ATTACHMENT C

MONMOUTH COUNTY PARK SYSTEM
DEER MANAGEMENT PROGRAM BACKGROUND INFORMATION
4/20/2022

Current Board of Recreation Commissioners Policy

The rules and regulations governing the public's use of County park and recreation areas as adopted by the Monmouth County Board of Recreation Commissioners (Resolution No. R-21-6-21=203) permit hunting in areas specifically opened for that purpose by order of the Board. The exact language of the relevant rules is provided below.

16. *No person shall discharge any weapon or firearms within or into a County Park or Recreation Area. Firearms shall not be carried nor had in possession unless unloaded in both barrel and magazine, except that this regulation shall not apply in portions of a County Park or Recreation Area which are open to hunting by order of the Board of Recreation Commissioners during such open periods. A bow with a nocked arrow is prohibited except in portions of a County Park or Recreation Area open to hunting and in other locations designated and posted for archery.*
17. *No person shall molest, trap, capture, hold, remove, injure or kill any animal, or disturb its habitat within a County Park or Recreation Area, except in portions of a County Park or Recreation Area open to hunting and/or fishing. The use of portions of a County Park or Recreation Area open to hunting and/or fishing is subject to NJ State statutes and Division of Fish and Wildlife laws and regulations. Hunting shall be subject to guidelines and permitting requirements promulgated by the Director of County Parks and Recreation. The release of wild or domestic animals in a County Park or Recreation Area is prohibited.*

The Board of Recreation Commissioners first approved the opening of park areas for deer hunting beginning with the State of New Jersey's 2004/2005 season. The program has continued and expanded through the 2023/2024 season by subsequent action of the Board.

Objectives of the Deer Management Program

As a conservation and recreation agency, the Park System acquires and manages land both for resource protection and recreation opportunities. Little, if any, of Monmouth County's natural environment is unaffected by the past and present actions of the people who live and work here. Responsible land stewardship and resource protection require that wildlife and its habitat be managed for the benefit of all animals and plants. Where the dominance or behavior of a particular species threatens the well-being of others, active intervention is required. The growth and density of the State's deer population and its consumption of both the native plant materials that are vital to a healthy forest and as food and shelter to birds and small mammals constitute a problem requiring active intervention. Although deer and other wildlife are not its property, as the third largest landowner and manager in Monmouth County (after the Federal and State governments), the Park System is the guardian of critical natural resources for current and future generations and has a responsibility to manage the deer populations within County parklands.

Deer Overabundance and Ecological Damage

As steward and protector of natural resources within the County parklands, the **consequence of concern** to the Park System regarding deer overabundance is **ecological damage.** Deer, one species, can have a significant negative impact on the abundance, growth, regeneration, and diversity of 700-800 native plant and animal species. In areas of overabundant deer population, deer consume ground cover and shrubs, affecting birds and other animals that rely on this vegetation; their populations decrease and may eventually disappear locally. In the absence of native ground cover, aggressive exotic plants, many introduced as ornamentals, begin to take over the forest floor, limiting the chances for the native plants and dependent birds and animals to recover. Deer also browse young saplings, precluding the natural regeneration of forests. A study released by the New Jersey Audubon Society in March 2005 cites over-abundant white-tailed deer as one of five "alien disruptions" threatening the integrity of New Jersey's natural ecosystems and requiring direct management intervention. Changes in the forest composition from deer damage are clearly visible at many county park sites, threatening natural resources that were intended to be preserved by the County's acquisition of the land. Because these changes happen over a period of time, the general public may not be aware of the ecological damage. Still, as stewards of public land, ecological damage is an issue that is of special interest to the Park System.

