



**METROPARKS
TOLEDO**

**2016-2017 Deer
Management Plan
and
Request for Deer
Damage Control Permit**

12-9-2016

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I. INTRODUCTION

A. METROPARKS OF THE TOLEDO AREA GOVERNING POLICIES

The following policies governed the development of the 2016-2017 deer management plan:

POLICY: THE MISSION OF THE METROPOLITAN PARK DISTRICT

The mission of Metroparks of the Toledo Area is to conserve the region's natural resources by creating, developing, improving, protecting, and promoting clean, safe, and natural parks and open spaces for the benefit, enjoyment, education, and general welfare of the public.

Board Policy #: 1	Resolution #: 60-01	Approved: August 15, 2001
	Resolution #: 58-08	Approved: July 16, 2008
	Resolution #: 79-14	Approved: June 4, 2014

POLICY: STEWARDSHIP OF PARKLANDS

Every activity of the Metropolitan Park District of the Toledo Area is subordinate to its duty to faithfully preserve the public parklands for future generations in essentially their natural state.

Ongoing research has identified significant representative areas that contain rare and endangered plants, animals, and natural features within the Metroparks, including the Oak Openings Eco-region, Lake Erie Coastal Marshes, Maumee River Alvar Ledges, the Great Black Swamp, Oxbow/Floodplain/Riverine Wetlands and prairies, Glacial Groove and Fossil Bedrock Outcroppings, as well as wet prairie.

These natural areas are land and water resources where natural processes are sustained through active best management practices with a goal of sustaining and enhancing the natural biodiversity and global connection of these representative areas of Northwest Ohio.

Where significant cultural resources are present in natural areas and are worthy of preservation for their historic value, they shall be protected and presented for public appreciation and enjoyment to an extent compatible with the mission of the park district.

The Metropolitan Park District of the Toledo Area will provide a leadership role in cooperation with other public and private agencies, and private landowners to preserve significant natural, historic, and cultural areas to enhance the quality of life within the northwest Ohio region.

The purpose, significance and mission statement for each Metropark are attached and made a part of this policy.

Board Policy #: 4 & 5	Resolution #: 59-02	Approved: August 21, 2002
	Resolution #: 58-08	Approved: July 16, 2008

B. WILDLIFE MANAGEMENT PHILOSOPHY AND PLANNING FRAMEWORK

The following management philosophy and planning framework were used to guide the development of the 2016-2017 deer management plan.

1. PROBLEM OF OVERABUNDANCE OF WILDLIFE POPULATIONS

The Northwest Ohio landscape has been irrevocably altered by humans. Human-induced changes to natural land cover have impacted populations of native and nonnative wildlife species, some negatively and others positively. Those species whose populations increase within the human-dominated landscape typically share one or more of the following traits:

- a) They tend to be habitat generalists which benefit from increased amounts of habitat edge associated with large-scale habitat fragmentation caused by human-induced land-use change.
- b) They are well adapted to living in suburban and exurban landscapes typically resulting from sprawl-type land development.
- c) They are relatively free from pressure from top predators which are largely absent from these human-dominated landscapes.
- d) They benefit from a lack of human controls on their population (such as hunting or trapping) which are largely absent from urban areas where such activities are not permitted.

2. DEFINING CARRYING CAPACITY:

Wildlife species exhibiting one or more of the above characteristics pose an increased risk of exceeding their biological, cultural, and/or ecological carrying capacities and may pose significant threats to native ecosystems including:

- a) Excessive direct predation on desired native plant and/or animal species
- b) Loss of habitat for desired plant and/or animal species, especially those that are rare, threatened or endangered
- c) Spread of wildlife diseases associated with high population densities

Within the context of this management plan document, the following definitions apply:

Biological Carrying Capacity: the maximum population size of a given species that can be supported within a set geographic area. Populations in excess of the biological carrying capacity can cause long-term degradation to the health of the species and its habitat.

Cultural Carrying Capacity: the maximum population size of a given species that can be supported within a set geographic area based on locally accepted cultural values and norms.

