

RECREATION, ECONOMIC SIGNIFICANCE, AND PUBLIC INTEREST

Deer have many positive values and provide many benefits to the Commonwealth. The state legislature – as well as many Pennsylvanians – so highly values the white-tailed deer that it has been officially designated as the “state animal” since 1959. The opening day of the rifle deer season is respected as a state “holiday” in localities throughout Pennsylvania; many school districts schedule this day off so students and teachers can hunt.

HUNTING

The white-tailed deer is one of the most widespread and popular game species in North America providing significant recreational value (Conover et al. 1995, Lynch 1997). According to the 2006 National Survey of Hunting, Fishing, and Wildlife-Associated Recreation, there are more than 10 million deer hunters in the U.S. or 94% of all big game hunters. Nationally, deer hunters spent more than 132 million days hunting deer (U.S. Department of Interior and U.S. Department of Commerce 2007a). Pennsylvania ranks second in the nation for the most participants of in-state hunters (U.S. Department of Interior and U.S. Department of Commerce 2007b).

Deer are the only species hunted in Pennsylvania by the majority of hunters (Responsive Management 2004). When asked to rate the importance of hunting to them personally, 41% of those interviewed rated it as “10” on a scale of 1 to 10 with 10 being very important. Eighty-eight percent gave a rating of “6” or higher (Responsive Management 2004). The most recent surveys indicate Pennsylvania has more than 700,000 deer hunters (Table 8). Nationwide, the number of hunters has been steadily declining. Since 1991, national hunter numbers have declined 11% (U.S. Department of Interior and U.S. Department of Commerce 2002, U.S. Department of Interior and U.S. Department of Commerce 2007a). Pennsylvania has experienced a 9% decline in general hunter numbers and a 22% decline in deer hunter numbers since 1994. Even with declines in deer hunter numbers, deer hunters in Pennsylvania spent more than 6.8 million days pursuing deer in 2006 (Table 8).

Many deer hunting opportunities exist in Pennsylvania, and hunter success has been relatively consistent and deer harvests have exceeded 300,000 for the past 20 years (Table 1). A hunting season has been held for deer every year since the 1800s, and an antlered and antlerless hunting season has been held every year since 1957. Archery stamps have been sold since 1951 and muzzleloader stamps since 1974. However, there is still considerable interest in expanding deer hunting opportunities in Pennsylvania (Responsive Management 2004).

RECREATION

Human society likely receives more benefits from deer than any other wildlife species (Conover 1997a). In fact, U.S. metropolitan residents gave deer a higher preference rating than any other mammalian wildlife species (Conover 1997a, Conover 1997b). Deer have a high positive

existence value. Existence values can be defined as a sense of well-being that people feel from knowing that deer exist and are thriving in nature (Conover 1997a). People value deer as a subject for learning more about nature and about deer themselves. They also are seen as an indicator of environmental quality (Stout et al. 1993).

Table 8. General hunting license sales, deer hunters, archery and muzzleloader stamps sold, and days spent deer hunting in Pennsylvania, 1986 to 2008.

Year	General Hunting License Sold	Total Deer Hunters¹	Archery Stamps Sold	Muzzleloader Stamps Sold	Total Deer Hunter Days¹
1986	1,166,771	1,019,644	246,099	79,182	Not available
1987	1,171,507	1,012,430	254,770	78,862	Not available
1988	1,164,420	1,006,994	264,796	92,619	Not available
1989	1,156,891	1,024,560	272,364	97,817	Not available
1990	1,160,780	1,013,974	285,352	105,620	7,561,815
1991	1,160,202	1,007,178	296,244	106,372	7,707,280
1992	1,156,736	1,008,725	309,012	103,309	7,615,521
1993	1,130,090	973,662	317,344	77,494	7,846,783
1994	1,116,832	983,703	322,378	76,071	8,843,314
1995	1,087,804	959,880	322,065	79,556	8,081,752
1996	1,088,733	940,127	328,193	83,996	8,511,025
1997	1,063,366	909,489	321,556	83,208	7,955,254
1998	1,069,627	899,965	328,451	90,421	8,046,895
1999	1,033,315	882,580	276,622	106,090	7,991,856
2000	1,038,846	913,646	284,223	137,737	8,190,304
2001	1,047,820	858,622	285,987	147,413	7,287,583
2002	1,017,154	793,502	283,055	166,076	6,875,037
2003	1,018,248	790,595	285,121	188,388	6,401,485
2004	1,013,866	No survey	284,493	200,193	No survey
2005	964,158	739,532	269,752	200,903	6,437,077
2006	945,892	762,936	268,751	198,291	6,858,281
2007	924,448	715,553	266,841	196,054	6,450,948
2008	926,892	708,069	271,023	195,809	6,465,879