Why there is a problem – As open areas throughout Monmouth County and New Jersey are developed, the deer population has concentrated on the remaining green space; public parklands, corporate parks, farms, stream corridors and suburban subdivisions. Because development has increased the edge habitats (woods bordering fields and lawns) where deer prefer to graze or browse, the deer population, although displaced, is thriving. Pockets of wetlands and buffer areas scattered throughout developed areas serve as prime deer bedding habitat, escape cover, and travel corridors. The reduction of land area open to hunting resulting from development also contributes to the increase in deer populations. Suburban development, corporate office parks, other large private property, and public parks where hunting is not permitted, serve as refuges, allowing unmanaged and, therefore, unchecked growth of the deer population. Monmouth County's forested areas, agricultural fields, and residential and corporate landscapes provide an abundant year-round food supply to support the deer population. As these patterns are repeated, the deer population will continue to increase and the problems associated with deer will escalate and spread to additional locations. Annual population growth of 40% is typical in the absence of any management strategy. In 2017, New Jersey Fish and Wildlife estimated the current statewide deer population at 150,000, roughly equivalent to an average deer density of 30 per square mile of deer range, although the populations are not evenly distributed. The maximum density tolerable for native timber species is 20-25 deer per square mile. To retain an existing healthy shrub layer, the maximum density should not exceed 10 deer per square mile.

Management Options

The authority and responsibility for managing deer in New Jersey has been given by legislative action to the New Jersey Fish and Game Council and the State Division of Fish and Wildlife. The Council is responsible for establishing seasons, bag limits, the number of permits to be issued, and the methods for hunting. The Division is responsible for the scientific information that serves as the basis for the Council's actions.

The options discussed here are limited to those that have the potential to reduce the ecological impacts of deer, as this is the consequence of concern of the Monmouth County Park System. Techniques to reduce ticks on deer, to discourage deer from crossing roads, and other strategies not related to ecological impacts are not included. Likewise, hunting of coyotes, turkeys, and other wildlife that do not consume or damage forest resources is outside the scope of the Park System's Deer Management Program.

Non-Lethal Options

Reproductive Controls – The availability of efficient and effective reproductive controls was investigated prior to the first year of the Deer Management Program. The progress of active research and experimental efforts and the status of Federal and State rules and regulations are monitored on an on-going basis.

There are currently no active or pending research projects involving deer reproductive control in New Jersey and the State does not have any funding available for such research. Generally speaking, the types of reproductive controls for deer that have been investigated by the scientific community include:

- Sterilization – surgical sterilization offers a one-time permanent approach to controlling population growth. It involves the capture and sedation of each deer, requiring significant effort and resulting in high stress to the animal. Scientific studies are investigating gene-therapy and chemotherapy as possible alternatives to surgical sterilization.
- Contragestation – administered to does orally or by vaccination post fertilization, contragestation agents terminate pregnancy. Annual administration is required. Compounds delivered late in a pregnancy may require up to 48 hours to take effect, causing significant stress to the animal. Used primarily with zoo or preserve animals, this method is largely ineffective in free-ranging populations that can easily become pregnant again after treatment.
- Immunocontraceptives – administered to male or female deer orally or by vaccination prior to fertilization to interfere with that natural process.

Sterilization of free-range white-tailed deer in the park system is not a feasible approach to deer management. Not only is it stressful to the deer, but it is also logistically difficult to capture female deer throughout the county and sterilize them, as this requires a sterile surgical environment, a specialized professional, and an estimated cost of $1000 per deer (Walker et al. 2021).