Ecological Carrying Capacity: the maximum population size of a given species that can be supported without adversely impacting populations of other native plant and animal species. It is important to note that ecological carrying capacity may be exceeded even when biological and/or cultural carrying capacities are not.

3. WILDLIFE MANAGEMENT PLANNING FRAMEWORK

In keeping with Board Policies 1, 4, and 5, management of overabundant wildlife populations should be done in a manner that is safe, ethical, legal, and in accordance with currently accepted best management practices.

Management of overabundant wildlife populations should be considered under one or both of the following scenarios:

- a) Ecologically-based wildlife population management: Should be considered when a given animal population exceeds its biological and/or ecological carrying capacity as evidenced by appropriate ecological indicators such as:
 - Widespread declines in the health of animals within the population
 - Excessive loss of other desirable native plant or animal species due to direct predation from animals within the population
 - Overall declines in ecological condition or native biodiversity associated with overabundance of animals within the population
- b) Situational wildlife population management: Should be considered when the cultural carrying capacity of a given species is exceeded resulting in a significant negative impact on park visitor experience such as:
 - Excessive animal waste occurring on lawns or developed areas where visitors congregate
 - Damage to the park district's built infrastructure.

C. WHITE-TAILED DEER ECOLOGY AND POPULATION TRENDS

The white-tailed deer (hereinafter "deer") is a native wildlife species occurring in every Ohio county and throughout the eastern United States. Deer are highly adaptable, utilizing a variety of habitats but are especially well suited for forested habitats near forest edges where buds, stems, and leaves of woody and herbaceous plants are abundant (PDCNR 2013). Deer are generalist herbivores, consuming a wide range of woody and herbaceous plant species and plant parts with specific dietary preferences varying by season and habitat (USDA 2014). Deer have an innate ability to preferentially select plants and plant parts that provide the greatest nutritional value for the least physiological cost (Berteaux et al. 1998). An individual deer typically consumes three percent of its body weight per day (Curtis and

Sullivan 2001), thus a single 200-pound adult deer consumes roughly 6 pounds of vegetation each day.

Deer are polygamous (i.e., a single male breeds with multiple females), breeding from October to January with peak breeding activity occurring in early to mid-November. Gestation averages 200 days with most fawns born from late May through mid-June. Fawns are weaned at 10 to 12 weeks and female fawns are capable breeding within their first 6 months. Life expectancy averages two years for males and three years for females in the wild, though individuals may live up to 15 years. In Ohio, adult males typically weigh 130-300 pounds while adult females typically weigh 90-210 pounds (ODNR *undated*).

The reproductive potential of Ohio's deer herd is extremely high. In western Ohio, over 50% of fawn does become pregnant, while pregnancy rates of yearling and adult does exceed 90%. Over 70% of yearling and adult does give birth to twins while 10% of adult does give birth to triplets (Tonkovich et al. 2004). Recruitment and mortality estimates show that Ohio's deer herd is capable of a 50-65% net population increase from the spring pre-fawning period to the fall pre-hunting period (Stoll and Parker 1986). As an example of the high reproductive potential of deer, in the University of Michigan's 1,100-acre fenced George Preserve an introduced population of six deer grew to 222 individuals in seven years (McCullough 1984). Over the past century, the Ohio deer population has exhibited an exponential growth rate since being reintroduced in the 1930s following extirpation from the state around 1904 due to overhunting and habitat loss (USDA 2009). Ohio's deer herd grew from 17,000 deer in 1970 to an estimated peak population of 700,000 deer in 2013 resulting from state-wide habitat improvements and zone-based hunting regulations (Tonchovich 2005).