¹ – Data from annual Game Take survey of a 2% random sample of Pennsylvania hunting license buyers

In 2006, more than 71 million Americans participated in various non-consumptive wildlife-related activities. This represents an 8% increase in participation from 2001 and a 13% increase in participation from 1996 (U.S. Department of Interior and U.S. Department of Commerce 2007a). Twenty-one million people participated in wildlife watching around the home for large mammals and 12 million people traveled away from home to observe, photograph, or feed large mammals (deer, bear, etc) in the U.S. in 2006 (U.S. Department of Interior and U.S. Department of Commerce 2007a). Pennsylvania ranks in the top 5 for most participants of in-state wildlife watchers (U.S. Department of Interior and U.S. Department of Commerce 2007b).

White-tailed deer are the most easily viewed of all large mammals in Pennsylvania. More than half of Pennsylvanians participate in wildlife viewing (Responsive Management 2003). Wildlife watchers outnumber sportsmen in Pennsylvania by more than 2 to 1 (U.S. Department of Interior and U.S. Department of Commerce 2003). More than 1.2 million people participated in large mammal wildlife watching around the home and 860,000 people participated in large mammal wildlife watching away from home. Activities included observing, photographing, and feeding (U.S. Department of Interior and U.S. Department of Commerce 2003).

Among the people who report watching wildlife in Pennsylvania, 59% are between the ages of 35 and 64, and 22% are 65 or older. Fifty-one percent are male, 55 percent live in urban areas, and 17% hunt (U.S. Department of Interior and U.S. Department of Commerce 2003).

ECONOMIC SIGNIFICANCE

Quantifying the economic influence of the white-tailed deer is not an easy task. Deer provide economic benefits through both hunting and non-hunting activities. America's 10.7 million big game hunters in 2006 spent \$11.8 billion on trip and equipment expenses. This is a 21% increase from 1996 (U.S. Department of Interior and U.S. Department of Commerce 1997, U.S. Department of Interior and U.S. Department of Commerce 2007a). In Pennsylvania, hunters spent more than \$11 million on deer-related licenses and tags (i.e., DMAP harvest permits, antlerless deer licenses, archery stamps, and muzzleloader stamps) in 2006 (Delutis 2007). This represents 38% of the total license revenue and does not include all general license sales that include an antlered deer tag. Based on the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation Survey, big game hunters spent more than \$488 million in Pennsylvania in 2001 (U.S. Department of Interior and U.S. Department of Commerce 2002). These costs included money spent on food, lodging, transportation, and equipment.

But hunting is not the only source of economic benefit from deer. Throughout the United States, 23 million people participated in wildlife-watching away from home and 67.8 million people participated in wildlife-watching around the home (U.S. Department of Interior and U.S. Department of Commerce 2007a). Total wildlife-watching expenditures which include trip-related expenses and equipment totaled \$45.7 billion in 2006. This is a 21% increase from 1996 (U.S. Department of Interior and U.S. Department of Commerce 2007a). The total expenditures in Pennsylvania in 2001 associated with wildlife watching activities were more than \$962 million. Pennsylvania residents spent \$866 million in-state for wildlife watching-related activities in 2001 (U.S. Department of Interior and U.S. Department of Commerce 2003). Although it is impossible to quantify how many people spent how much to observe deer specifically, there is no doubt deer are a popular and observable species among wildlife watchers (Conover 1997a).