In 2009, the U.S. Environmental Protection Agency (EPA) granted regulatory approval for the use of the immunocontraceptive vaccine, GonaCon™ by state wildlife management agency personnel as a “Restricted Use” pesticide to prevent reproduction by free ranging white-tailed deer over 1 year old. Registration of GonaCon™ by individual states is necessary before it can be used; New Jersey registered the product in 2011. NJ Division of Fish and Wildlife requires that both a Community Based Deer Management permit and a Special Permit to Inhibit Wildlife Reproduction must be obtained. The Division would only approve the use of GonaCon™ if administered by a person experienced in tranquilizing and vaccinating deer. Regulations include a need to tranquilize each deer prior to administering GonaCon™, tagging the deer in some way to indicate vaccination, and the need to obtain written permission to access all properties within 2000’ of sites on which deer might be tranquilized, recovered and vaccinated. The Division notes that GonaCon™ may not be administered to deer less than one year of age, and in most areas of New Jersey, 30-40% of fawns reproduce and give birth to one fawn. In the most recent efforts to use GonaCon™ in New Jersey, 30% of female deer receiving the vaccine became pregnant. For these reasons, the Division believes GonaCon™ is still an expensive means of population control, that is really only suitable in a few unique circumstances, and that hunting must still be the primary means of population control wherever possible. A wildlife biologist with the NJ Division of Fish and Wildlife confirmed in December 2016 that no Special Permits to Inhibit Wildlife Reproduction have been issued.

Fertility control in deer is an advancing technology that continues to have successes and failures as it is evaluated for use. Implementing deer contraceptive techniques, including gaining access to the animals, and applying the precise dosage at the proper time and in the required frequency has proven to be technically challenging and labor intensive in research trials within contained sites, and can be expected to be more so with free ranging populations. As research has progressed questions persist regarding the methods and

effectiveness of delivering the contraceptive including the longevity of treatment and the percentage of the population requiring treatment. Feeding stations, capturing and sedating animals, dart applications, and surgery have limitations of effectiveness and result in trauma to the animal. Specific concerns pertaining to oral contraception include the logistics of daily bait distribution and treatments, dosage control, and ingestion by non-target wildlife, domestic animals, or children. Intramuscular administration typically requires individual deer to be injected with an initial dose or doses of a reproductive inhibitor that would either make the doe infertile or cause her to abort her fetus, or render the buck sterile, followed by an annual dose. Newer formulations of these compounds may effectively prevent conception for two to four years, but eventually retreatment is required and the location and recapture of previously treated deer has proven difficult in experimental programs. Because deer are a food animal, the use of most experimental products requires that the treated deer be tagged as “Not for Human Consumption.” Additional concerns exist with regulatory issues, effects on deer social structure, the impact on the overall long-term health of the deer population, public health considerations, and its cost effectiveness.

The March 2005 New Jersey Audubon Society study, Forest Health and Ecological Integrity Stressors and Solutions Concept White Paper, stated “reproductive control agents have been demonstrated on individual animals but an efficient, cost-effective means of delivering large-scale population control of deer is not yet available.” More recent research corroborates this statement. The high reproductive output of deer, their high survival rate, and the size of the range of non-contained populations are problematic for effective reproductive control. The majority of the research trials involve small insular deer populations on islands or within fenced areas; positive results from trials such as these may not necessarily transfer to the free-range populations within the County Park System. A 2021 study by Walker et al. found that fertility control with GonaCon™ in an insular free-range deer population was unsuccessful, as the deer population continued to increase concurrently with the immunocontraceptive project. Additionally, this study estimated that the cost of deer management by hunting was approximately a quarter of the price per deer compared to the immunocontraceptive program. The not-for-profit group SpayVac-for-Wildlife suggests that a minimum of 80 percent of all does would need to be treated in order for the immunocontraceptive to be effective at limiting population growth. The target rate for immunocontraceptive effectiveness is 90 percent of does treated; in a two-year study at the Giralda Farms Corporate Center in Madison, NJ, a 70 percent rate of effectiveness was achieved the first year (of 51 adult does treated with GonaCon™, 30 percent produced fawns after one year) and a 55 percent rate of effectiveness after the second year (45 percent of does treated produced fawns after two years). Fertility control for deer at this time for free-range populations is not effective at reducing deer populations, not logistically possible within the current resources, and not cost effective.

The Park System continues to follow ongoing regional studies, including an experimental PZP project in Hastings-On-The Hudson (NY), vasectomy efforts in Staten Island, NY, and the now discontinued East Hampton sterilization project.