D. ECOLOGICAL IMPACTS OF DEER OVERABUNDANCE

Deer are considered a keystone herbivore, thus they have a disproportionately large impact on the ecosystem relative to their abundance (Urbanek et al. 2012). The intensity of deer impacts to the ecosystem is widely known to be positively associated with deer population density. Because deer are selective browsers, these impacts disproportionately affect certain preferred plant species over other less preferred species (Gill 1992). At high population densities, deer browse is known to reduce the number of tree seedlings and saplings, reduce growth and reproduction of woodland herbaceous plants, cause local extinction of herbaceous species, and decrease overall vegetation density (Shelton et al. 2014). Excessive deer browse can reduce biological diversity by decreasing abundance of browse-sensitive plant species and leading to dominance of browse-tolerant plant species (Gill 1992). Heavy deer browse is also known to increase the spread of invasive species and lead to long-term shifts in forest succession (Côté et al. 2004).

In addition to impacts to native plant species and communities, deer overabundance has been found to negatively impact other native wildlife species including birds, small

mammals, amphibians, reptiles and arthropods by changing food availability, cover from predators, and microhabitats (Shelton et al. 2014). For example, deCalesta (1997) found that in managed Pennsylvania forests with high deer population densities, species richness and abundance of intermediate canopy-nesting birds (those nesting in the mid-tree canopy) declined by 37% and 27%, respectively. Additionally, five species of birds disappeared from forests when deer densities reached 38 deer per mile² and another two species were lost when deer densities reached 64 deer per mile². Indirect effects of deer overabundance include loss of forest leaf litter, compaction of soils, and changes in nutrient cycling which are known to affect densities of arthropods both above- and below-ground (Shelton et al. 2014). All of these impacts to plant and animal communities, both direct and indirect, are known to occur at deer population densities well below their biological carrying capacity (McShea 2012). Thus there is a need to manage deer populations to mitigate these effects even when there are no signs that the deer population itself is under ecological stress.

II. 2016-17 DEER MANAGEMENT PLAN

A. DESCRIPTION OF AREA TO BE MANAGED

Metroparks of the Toledo Area (Metroparks) is a special park district established under Ohio Revised Code Chapter 1545, which owns and manages over 12,000 acres of parklands and greenways in and around Lucas County, Ohio (Figure 1). The western portion of the park district (approx. 60% of all parkland) occurs within Ohio's Oak Openings Region, which is one of Ohio's most biologically diverse land areas, harboring one third of Ohio's state-listed rare and endangered plant and animal species in an area that collectively represents less than 0.5% of Ohio's total land area. The central portion of the park district (approx. 25% of all parkland) is characterized by the Maumee River, Ottawa River and Swan Creek drainages. These central parklands provide critical natural / forested habitat along these waterways and protect the largest tracts of natural habitat near Lucas County's urban center. The eastern portion of the park district (approx. 15% of all parkland) occurs within the lake plains of Lake Erie's western basin, providing important wetland habitat for migratory / resident waterfowl, songbirds and other wildlife species.

Since 2013, Metroparks has implemented a controlled archery hunting program on several thousand acres of parkland in the Oak Openings Region during the regular state-wide deer archery season. Metroparks staff will continue to seek opportunities to expand this archery program into additional park areas where it can be implemented safely and effectively without adversely impacting other park users and activities. However, controlled archery hunting is not an available management option for parks within some urban park due to municipal restrictions on hunting.

In January 2016, Metroparks initiated a deer culling program with assistance from the U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS) Wildlife Services (WS) within Oak Openings Preserve Metropark located in Swanton Township and Wildwood Preserve Metropark located in Sylvania Township. Beginning in January 2017, Metroparks intends to continue culling at Oak Openings Preserve Metropark and expand its culling program to include Swan Creek Preserve Metropark located within the City of Toledo. At this time, Metroparks does not intend to implement additional culling at Wildwood Preserve under the 2016-17 deer management plan.