Based on this information, deer are clearly an economically beneficial species in Pennsylvania. However, deer also carry negative economic costs. And the majority of these costs are shouldered by individuals (Conover 1997a). Negative monetary values of deer include deer-vehicle collisions, damage to agricultural productivity, damage to timber productivity, and damage to households (Conover 1997a).

An estimated 1.5 million deer-vehicle collisions (DVCs) occur each year in the U.S. The average cost of vehicle repairs was \$1,500 which means that total vehicle damage resulting from a collision with a deer exceeded \$1 billion annually (Conover et al. 1995).

Based on their known market share in Pennsylvania, State Farm Insurance projected more than 98,000 deer-vehicle claims for all insurance companies in the state during July 1, 2006 – June 30, 2007. Repairing a vehicle may cost more than the national average in Pennsylvania as well (\$2,200 in Pennsylvania [Witmer and deCalesta 1992]) resulting in even higher costs annually. It is also estimated that 29,000 people are injured and more than 200 fatalities occur annually in the U.S. as a result of a DVC (Conover et al. 1995). State Troopers reported 21 human fatalities resulted from DVCs on Pennsylvania's state and federal highway system from 1996-2001. Other studies report that four to five percent of all deer-vehicle collisions involve human injury (Hansen 1983).

Crop damage is a cost that is increasingly associated with white-tailed deer. More than any other wildlife species, deer are perceived to cause the most damage to crops (Conover and Decker 1991). Estimated crop damage caused by wildlife costs the United States agriculture industry almost \$500 million each year (Wywiałowski 1994, Conover et al. 1995).

In Pennsylvania, deer damage to crops is common. Major losses occur in corn, forages, and small grains. Orchards, nurseries, and vegetables that are grown in restricted areas also are heavily damaged. The annual crop loss to deer is estimated between \$16 and \$30 million (Forest Resources Extension 2007). The uneven distribution of this damage results in excessive losses for individual growers.

Deer browsing on small trees is the main source of deer damage to the timber industry. Excessive deer browsing can kill or retard tree growth, and both represent economic losses to the timber industry. There is a lack of economic data on deer damage to timber in most parts of the U.S. (Conover 1997a). The data that do exist give a glimpse of the losses. In the Pacific Northwest, estimates of annual financial loss in Oregon total \$333 million (Nolte and Dykzeul 2002).

In some heavily forested areas of Pennsylvania, deer browsing has completely prevented the reestablishment of forest trees following cutting. Other areas have experienced altered species composition, reduced vegetation density and growth, limited forest management practices, and reduced amount of favorable habitat for other wildlife species (Marquis and Brenneman 1981). Nearly 30 years ago, timber losses to the Allegheny hardwood forest alone were estimated at \$1,075 per acre (Marquis 1981). This is a loss of \$367 million annually (Conover et al. 1995).

Deer browsing on ornamental trees, shrubbery, and gardens in suburban and residential areas is a common complaint and financially impacts homeowners each year (Connelly et al. 1987, Witham and Jones 1987, Conover 1997b). Wildlife damages incurred by metropolitan residents in the U.S. have been estimated at \$3.8 billion annually. This is in addition to spending \$1.9 billion and 268 million hours trying to solve or prevent the problem (Conover 1997b). Deer are not responsible for all of this damage. Only 4% of respondents to a 1997 survey reported a

problem with deer. Using this percentage, a conservative estimate of deer damage and preventive measure costs to households is \$376 million (Conover 1997a).

PUBLIC INTEREST

One could make the argument that no other wildlife species in the Commonwealth can influence the lives of plants and animals more than the white-tailed deer. Although deer are not at the top of any food chain, they can have an enormous influence on habitat and other wildlife just by eating.

Deer, like people, have preferred foods and will select those they like first. After all the preferred plants are gone, deer will then move onto those they like less.

Deer can have a major impact on the natural community in which they live. As the number of deer increases, plants that are preferred by deer will become less abundant or may disappear (Ross et al. 1970, Marquis 1981, Tilghman 1989, Healy 1997). Preferred plants (i.e., those that are highly palatable to deer) become scarce as deer densities increase, because there are too many animals consuming a fixed number of plants. The disappearance of highly palatable plants adversely affects other wildlife species that rely on these plants for food and cover that can cause a dramatic reduction of biodiversity in forest ecosystems (Whitney 1984, McShea and Rappole 1992, deCalesta 1994, 1997).