While fertility control agents may in the future become practical as an element of the Park System’s Deer Management Program, they are unlikely to ever serve as the sole management tool given the number of sites managed by the Park System, the fact that the deer are free ranging, and the likely cost of such a program. To meet resource restoration objectives, an initial population reduction by mortality would be necessary both to bring the high population numbers down to a level that could reasonably be treated and also to compensate for the fact that a deer fertility program has no short-term effect on population. The Park System would be willing to partner with a municipality on a Community Based Deer Management program if a county property and adjacent municipal/private land were to meet the requirements outlined by the NJ Division of Fish and Wildlife. The Park System will continue to monitor progress in the development of reproductive controls suitable to its deer population.

Trap and Translocation – There are private contractors who capture and relocate deer to game farms, private refuges, or where permitted, in the wild. The sites that accept relocated deer may sell or butcher any offspring, and those relocated to game farms are eventually killed. Releasing them into the wild requires the consent of the property owner or manager. While some other states permit release of deer into the wild, State law in New Jersey prohibits it other than the release of individual rehabilitated or nuisance animals and most other states now ban the importation of deer because of the concern for chronic wasting disease. Baiting and trapping are less effective when other sources of food are readily available. Relocation does not guarantee the survival of the deer. Studies have found that 50 percent of relocated deer die within one year; many deaths are related to the stress of relocation.

Fencing – Rutgers University's Center for Wildlife Damage Control at the Snyder Research Farm in Pittstown has conducted field experiments on the effectiveness of various fences in controlling deer access. They recommend a fence at least 8 to 10 feet in height. Access points need to be gated, limiting the practicality of this option in most park settings with numerous formal and informal access points. It is often necessary to conduct a hunt or relocation program in conjunction with fencing to eliminate resident deer from the fenced area. The Park System spent over $180,000 to fence the 52-acre Deep Cut Gardens, one of the County's smallest parks and home to a valuable horticultural collection, including decorative fencing and a gate along the public road frontage and a 10-foot-high fence consisting of 8 foot high galvanized wire mesh topped by four strings of high tensile galvanized wire along the remainder of the property boundary. However, due to trees falling from storms and other natural causes, the fence is regularly damaged and is often insufficient at keeping deer out. Even with the fence intact, deer still enter Deep Cut Gardens through the front gate entrance and are present in the park, causing significant damage to both the high-value horticultural collection and the natural vegetation. At the Arboretum at Holmdel Park, where the expensive collection of specimen trees, shrubs, and woody plants was suffering extensive damage from deer browsing, the Park System spent roughly $147,000 to install similar fencing around a 12-acre area. Fencing was the selected deer control option at these areas because of the zero deer damage tolerance of the valuable plant collections that are the fundamental purpose of the facilities. However, because of the cost of fencing, the large size of most park properties, the limited effectiveness, and the negative impact of fencing on public and neighbor access to park properties, fencing is not a practical option for protecting most parks from deer damage.

Repellents – There are a number of commercially available repellents that can be applied to plant materials to discourage deer from eating them. Treatment of a large number of plants can be labor-prohibitive, as most repellents must be applied by hand spraying. Treatment of select plants tends to force deer to other less desirable but equally edible plants. The effectiveness of the repellents currently on the market is compromised by rainfall, requiring frequent reapplication. Repellents may be a viable solution in a residential setting, but this is not a practical option for protecting large sites and forested areas from deer damage.

Change of crops and plant materials – Certain crops are less vulnerable to deer damage; for example, deer tend to eat the seed heads of corn plants, precluding their germination, but will eat some soy beans while leaving the bulk of the plant and beans in tact. Likewise, certain ornamental plant materials are more or less appealing to deer. For example, deer devour Hosta, but leave Stephanandra untouched. Avoiding the cultivation of their favorite plants and crops can reduce deer damage, but it also reduces the diversity of plant materials available for enjoyment by park visitors and for nourishment and shelter by other small mammals and birds. If the plants most desirable to deer are eliminated from the landscape, the deer will consume the less desirable plants that are available. Changing to less vulnerable plant materials may be a suitable strategy for small properties

and decorative plantings, but this is not a practical option for protecting large sites, forested areas, and native plants from deer damage.