Oak Openings Preserve Metropark (see Figure 2)

At 4,180 acres, Oak Openings Preserve features the largest contiguous block of protected natural areas in northwest Ohio. It was first established as an open park in 1931. The park contains approx. 3,000 acres of native hardwood forests (upland oak forests, oak swamp forests, and floodplain forests), 600 acres of native Oak Openings plant communities (savannas, barrens, upland prairies, wet prairies), and 400 acres of planted coniferous forests (dominated by monoculture pine plantations established in the 1930s through 1970s). Oak Openings Preserve supports populations of 53 known

plant species and 13 known animal species designated as endangered or threatened in Ohio. Additionally, the park supports four biological communities designated as globally imperiled or vulnerable (G2 or G3) by the International Union for Conservation of Nature (IUCN). The park is surrounded by a matrix of agricultural lands, residential dwellings, and large forested tracts managed as part of the Maumee State Forest. While hunting occurs within the Maumee State Forest and on many private properties surrounding Oak Openings Preserve, the park itself serves as a large refuge area for the region's growing deer herd.

Swan Creek Preserve Metropark (see Figure 3)

At 451 acres, Swan Creek Preserve features the largest tract of contiguous forest within the City of Toledo. The park was established in the 1960s to mitigate habitat loss resulting from the expansion of the interstate highway system within the Toledo area. The preserve is largely surrounded by a mixture of commercial and residential development along Airport Highway and Glendale Avenue, although the preserve is also connected to a series of other natural areas along the Swan Creek floodplain. Swan Creek Preserve supports populations of seven animal species designated as "of concern" by the Ohio Division of Wildlife. Additionally, the preserve harbors populations of a variety of spring ephemeral wildflower species including large white trillium (*Trillium grandiflorum*) and sessile trillium (*Trillium sessile*). However many of these populations have been in decline since the 1990s based on observations from Metroparks naturalists and volunteer plant monitors.

B. LEGAL/MANAGEMENT OBLIGATIONS FOR MANAGING

Metroparks' legal mandate is established under Ohio Revised Code (ORC) Chapter 1545. Metroparks is governed by a 3-member Board of Park Commissioners appointed by the probate judge of Lucas County. According to ORC 1545.11, "The board of park commissioners may acquire lands either within or without the park district for conversion into forest reserves and for the conservation of the natural resources of the state, including streams, lakes, submerged lands, and swamplands, and to those ends may create parks, parkways, forest reservations, and other reservations and afforest, develop, improve, protect, and promote the use of the same in such manner as the board deems conducive to the general welfare." Park rules and regulations are set by the Metroparks Board of Park Commissioners to protect members of the public as well as the natural and historical resources entrusted to Metroparks. These park rules and regulations are enforced by Metroparks rangers serving as commissioned Ohio peace officers.

C. SPECIFIC REASONS/NEED FOR DEER MANAGEMENT PROGRAM

The Metroparks deer management program is needed to address ongoing negative ecological impacts associated with overabundance of deer within the park district's natural areas. These impacts include documented loss of biological diversity, negative impacts to

forest regeneration, direct damage to woody and herbaceous plants, and increased costs of restoration and maintenance in response to deer damage.

In January 2016, Metroparks initiated a deer culling program with assistance from the U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS) Wildlife Services (WS) within Oak Openings Preserve Metropark and Wildwood Preserve Metropark. Oak Openings Preserve and Wildwood Preserve were specifically selected for deer culling operations in 2016 because they harbor representative examples of some of the highest quality natural features remaining in the Oak Openings Region which are increasingly threatened by a growing deer herd. This action was carried out based on a growing body of evidence within these parks documenting significant negative ecological impacts associated with deer overabundance.

The 2016 Metroparks culling program successfully removed 165 deer from Oak Openings Preserve and 30 deer from Wildwood Preserve. While the initial ecological impacts of culling operations in both of these parks appear to be favorable, especially at Wildwood Preserve, the information that follows in Sections II C. and D. of this management plan clearly demonstrates the need for continued culling operations at Oak Openings Preserve in 2017. While additional culling operations at Wildwood Preserve are not warranted at this time, Metroparks staff will continue to carefully monitor both the deer population and deer damage at this park on an annual basis to determine whether future culling is needed.

In 2017, Metroparks intends to expand its deer culling program to include Swan Creek Preserve based on a strong body of evidence that overabundance of deer at this park are causing long term degradation of park natural resources. This expansion of the Metroparks deer culling program is part of a deliberate and methodical approach to evaluating deer impacts across the park district, prioritizing actions to target park natural areas that are most sensitive and most negatively impacted by overabundance of deer.