Necessary food and cover for a variety of songbirds and small mammals disappear from overbrowsed areas. At Catoctin Mountain Park in Maryland, for example, the unmanaged deer herd resulted in lower tree regeneration, less understory cover and biodiversity between 0.3 to 5 feet above the ground, and a lower density of ground-nesting birds than compared with the Frederick City Watershed Cooperative Wildlife Management Area, where deer were managed by the Maryland Department of Natural Resources (Bates et al. 2007).

An Allegheny National Forest study showed deer overbrowsing had the greatest effect on intermediate canopy-nesting birds. The study noted that species such as indigo buntings and eastern wood pewees disappeared from the forest when deer densities got too high (DeCalesta 1994). Birds are a vital part of our forest ecosystem. Consider the diet of these and other birds that depend on the area below the browse line. It often consists of insects and caterpillars including some that are potentially destructive to our forests and backyard shade trees.

Further, plants that are less palatable to deer may increase in abundance. The abundance of less palatable plants may inhibit regeneration of other plant species, further complicating succession. Finally, deer are at greater risk when they overbrowse their forest habitat. Previous studies have linked reduced recruitment and natural survival rates of deer to food availability and habitat conditions (McCullough 1979, DePerno et al. 2000). In general, when habitat conditions decline, so will deer populations.

DEER POPULATION MANAGEMENT

DEER POPULATION TREND OBJECTIVES

A deer population trend objective in each WMU is limited to one of three options; 1) increase, 2) decrease, or 3) remain the same. A decision on whether a population should increase, decrease, or remain the same will depend on deer management goals of healthy deer, healthy forest habitat, and acceptable levels of deer-human conflicts.

ROLE OF REGULATED HUNTING

The Game Commission uses hunting as the principal method for controlling deer numbers and deer impacts in the Commonwealth. Regulated hunting of deer has been proven to be an effective management tool, and the most efficient and least expensive technique for removing or managing deer numbers (Ellingwood and Caturano 1988). The Game Commission, as the state agency responsible for wildlife management, is directed by law to use hunting for management of game populations, including deer (34 Pa. Code, Section 103). Additionally, an important legal duty is to promote Pennsylvania's hunting heritage and provide adequate opportunities to hunt in the Commonwealth. At times, when regular hunting seasons prove insufficient or ineffective in adequately managing deer herd impacts, special laws, regulations and programs are used to facilitate the taking of additional deer.

CONSEQUENCES OF HARVEST MANAGEMENT OPTIONS

The long-term consequences of most deer management strategies are predictable based on what is known about the population ecology of deer and historical management practices. This section discusses deer harvest management strategies that are frequently suggested and/or endorsed by various groups.

No deer hunting

Unless winter weather conditions frequently impact deer thereby regulating their population (this happens along the northern fringe of their range), hunting is absolutely necessary to keep deer herds from growing beyond their biological carrying capacity (McCullough 1979). The "No deer hunting" strategy is promoted most by people and groups that do not support hunting. Farmers and foresters concerned about economic losses, all deer hunters, taxidermists, meat processors, and people concerned about deer-vehicle collisions or habitat and landscape damage typically do not support the "no hunting" alternative.

Antlered-only deer hunting

Similar to no deer hunting, bucks-only hunting results in the deer population quickly growing to its biological carrying capacity (McCullough 1987). This is because male deer are promiscuous breeders and one antlered male can breed with multiple females. Harvest of females is necessary

to control population growth. Although hunters would see many antlerless deer, their success rates likely would be low as a result of diminished fawn recruitment rates that occur when deer numbers are near or beyond their biological carrying capacity.

Regulated deer hunting

Regulated deer hunting, which includes harvesting both antlered and antlerless deer, has long been the primary tool used by wildlife agencies to manage deer populations (Woolf and Roseberry 1998). Regulated deer hunting provides a unique opportunity for those who participate, and is the most fiscally-responsible, effective technique available for controlling deer herd sizes given the technology available and regulations in place today.

