stakeholders may make informed decisions. Goals should define acceptable levels of damage by deer, which minimize deer–human conflicts.

Identify the Problem.–Stakeholder groups should obtain information on the impacts of deer damage such as deer–vehicle accident records, rates of Lyme disease, and estimates of damage to landscape and commercial plants. Establishing the extent and timing of how deer may be impacting the target area is the first step toward identifying whether a deer problem exists.

Establish Monitoring.–Information collected during the problem identification phase may be used as baseline data for long–term indices relative to goals of the program and as the basis for making management decisions. Estimates of deer abundance are necessary to assess the effects of any management actions relative to the program goals. WS specializes in conducting deer density surveys using a variety of techniques tailored to individual situations.

Develop a Management Plan.–A deer damage management plan should document clearly defined program goals, identify the level of damage caused by deer based on the supporting evidence collected, and should propose management actions to achieve the program goals. Effective management plans must allow for the flexibility to adapt future management actions based on data collected during continued monitoring.

Options for Management

No Action.–The "no action" alternative is appropriate if monitoring indicates that current management practices are maintaining deer densities in balance with program goals. For example, on some public lands or private communities, this means allowing the deer population to grow unrestricted. Often, deer numbers grow above levels which the habitat can support and above that which humans are willing to tolerate. In urban situations, deer densities may be maintained by a high rate of deer–vehicle collisions. In extreme cases, mortality may occur in the form of starvation. Alternatively, the "no action" alternative often means that sport–hunting continues as the established management practice because hunters are achieving adequate harvests to meet program goals.

Non–lethal Damage Management.–A myriad of non–lethal deer damage management techniques are available, and fall under three categories: exclusion, deterrents, and repellents. Research has demonstrated that some practices are effective while others appear to be marketing ploys. Properly installed and maintained fencing 10 feet in height and secured to the ground is the most effective exclusion tactic. Fencing can be cost prohibitive for large acreages, and many communities have ordinances limiting the use or height of fences. However, fencing used to protect young plant growth can be beneficial in deterring deer browsing until plants are no longer vulnerable. Deterrents use sound, visual, or tactile cues to frighten deer from areas where they are causing damage. Deterrents which are set off by the offending deer or those with irregular cues tend to be most effective since deer may easily become acclimated to deterrents. Repellents use taste or scent to discourage deer from eating treated plants or entering treated areas. A wide variety of commercially available repellents have been reported to be effective in independent research. Repellents require reapplication after rain events and may lose effectiveness at temperatures below freezing.

Population Management.–When deer become overabundant, a rapid reduction in deer density is necessary to suppress annual population growth and to reduce damages. Once management goals are reached, annual deer harvests must be conducted to maintain acceptable population levels. The methods used to remove deer will depend on safety, legal restrictions, financial constraints, timing of the management action, and effectiveness of the removal methods employed. In many deer management situations, using a combination of deer removal methods is necessary to achieve management goals.

Population Management Alternatives

Sport–hunting.–Sport–hunting should be encouraged whenever possible as it is generally the most economically feasible strategy to manage deer. However, legal restrictions (e.g., safety zones, timing of hunting activity) and other limitations (e.g., hunters resistant to harvesting adequate numbers of does) may limit the effectiveness of sport–hunting in some situations. In recent years, the Pennsylvania Game Commission has provided for additional deer harvest opportunities under depredation permits outside of the normal hunting seasons.

Controlled Hunts.–Controlled hunts using sport hunters can be structured to maximize deer removal efforts. Stipulations may include designated dates and times of hunts, weapon restrictions, and safety certification of hunters. By concentrating hunting pressure during specific times, controlled public hunts usually increase deer harvest and require less time than normal sport–hunting.

Professional Deer Removal.–In instances where sport–hunting is not practical or effective, deer removal may be conducted under a depredation permit by WS, private contractors, or other agents of the cooperator. Professional deer removal operators are permitted to use specialized equipment and methods such as high–powered rifles fitted with suppressors to minimize noise; infrared and night vision technologies for identification of safe shooting opportunities and to increase the ability to locate deer; baiting; and shooting at night, from vehicles, and in close proximity to buildings. Deer harvested by professional operators provide

venison for charitable donation. Professional deer removal usually requires the least amount of time versus other methods to reach population goals.

Relocation.–Capturing deer and relocating them to another location is not an option in Pennsylvania because this practice is not legal. The Pennsylvania Game Commission does not recognize trap and transfer of deer as a viable alternative for localized population reduction and prohibits trap and transfer of deer to prevent the spread of disease. Legal considerations notwithstanding, trap and transfer of deer is expensive, ideal relocation sites are limited, and relocated deer suffer greater than 50% mortality.