C.1. Deer Overwinter Browse Damage to Native Trees and Shrubs

In 2015, Metroparks staff initiated a deer browse monitoring program adapted from the Kinzua Quality Deer Cooperative, McKean County, PA (see Benner 2007) within forested areas of Oak Openings Preserve (OOPM) and Wildwood Preserve (WPM). In 2016, this program was expanded to include forested areas of Swan Creek Preserve (SCPM). Along fixed transects in each park, 10-ft diameter (78.5 ft²) plots were sampled every 200 feet prior to spring leaf-out during the month of April. Areas showing evidence of recent resource management activities by Metroparks staff were excluded from sampling. Within each sampling plot, all woody plants over 2 inches in height with leading stems < 4.5 feet in height were evaluated for browse impacts using the following scale:

1. Not Browsed – no visible browsing damage
2. Light – 0 to 50% of seedling stems are browsed
3. Moderate – more than 50% of stems are browsed but plant is not hedged
4. Heavy – more than 50% of stems are browsed and the plant is severely hedged (plant is browsed to a small ball of twigs), but it is taller than ½ foot.
5. Severe – no seedlings of the species within the plot are > ½ foot tall. Seedlings are severely hedged



Examples of heavy browse (left photo) and severe browse (right photo) from 2015 browse surveys.

Sampling plots with no woody seedling regeneration and those with no deer browse impacts were noted. Deer browse was distinguished from other herbivore browse (e.g., mice and rabbits) by the irregular, torn surfaces on twigs and by the height of browse. Within each sampling plot, woody plants were segregated into the following groups prior to assigning an overall numerical browse rating for each group. Additionally, each species group was assigned a browse preference rating following Wakeland and Swihart (2009):

<u>Species group</u>	<u>Browse preference</u>
<i>Quercus</i> sp. (all oak species)	high
<i>Fraxinus</i> sp. (all ash species)	high
<i>Acer</i> sp. (all maple species)	medium-high
<i>Prunus serrotina</i> (black cherry)	medium
Other trees (all other native tree species)	unassigned
Native shrub species (all)	unassigned
Invasive woody plant species (all)	unassigned

In 2016, a total of 314 plots were sampled at OOPM (compared to 313 plots sampled in 2015), 139 plots were sampled at WPM (compared to 69 plots sampled in 2015), and 130 plots were sampled at SCPM (no plots sampled in 2015). Table 1 summarizes plot regeneration and browse by species group for each of these parks.

At WPM, the percentage of plots exhibiting no regeneration fell by 9% from 2015 to 2016, while the number of vegetated plots experience no deer browse during this same period increased by 11%. Among oak species, plots with regeneration increased by 20% while the amount of deer browse categorized as heavy or severe decline for oaks, maples and cherry by 66 - 90%. These early results for WPM are promising for long term forest regeneration of native hardwoods, corresponding to a drop in estimated post-culling deer population density to 23 deer per mile² in January 2016 compared to an estimated 38 deer per mile² in January 2015.

At OOPM, changes in both deer browse and regeneration between 2015 and 2016 appeared somewhat favorably but were less pronounced than results at WPM. At OOPM the percentage of plots experiencing no deer browse increased by only 1% between 2015 and 2016, while the percentage of plots exhibiting no regeneration increased by 2% during this same time period. Among tree species considered highly preferred by deer (oaks and ashes), number of plots with regeneration increased by 2 – 9%; while the number of plots with heavy to severe browse of highly preferred species fell by 19%. These results correspond to an estimated post-culling deer population density of 36 deer per mile² in January 2016, down from an estimated population density of 39 deer per mile² in 2015, but still above the initial target of 25 deer per mile² set by Metroparks as part of its 2015-16 deer management plan. While these early results point to a positive impact of the deer cull on forest regeneration, additional reductions in deer population density are needed at OOPM to have meaningful long-term impacts on the park's forested communities.