A common argument against regulated deer hunting is that it increases deer reproduction rates. In other words, it is counter-productive to reducing deer populations, because deer will increase reproduction to compensate for fewer deer.

This may be true for individual deer, but not for a population. For example, if a population is at 50 percent of biological carrying capacity, individual females may produce 1.6 fawns per female (Downing and Guynn 1985). If the population is reduced to 30 percent of carrying capacity, individual females may produce 1.8 fawns per female. As a population is reduced in relation to biological carrying capacity, individual deer can produce more fawns. However, this increase in individual reproduction does not compensate for fewer deer.

A smaller deer population will produce fewer fawns. For example, if a population is at 50 percent of biological carrying capacity with 50 adult females, the population can produce 88 fawns. If the population is reduced to 30 percent of biological carrying capacity and contains 30 adult females, the population may produce 70 fawns (Downing and Guynn 1985). The smaller population produces fewer fawns, despite an increase in individual female reproduction.

Regulated deer hunting is an ongoing management action. For regulated deer hunting to be effective in managing deer populations at levels where impacts are acceptable, it must be done on a regular basis. Finally, hunting is not counterproductive to an objective to reduce deer populations. Although fewer deer may result in increases in individual reproductive output, this increase in reproductive output cannot compensate for lower deer numbers.

TRAP AND TRANSFER

Back in 1906, the Game Commission launched a deer stocking program to accelerate restoration of the deer herd. At the end of the 19-year program, 1,200 deer from Kentucky, Maine, Michigan, New Hampshire, New Jersey, North Carolina, Ohio, and Pennsylvania had been trapped and transferred throughout Pennsylvania (Kosack 1995).

Today, requests to transfer deer are still heard. But the times have changed. Although market killing and unregulated harvest reduced most game in Pennsylvania at the previous turn of the century, our last century turned with deer in every corner of the state. The need to move deer from one location to another to reestablish a population is long gone.

The call to move deer usually stems from the desire to preserve individual deer in urban and suburban environments. Excessive deer populations in these areas and lack of a strong hunting heritage prompt requests for moving deer out of neighborhoods where they are causing problems or are perceived to be in danger.

Over the last 100 years, our knowledge of deer biology, behavior, and disease has grown by volumes. Translocating deer moves the needs of those deer to the new location; a location that already supports deer. Unlike 1906, there are no areas devoid of our state animal, and no empty or excess habitat to support a new population. Moving deer places more stress on the existing habitat to support those additions.

When a deer is relocated, it's not just the deer. Disease agents and parasites also are relocated. Meningeal worm was introduced to Florida and Georgia from deer that were moved from Wisconsin and Pennsylvania in the 1920s (Keel 2009, Davidson 2006). Chronic Wasting Disease (CWD) which is a contagious, environmentally contaminating, and always fatal disease to deer and elk species was introduced into Saskatchewan in 1989 from an imported elk. It wasn't detected until 7 years later (Keel 2009). CWD has been found in New York and West Virginia and is believed to have been introduced from an outside source as well. Deer can be reservoirs for bovine brucellosis and tuberculosis, which have implication for not only deer, but also livestock. Deer also carry parasites like ticks, which serve as vectors of the human diseases such as Lyme disease and ehrlichioses.

Finally, transporting live deer is very stressful to them, and results in high mortality both during transfer and after release. Several studies document this, some demonstrating fewer than half of deer transferred survive more than a year in their new surroundings (Jones and Witham 1990, Mayer et al. 1995, Cromwell et al 1999, Missouri Conservationist 1999, Beringer et al. 2002). Of the 1,200 deer purchased between 1906 and 1925, the number that actually survived the release and contributed to the state's whitetail recovery is unknown. In addition to these low survival rates, deer captured from urban/suburban areas usually seek out comparable residential locations defeating any justification for this type of the program (Beringer et al. 2002, Cromwell et al. 1999).