Fertility Control.–WS is conducting ongoing research through its National Wildlife Research Center in the development of a fertility control agent to limit deer population growth. To date, tests of fertility control in deer populations in fenced enclosures have demonstrated limited effectiveness. Currently, no fertility control agents for use in white–tailed deer have been approved for use in Pennsylvania. If registered, future use of fertility control will have limited applicability, especially for large populations of free–ranging deer. Implementation of a fertility control program would be costly and herd reductions would still be necessary to reduce damage since fertility control does not directly reduce deer numbers.

METHODS

Deer Surveys - To estimate the abundance of deer in SCE, WS established a 14.7–mile survey route along established roads within the community, which traversed approximately one–third of the community's roads. WS procured an aerial photograph of the community, overlaid a geo–referenced 500–meter grid system, and overlaid the survey route onto a 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 dusk and spanned 2 to 3 hours. Deer were observed utilizing hand-held Forward Looking Infra-red (FLIR) units (Figures 2-3), spotlights, and binoculars. Observers recorded the number of deer, deer locations (referenced by grid quadrant); distance deer were from the closest point on the survey route, time, gender, and age class. The survey vehicle moved at approximately 5 to 10 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 calculated average observation distances, area surveyed (square miles), and deer density estimates (deer per square mile).

RESULTS

Deer Surveys - WS conducted density surveys on January 23 and February 3, 2020, observing an average of 41 deer along the established survey route (Figures 4-5). These surveys yielded an average deer density estimate of 37.4 deer per square mile (Table 2).

It should first 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.

Table 2. Summary of two white-tailed deer density surveys completed by USDA APHIS Wildlife Services at Saw Creek Estates, Bushkill, PA during January and February 2020.

Date	Number Observed	Average Distance from road (yds.)	Area surveyed (acres)	Deer density estimate (n/mi sq.)	Buck: Doe Ratio
1/23/2020	47	61	657	45.8	N/A
2/3/2020	35	72	772	29.0	N/A

DISCUSSION

SCE, as a community, needs to decide whether they are serious about properly managing deer within the community or not, as SCE has invested a lot of time and money into the program to date. SCE's deer management program continues to experience setbacks because of opposition to the deer management program. In both 2017 and 2020, as WS neared the target density, deer management was suspended, thus allowing the deer population to rebound with no further management. During years where no management takes place, two fawning seasons actually occur, quickly increasing the deer population throughout the community.

Communities have the tendency to become fixated on survey results and survey results only. SCE should avoid focusing solely on deer density estimates. SCE should focus more on the deer management goal data being collected by the community and how it changes in relation to management actions. It is important to manage deer to reduce the damages they cause to an acceptable level, not necessarily their numbers. The results of the surveys should be used in conjunction with forest health data and deer/vehicle collision data, to determine a target number of deer to be removed each year.

SCE's main deer management objective is to reduce the deer density within the community to minimize the negative effects that deer are having on the forest understory. SCE must assess forest health and monitor the effects of a reduced deer density on the forest understory within the community. SCE should continue to educate residents that improved habitat not only benefits deer, but also other wildlife species, the forest, water resources and improves the natural aesthetic of communities.

As deer densities continue to be managed the health of the forest will continue to improve. As the forest health continues to improve, additional food resources will be available, improving the health of the deer living in and around the community. While research has demonstrated that deer densities must be less than 10 deer per square mile to fully stimulate forest regeneration, the board has compromised with residents and is managing for a more conservative density of approximately 30 deer/sq.mi.

WS conducted a site visit in June 2019 to document the early signs of forest health recovery being observed within the community. WS observed an abundance of new forest regeneration including many species of tree seedlings, wildflowers, and berry producing plants

including blackberries, raspberries, and blueberries. WS included pictures in the 2019 summary report.

Supplemental feeding should be eliminated in SCE, as the community must maintain a strict no feeding policy as a condition of the deer control permit obtained from the PGC. 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 nutrients from these foods are not easily obtained by deer due to the fact that it takes up to four weeks for deer to adjust to a new food source by slowly establishing microorganisms that can properly process it. The time and energy it takes to establish these microorganisms utilizes important fat reserves that could have been spared. Rapid exposure to high grain diets, especially in the winter, has been shown to cause a fatal disruption of their acid-base balance in their systems. Even deer that survive the immediate overload often die from secondary complications in the days or weeks that follow. Lastly, supplemental feeding creates reliance of deer on humans, and may increase transmission of diseases at feeding sites.

Although beneficial with regard to deer health and eliminating the dependence of deer on humans, simply stopping the feeding of deer will not reduce the local deer population in SCE. Deer concentrating at a bait site may disperse from the immediate area of the bait site after cessation of feeding, but they will not leave their established home range in search of alternative food sources. Home ranges are maintained throughout a deer's life.