Harassment – Harassment in the form of noise or physical intimidation can provide short-term relief and is an effective strategy for moving deer from targeted areas such as airport runways. Site conditions such as thick woods, bodies of water or wet areas may make this difficult, and it cannot be attempted where there is a risk of inadvertently forcing the deer onto a public roadway. Deer will return to the site once the harassment ceases and, in some cases, will adapt to the harassment over time, rendering it ineffectual.

Lethal Options

Regulated hunting – There were 54,980 deer harvested during the State's 2020-2021 deer hunting seasons; 950 were harvested in Monmouth County Parks, roughly 2% on County park property. The Division of Fish and Wildlife makes annual adjustments to the seasons in order for hunting to be a more effective means of controlling deer populations. Examples of such adjustments include additional hunting days, increasing the number of permits available, allowing the harvesting of two deer at a time under certain conditions, expansion of the "earn-a-buck" program whereby hunters are required to harvest an antlerless deer before harvesting an antlered deer, and limiting hunters to no more than one antlered male deer per permit per season throughout the state. The Division warns that these changes alone are of little value if hunters are denied access to deer herds. They identify the following factors as limitations to the effectiveness of hunting in controlling deer populations: development patterns, establishment of parks where hunting is prohibited, regulations that severely restrict or preclude hunting, and landowner decisions not to allow hunting. A long-term study based in New Jersey demonstrated that effective deer management through sustained hunting can help reverse forest degradation, even if conditions fail to improve in the surrounding region (Almendinger et al. 2018).

Controlled or limited hunting – A controlled or limited hunt is a form of regulated hunting that is conducted within the framework of the basic rules and regulations of the State, but with additional controls or limitations in place. Examples of limitations include allowing hunting on fewer dates than permitted by the state, permitting only select types of hunting (e.g. bow hunting only), limiting who may hunt and/or the number of hunters, and pre-screening prospective hunters.

Permit to shoot – State law authorizes the Division of Fish and Wildlife to issue a permit-to-shoot or depredation permit to owners or lessees of agricultural land experiencing crop damage. These permits may be used throughout the calendar year. The permit includes a list of individuals permitted to hunt under the permit. Golf courses, gardens and other park landscapes managed by the Park System do not constitute crops for the purpose of these permits.

Community-Based Deer Management Program

State law authorizes the issuance of special deer management permits where conditions preclude regulated hunting or where a more aggressive harvest is required. A Community-Based Deer Management Program can choose to be a hybrid of lethal and non-lethal techniques. Examples of techniques that may be part of a CBDMP include shooting by an authorized agent, capture and euthanization, the use of high-power rifles and silencers, hunting at night, out-of-season hunting, harvest limits different from those established by the Division of Fish and Wildlife, and chemical fertility control. Until 2010, only municipalities, airports and County Boards of Agriculture were eligible for this program. Under legislation enacted in August 2010, a county governing body may apply for a permit under this program for lands owned by the county.

<u>Hunting in New Jersey</u>

Who hunts - State records indicated that in 2010 there were an estimated 90,000 hunters licensed in the State of New Jersey, of which approximately 4200 live in Monmouth County.

The State of New Jersey requires all hunters to be licensed and, since 1955, the licensing of new hunters has been conditioned on their successful completion of an approved hunter education program. The purpose of the Hunter Education Program is to promote responsible, ethical hunter conduct; emphasize the importance of wildlife management, laws and regulations; and to encourage safe handling of hunting equipment. Hunters must also demonstrate field proficiency prior to licensing.

Where they hunt - The State Division of Fish and Wildlife manages over 327,000 acres of Wildlife Management Areas; those in Monmouth County open for deer hunting are Turkey Swamp Wildlife Management Area in Freehold Township, Assunpink Wildlife Management Area in Millstone and Upper Freehold Townships, and Manasquan Wildlife Management Area in Wall Township. A portion of State license fees is used for land acquisition; the Division added approximately 2,000 acres to the Wildlife Management Area system in 2010.