As a result of the disease risk, stress and mortality risks, and lack of need for population restoration, the Game Commission does not permit the use of trap and transfer as a deer management option. For areas where deer impacts exceed acceptable levels, other population reduction methods exist, such as hunting or sharpshooting. Where more deer can exist in balance with habitat, wildlife, and people, the deer population can be increased by reducing antlerless deer harvests. Trap and transfer neither protects individual deer from stress and mortality, nor is it a needed method for deer population restoration.

FERTILITY CONTROL

Research on wildlife fertility control agents is more than four decades old. It has been fueled by desires to control overabundant wildlife causing conflicts with humans. Changing landscapes and increased interest in nonlethal methods of population control have spawned a debate over traditional wildlife management techniques and the role of wildlife fertility control agents. Some

members of the public believe fertility control to be more humane and morally acceptable than lethal management techniques. However, these perceptions do not take into account the efficiency, practicality, or safety of these drugs.

Fertility control agents for white-tailed deer are known as immunocontraception vaccines. These vaccines use the animal's immune system to produce antibodies that prevent pregnancy by interfering with proteins and hormones essential to reproduction. Currently, there are 2 types of immunocontraception vaccines that can be used in white-tailed deer: Porcine Zona Pellucida (PZP) and Gonadotropin Releasing Hormone (GnRH) (Fagerstone et al 2006). Advantages of PZP include: 1) breakdown in the gastrointestinal tract which precludes its entry into the food chain, 2) normally reversible when the antibody level declines in the body, and 3) reduced fertility in most female mammals. A single-shot has been effective in reducing fertility in white-tailed deer females for at least 5 years in some animals. Disadvantages of PZP are that it must be applied as an injection (no effective remote delivery) and it results in multi-estrous cycles (up to 7 cycles in treated deer) which could result in late season births if antibody levels fall below a critical threshold (Fagerstone et al 2006). Advantages of GnRH are that it: 1) is normally reversible when the antibody level declines in the body, 2) it is not sex specific and reduces fertility in most mammals, and 3) does not result in multi-estrous cycles. Disadvantages of GnRH are that it must be applied as an injection and it affects social behavior by reducing the sexual activity of both sexes. A single-shot of GnRH is effective for 1 to 2 years in reducing fertility (Fagerstone et al 2006). PZP remains experimental and has not been approved by the Food and Drug Administration (FDA) or Environmental Protection Agency (EPA). GonaCon was registered with the EPA as a restricted use pesticide in September 2009.

Although fertility control agents can stop reproduction in individual animals, effect on populations is the most important measure for deer management. Population modeling comparing the relative efficiency of reproductive control and lethal control in wildlife populations has been conducted. Results show that fertility control agents would be most effective in managing smaller wildlife species (rats and cowbirds) with high reproductive rates and low survival rates. Conversely, to achieve population reductions in those species with a low reproductive rate and high survival rate lethal control is more efficient (Fagerstone et al 2006). Deer have a low reproductive rate, compared to smaller wildlife species, and a life span of 10-12 years. Fertility control alone would probably not be effective in reducing the population. Modeling has shown that maintaining deer populations at a desired level is possible with long-lasting contraceptives (lasting 4 years) but reducing populations would be difficult without some lethal control (Fagerstone et al 2006).

In addition to population modeling, field studies of fertility control agents on deer populations have been conducted. The 2 largest and longest running field studies have occurred on Fire Island National Seashore in New York and National Institute of Standards and Technology (NIST) in Maryland. Fire Island National Seashore started using PZP in 1993. Population density on the most heavily treated area saw a 50% decline in the population by 2002. Initially, this area experienced a population increase after initiation of the study (Rutberg 2005, Underwood 2005). In other treated areas of Fire Island, population effects were not as clear. "One conclusion is perfectly clear, however; management horizons of at least a decade are not unreasonable when attempting to evaluate fertility control for managing free-ranging deer"

(Underwood 2005). The NIST PZP study began in 1993 as well. From 1993 to 1997, the deer population increased by 10.6% per year. From 1997-2002, the deer population decreased by 7.9% per year (Rutburg et al 2004). So after 10 years, the population and deer-vehicle collisions were the same as when the study was initiated. This population decline was precipitated by high mortality due to deer-vehicle collisions and low reproductive rates of untreated females associated with high deer densities (Rutburg et al 2004). As a result, effects of fertility control on deer populations remain ambiguous.