For further information, please visit the PA Game Commission website, and follow the link below to the page regarding white-tailed deer. Within the section titled "Living with Whitetails", you will find the Guide to Urban Deer Management, and a video on Community Deer Management (15 min.). http://www.portal.state.pa.us/portal/server.pt/community/deer/11949 These tools may provide additional information for communities in the early stages of deer damage management.

RECOMMENDATIONS

- Work closely with service foresters or private consultants to monitor and measure the negative impacts deer are having on the forest understory. SCE must record negative deer incidents within the community (i.e. deer vehicle collisions).

- Aggressively enforce the ordinance which prohibits feeding of deer. Provide information about the negative effects of supplemental feeding of deer.

- Continue to educate residents about deer management and biology. Utilize non-lethal techniques to reduce damage by deer to landscape plants.

- Continue to conduct standardized density surveys to monitor trends in the local deer population.

- Continue deer removal activities in January 2021 to target a population of approximately 30 deer per square mile or less, for the betterment of deer health, other wildlife, habitat, and to minimize deer–human conflicts.

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Figure 1. Roving survey route traversed for white-tailed deer density surveys completed by USDA APHIS Wildlife Services in Saw Creek Estates, Bushkill, Pennsylvania from 2009 - 2020.

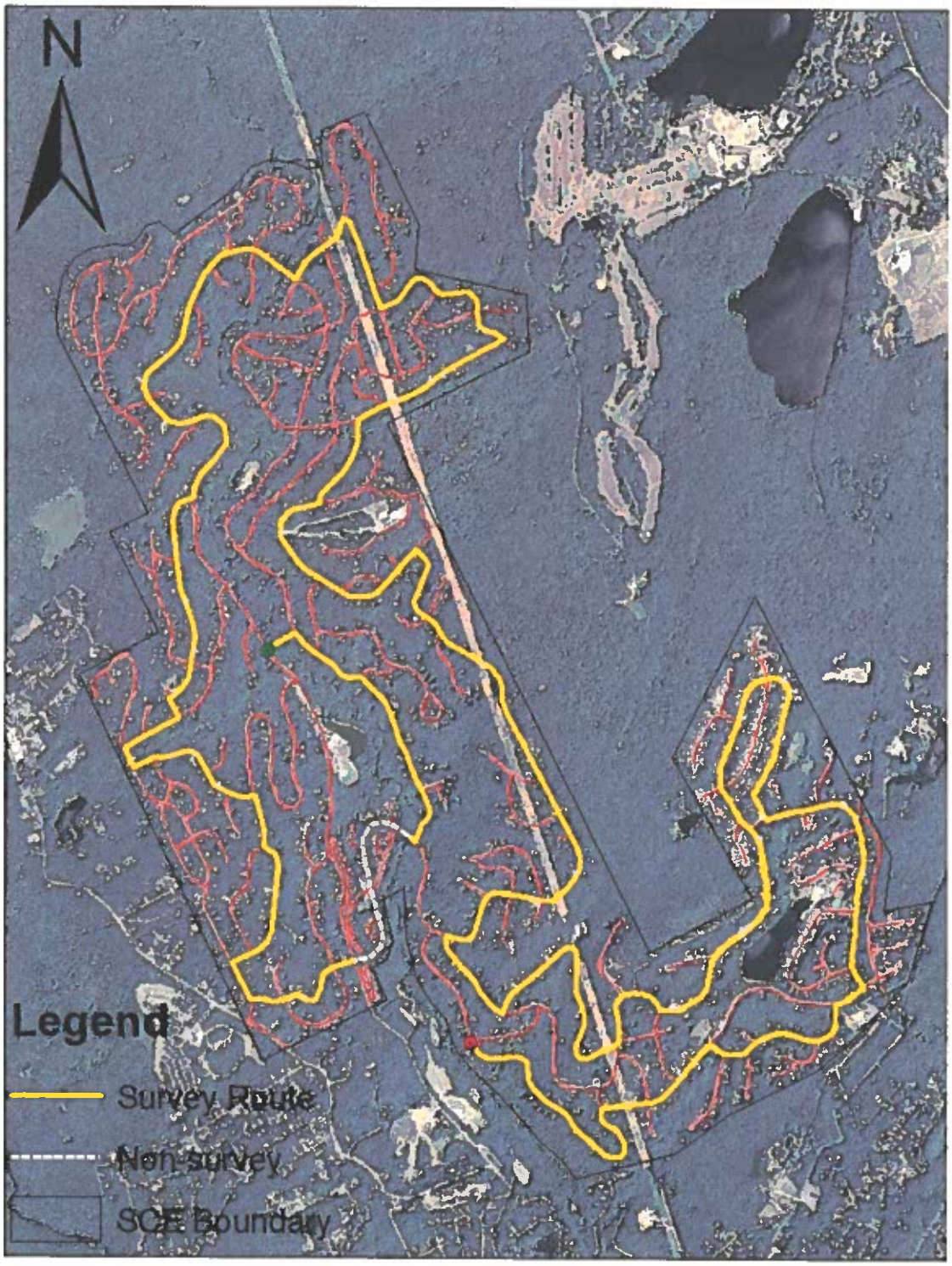

Figure 2. Four deer photographed with the infrared camera during roving density survey at Saw Creek Estates, on January 23, 2020.