In total over 750,000 acres of public land in New Jersey is open to deer hunting. Other public lands open to deer hunting include State parks and forests, including Allaire State Park in Howell and Wall Townships and Monmouth Battlefield State Park in Manalapan and Freehold Townships; a number of federally owned properties including Earle Naval Weapons Station in Colts Neck, Howell, and Tinton Falls; and several parks and open space areas managed by the Atlantic County, Morris County, Mercer County and Hunterdon County Park Systems and the Township of Millstone.

Historically, private lands have been a major component of hunting lands. This supply of land will continue to shrink as more land is either developed or preserved as parks where hunting is prohibited. Of the roughly 7542 acres acquired by the Monmouth County Park System since 1990, it is estimated that as many as 6520 acres may have been hunted under prior ownership (calculated in 2004).

Firearms and bows cannot be discharged across roads. Loaded firearms are prohibited within 450 feet of any structure or school property except with written permission of the property owner. In 2010 State legislation reduced the mandatory safety zone for bow hunting from an elevated tree stand to 150 feet; other bow hunting is still subject to the 450-foot buffer.

When they hunt – Deer hunting seasons are regulated by the State Division of Fish and Wildlife and vary from year to year and by zone. As a rule, they are organized by hunting type, i.e. bow, muzzleloader, shotgun. The zones wholly or partially in Monmouth County include Zones 15, 16, 17, 39, 40, 50, 51, and 64. Generally speaking, the seasons are as follows:

- Fall Bow - early September through late October; variable by zone

- Permit Bow (special permit required in addition to license) – late October through the end of December; variable by zone
- Six-day Firearm– early December
- Permit Muzzleloader (special permit required in addition to license) - late November/early December through early January/mid February; variable by zone
- Permit Shotgun (special permit required in addition to license) – late November/mid-December through mid-late January/mid February; very variable by zone
- Winter Bow – January through mid-February; variable by zone

Deer hunting is prohibited in public parks on Sundays. State legislation adopted in 2009 permits deer hunting with a bow and arrow on Sundays on private property and within State Wildlife Management Areas only.

ATTACHMENT D

MONMOUTH COUNTY PARK SYSTEM
AERIAL DEER SURVEY RESULTS

- Helicopter counts are performed with the assistance of the Monmouth County Shade Tree Commission. A park manager serves as the spotter/counter.
- There is no schedule for helicopter counts. Counts are taken when there is snow cover for maximum visibility, when the helicopter and pilot are available for this purpose, and when weather conditions permit the helicopter to fly. Therefore, the number of counts and parks included varies from year to year. The last opportunity to count via helicopter was 2/18/2010.
- The methodology employed is not claimed to be scientifically valid, but a reasonable attempt to estimate deer densities within park areas.
- It is assumed that, as only deer visible from the helicopter are counted, the survey results represent an under count of actual deer densities. This is particularly true in those parks where forest cover and the presence of many evergreens obscure visibility (these areas are marked as OV).
- Because deer herds travel across property boundaries, in some instances deer were counted both within park boundaries and on adjacent properties (column labeled “Deer in Area”).

Park	Date	Deer in Area	Deer per Square Mile	Deer in Park
Big Brook Park Marlboro 378 acres/ .59 sq. miles	2/21/03	110	186	
	2/02/04	>125	212	
	1/31/07	>95	161	
	2/25/08	71	120	
	2/8/10	42	71	56
Charleston Springs Golf Course Millstone 743 acres/ 1.16 sq. miles	2/26/03	130	112	
	1/30/04	>124	107	
	2/02/04	>120	103	
Partial (.41acres)	1/25/05 (See note 1)			85
	2/18/10 (See note 4)	15	37	18
South Course only 200 acres/ .31 sq. miles	2/20/03	70	226	
	1/29/07	31	100	
Clayton Park Upper Freehold 311 acres/ .49 sq. miles (OV)	2/02/04	30	61	
	1/29/07	11	22	
Hartshorne Woods Park Middletown 736 acres/ 1.15 sq. miles (OV)	2/21/03	24	21	
	2/6/09	15	13	14