Stabilization or modest population reductions under relatively ideal conditions (i.e., small areas of 1 square mile or less, access to nearly all deer, isolated deer populations, and resources to support intensive field work) do not prove fertility control as a practical deer management tool. On Fire Island, deer population reduction occurred in one area but not in others (Underwood 2005). At NIST, factors other than fertility control, such as deer-vehicle collisions and high deer density, influenced deer population changes (Rutberg et al. 2004). And in both cases, fertility control was shown to be a multi-year process to stabilize deer populations.

Current fertility control agents are not timely deer management tools. By the time communities initiate action to manage local deer populations, conflicts are typically at crisis level. The questions regarding fertility control agents in these situations not only center on biological and financial feasibility but also timeliness. For a community contemplating use of contraceptives for deer management, a number of questions must be asked. First, do deer impacts exceed safe and acceptable levels? An affirmative answer to this question is a prerequisite for a community to take action to manage deer impacts. Otherwise, the debate will not focus on a solution, but rather on whether or not there is a problem. Second, can a community suffering unacceptable deer-human conflicts wait 10 years for the population and deer-human conflicts to stabilize? If a deer population can be stabilized using fertility control agents, populations still need to be reduced to alleviate deer-human conflicts. Is reducing a deer population via deer-vehicle collisions acceptable? “From a wildlife conflict resolution viewpoint, if you can’t stabilize or reduce a deer population with a contraceptive—no matter how well it works on treated individuals—you don’t have a management tool” (Rutberg 2005). Additionally, if this stabilization or reduction does not occur in a reasonable timeframe, you also do not have a management tool.

The Game Commission is struggling to control urban/suburban deer populations and continues to search for effective and practical tools to reduce these deer populations and thus deer-human conflicts. In Pennsylvania’s most developed areas, survival rates and reproductive rates create a situation where there is little room for error if contraceptives were to stabilize deer populations. For example, to stabilize a deer population with average non-hunting survival and reproduction rates, 95 percent of all adult females would need to be treated with a fertility control agent that was 90 percent effective to stabilize a deer population. It took 7 years to reach this level of treatment on the 570-acre NIST study site (Rutberg et al. 2004). Again, fertility control agents are not a short-term solution. Although the Game Commission understands the desire by some to use fertility control agents as an alternative to lethal methods, fertility control agents have not demonstrated an ability to reduce deer-human conflicts.

CONCLUSION

Different stakeholders want different deer densities for different reasons. These reasons range from individual beliefs and self-gratification to economics and environmental concerns. Table 9 also depicts the impracticality of pleasing everybody. The overarching goal is to create an effective deer management program that strives for a deer population that will preserve, protect, and enhance ecological communities, while striking a balance between the positive and negative impacts deer have on Pennsylvania's economy and residents.

Table 9. Deer densities that would likely be preferred by various stakeholders in Pennsylvania. Preferences are based on how each stakeholder is impacted by deer, and what is known about deer population ecology. Concept derived from Roseberry and Woolf (1991).

Stakeholder	Deer Density		
	Low	Intermediate	High
Anti-hunter opposed to recreational hunting	Unsatisfied	Unsatisfied	Satisfied
Hunters who want antlered-only hunting	Unsatisfied	Unsatisfied	Satisfied
People who want to see a lot of deer	Unsatisfied	Unsatisfied	Satisfied
Hunters who want high antlered harvests	Unsatisfied	Satisfied	Unsatisfied
Hunters who want high success rates	Unsatisfied	Satisfied	Unsatisfied
Deer processors and taxidermists	Unsatisfied	Satisfied	Unsatisfied
People interested in a healthy deer herd	Satisfied	Satisfied	Unsatisfied
People who are concerned about the environment	Satisfied	Unknown	Unsatisfied
Commuters concerned about deer-vehicle collisions	Satisfied	Unknown	Unsatisfied
Farmers concerned about crop damage	Satisfied	Unknown	Unsatisfied
Foresters concerned about forest regeneration	Satisfied	Unknown	Unsatisfied