Figure 3. Deer photographed during roving density survey at Saw Creek Estates, on January 23, 2020.

Figure 4. White-tailed deer density data collected by USDA Wildlife Services during a roving infrared deer survey on January 23, 2020, in Saw Creek Estates, Bushkill, Pennsylvania.

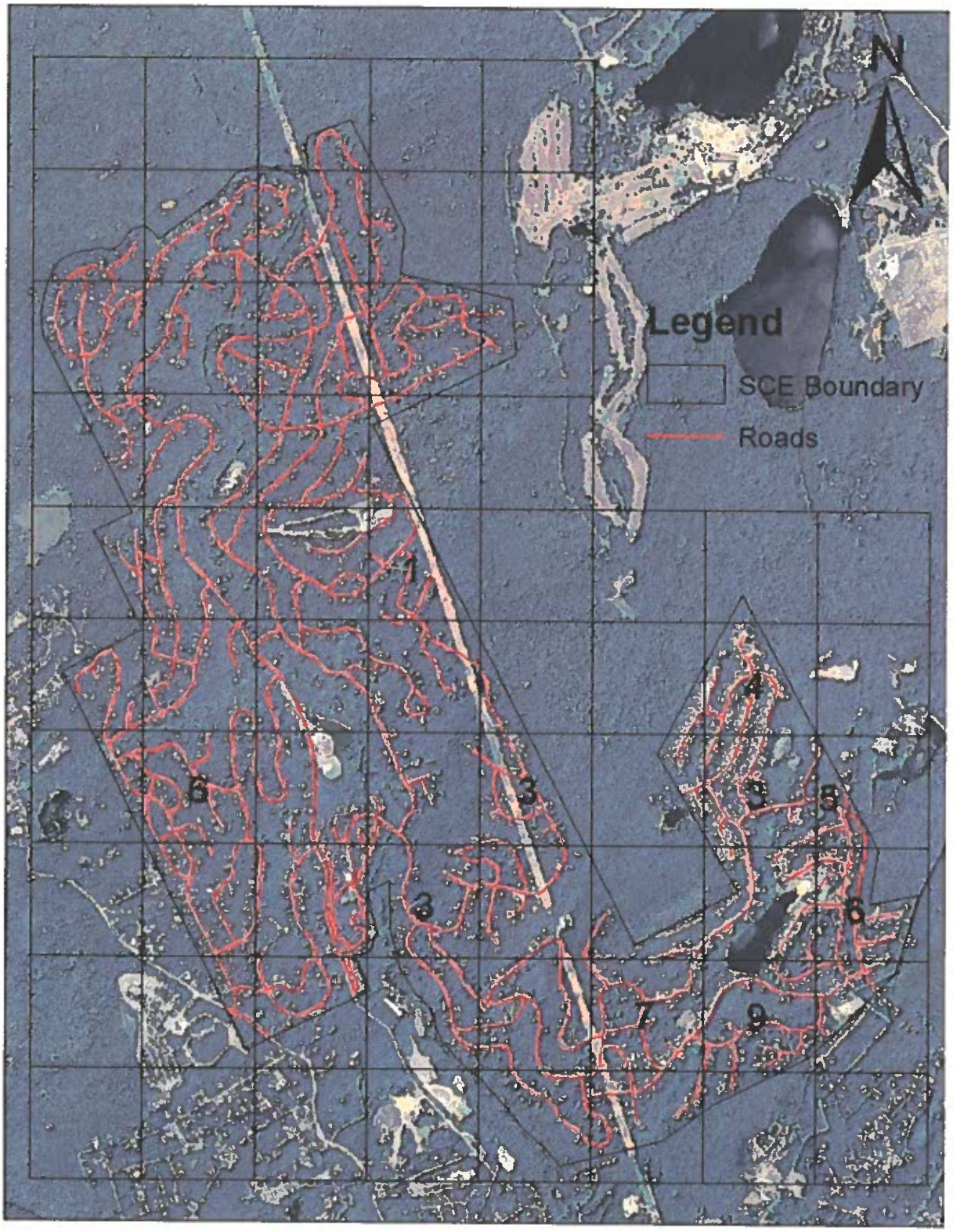

Figure 5. White-tailed deer density data collected by USDA Wildlife Services during a roving infrared deer survey on February 3, 2020, in Saw Creek Estates, Bushkill, Pennsylvania.