Park	Date	Deer in Park	Deer per Square Mile	Deer in Area
Durand Tract Freehold 90 acres/ .14 sq. miles	2/26/03	46	329	
Holmdel Park Holmdel				
Main section 346 acres/ .54 sq. miles (OV)	2/20/03	15	28	
	12/8/05	6	11	11
	1/16/09	47	87	4
	2/6/09	44	81	
	2/8/10	25	46	14
	2/18/10	16	30	
Ramanessin section 226 acres/ .35 sq. miles	2/20/03	20	57	27
	2/21/03	43	123	
	1/30/04	19	54	
	12/8/05	47	134	64
	1/29/07	51	145	
	2/25/08	42	120	
	1/16/09	49	140	78
	2/6/09	1	3	9
	2/8/10	0		54
	2/18/10	19	54	
Howell Park Golf Course Howell 308 acres/ .48 sq. miles	2/26/03	33	69	
	2/18/10	15	31	14
Huber Woods Park Middletown 258 acres/ .40 sq. miles (OV)	2/20/03	11	28	
	2/21/03	38	95	
	1/16/09	12	30	7
Manasquan Reservoir **Bear Swamp section** Howell 122 acres/ .19 sq. miles (OV)	1/30/04	9	47	
Shark River Park Wall/Neptune/Tinton Falls 915 acres/ 1.43 sq. miles (OV)	1/30/04	30	21	
Tatum Park Middletown 368 acres/ .58 sq. miles (OV)	2/20/03	13	22	19
	1/25/05 (See note 1)	30	52	45-50
	1/31/07	6	10	16
	1/16/09	23	40	25
	2/6/09	24	41	
	2/18/10	15	26	13

Thompson Park Middletown/Holmdel 665 acres/ 1.04 sq. miles	2/13/03	70	67	100
	1/30/04	52	50	73
	2/02/04	56	54	80
	1/25/05 (See note 1)	33	32	65-75
	12/8/05	70	67	78
	2/21/06 (See note 2)	19	18	34
	1/29/07	18	17	35
	1/31/07 (See note 3)	26	25	43
	2/25/08	8	8	
	1/16/09	12	12	18
	2/6/09	6	6	
	2/8/10	14	13	34
	2/18/10	6	6	13

Notes:

1. Deep snow cover at the time of the 1/25/05 flight may have yielded an under count of actual deer as deer were likely bedded down in dense cover.
2. Assignment of the counter to a rear seat of the helicopter for the 2/21/06 flight may have yielded an undercount of actual deer.
3. Flight excluded Longbridge Annex section of park due to insufficient fuel; likely resulted in an undercount.
4. High winds precluded a complete survey of the golf course, likely resulting in an undercount.

MONMOUTH COUNTY PARK SYSTEM
SPOTLIGHT DEER SURVEY RESULTS

- Spotlight deer survey counts are performed by park staff driving a designated route and searching for deer perpendicular to the route using a spot light.
- Spotlight counts can only be performed within areas of a park with a drivable route. Wet conditions may temporarily render some routes impassable.
- The spotlight surveys are conducted between mid-April and mid-May when deer are moving around, but before full leaf- out interferes with visibility.
- Each route is surveyed for three to four weeks.
- Surveys begin ½ hour after sunset when the deer are likely to be feeding at forest/field edges; surveys taken earlier in the day are likely to yield under counts.
- Surveys are cancelled in the event of rain as rain disrupts feeding patterns and would yield an under count.
- The methodology employed is not claimed to be scientifically valid, but is commonly used in the conservation world and is a reasonable attempt to estimate deer densities within park areas.
- It is assumed that, as only deer visible from the route are counted, the survey results represent an under count of actual deer densities.
- The below table summarizes the highest individual count of deer per year (top row) and the calculated density of deer per square mile.
- Spotlight counts were not conducted in the 2020/2021 season due to the covid-19 pandemic.

Park	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2021
Big Brook Park 382 ac/0.6 sq mi	89 148/ mi^2	121 202/ mi^2	103 172/ mi^2	93 155/ mi^2	135 225/ mi^2	133 221/ mi^2	97 161/ mi^2	81 135/ mi^2	52 87/ mi^2		75 125/ mi^2			
Hartshorne Woods Park 787 ac/1.23 sq mi	30 24/ mi^2	18 15/ mi^2	17 14/ mi^2	16 13/ mi^2	15 12/ mi^2	5 4/ mi^2		26 21/ mi^2	10 8/ mi^2	16 13/ mi^2	36 29/ mi^2	27 22/ mi^2	29 24/ mi^2	37 30/ mi^2
Holmdel Park - North 343 ac/ 0.54 sq mi								50 93/ mi^2	68 125/ mi^2	63 117/ mi^2	11 20/ mi^2			19 35/ mi^2
Holmdel Park - Ramanessin 227 ac/ 0.35 sq mi	41 115/ mi^2	77 220/ mi^2	53 151/ mi^2	52 149/ mi^2	53 151/ mi^2	87 248/ mi^2	48 37/ mi^2	69 197/ mi^2	43 122/ mi^2	49 140/ mi^2	10 28/ mi^2			37 106/ mi^2
Huber Woods Park 355 ac/ 0.55 sq mi	16 29/ mi^2	19 35/ mi^2	15 27/ mi^2	15 27/ mi^2	18 33/ mi^2	34 62/ mi^2		16 29/ mi^2	12 21/ mi^2	10 18/ mi^2	18 32/ mi^2	18 33/ mi^2		15 25/ mi^2
Tatum Park 368 ac/0.58 sq mi	32 55/ mi^2	21 36/ mi^2	21 36/ mi^2	27 47/ mi^2	25 43/ mi^2	10 17/ mi^2		21 36/ mi^2			21 36/ mi^2			26 45/ mi^2
Thompson Park 665 ac/1.04 sq mi	48 46/ mi^2	39 38/ mi^2	58 56/ mi^2	45 43/ mi^2	39 38/ mi^2	46 44/ mi^2		43 41/ mi^2	60 58/ mi^2	87 84/ mi^2	53 51/ mi^2	38 37/ mi^2	67 64/ mi^2	

ATTACHMENT E

MONMOUTH COUNTY PARK SYSTEM
DEER EXCLOSURE STUDIES

Park System staff have constructed 9 deer exclosure sites at 7 park areas since 2003 as part of an on-going Deer Exclosure Study (Clayton Park, Hartshorne Woods Park, Holmdel Park, Shark River Park, Tatum Park, Thompson Park and Turkey Swamp Park). The exclosures provide a physical barrier to access by deer while allowing access by small mammals, insects, and birds. The plant species in plots within the 30-foot by 30-foot exclosures are compared to those in plots outside the exclosures. Of the 9 exclosures, 7 have demonstrated significant recovery to understory and midstory vegetation cover inside the exclosure compared to outside the exclosure. The exclusion of deer browse has allowed this vegetation to reestablish. Of the 9 exclosures, about half of them have also demonstrated higher species richness and/or higher forest quality composition inside the exclosures compared to outside the exclosures. These studies lend insight on the possibilities of forest recovery with a successful deer management program. The following photographs from the Thompson Park deer exclosure demonstrate the deleterious effects of deer browse on forest composition in our parks.

5/29/2012
Thompson Park Deer Exclosure

Figure 1: Exterior of the exclosure taken from fence

Figure 2: Interior of the 30' sq exclosure.

Figure 3: Stark contrast in percent cover and diversity of species outside and inside the exclosure fence