At SCPM, comparisons between 2015 and 2016 were not available. However, overall trends at SCPM in 2016 are similar to those found at OOPM, with 17% of plots exhibiting no regeneration (compared to 18% at OOPM) and 9% of plots exhibiting no deer browse (compared to 5% at OOPM). While forested areas at SCPM are different in species composition than those at OOPM, these preliminary data indicate the need to reduce deer browse pressure within the park.

C.2. Deer Browse Damage to Endangered and Threatened Plant Populations

For over 25 years, Metroparks staff and volunteers have monitored populations of state-listed endangered and threatened plants within each park. As populations are counted, any observed threats to those populations (including deer browse) are recorded. Table 2 provides a brief summary of deer browse damage documented to rare plant populations at OOPM during the 2016 growing season following removal of 165 deer from the park during January and February of 2016. Due to the location and disbursed nature of these plant populations, it is unrealistic to fence these populations to protect them from deer browse.

C. 3. Deer Browse Damage to Lupine Populations

Wild lupine (*Lupinus perennis*) is considered a keystone species in the Oak Openings Region and is listed as Potentially Threatened by the Ohio Department of Natural Resources. Historically, it was widely distributed within dry open prairies, savannas and woodlands throughout the Oak Openings Region but its modern range has become severely limited due to land use conversion, habitat fragmentation, woodland succession and lack of natural fires in the region. As a legume, lupine serves a fundamental role in nitrogen fixation in an otherwise nutrient poor environment. It also serves as an obligate host plant for the federally endangered Karner blue butterfly and two Ohio endangered species, the Persius dusky wing and frosted elfin butterflies. Over the past decade, Metroparks has undertaken a major initiative to implement resource management prescriptions (e.g., prescribed burning, mowing, selective herbicide application, tree canopy reduction) to protect and expand existing lupine populations and reestablish lupine into suitable habitats within its historic range through seed collection, plant propagation, and reintroduction of seeds, seedlings, and mature plants.

Over the years, Metroparks staff members have observed that deer preferentially select lupine as forage during a critical period in the plant's reproductive cycle. Specifically, deer seek out flowering stems and immature seed pods in late spring prior to plant senescence (Frye 2012). During this time period, deer are likely taking advantage of elevated nitrogen levels and lower levels of plant secondary compounds in these immature plant reproductive structures. Since deer forage opportunistically, not all lupine populations are negatively impacted each year. Lupine populations closer to woodland edges likely have an elevated risk of repeated deer browse, thus increasing the likelihood of long-term declines in these populations. Between 2009 and 2012, Metroparks staff recorded observations of deer browse damage on lupine seed pods as they were hand collected within designated management units at OOPM for the purpose of lupine propagation. These observations showed consistent, repeated deer browse damage within the collection areas.

In an effort to formally document and measure deer browse impacts to lupine, Metroparks staff established research plots within three separate management units at OOPM (management units OO3, OO4, OO29) with high concentrations of lupine using square 9-m² deer fence exclosures and corresponding 9-m² control plots which were open to deer browse (3 exclosures and 3 control plots per management unit). The size of mesh used was large enough to allow movement of small herbivores (e.g., mice and rabbits) into exclosure plots while preventing deer from accessing them. After establishing six plot locations within each management unit, they were randomly assigned as either control plots or exclosure plots. All plots were evaluated during the growing season for a) percent vegetative cover of lupine plants, and b) number of flowering stems.

In May 2014, prior to establishment of enclosure fences there were no significant differences in lupine vegetative cover between control and enclosure plots for any of the three management units ($p>0.19$). In 2014, all flowering stems were counted 19 days after enclosures were established. For management unit OO29 there were significantly fewer flowering stems in control plots that were open to deer browse compared to the enclosure plots ($p<0.04$). For management units OO3 and OO4, number of flowering stems tended also to be greater in enclosure plots compared to control plots. However, these results were not statistically significant at $p<0.05$. Lupine study plots were sampled again in 2015 but data were inconclusive, most likely as a result of resource management activities conducted in two of the three management units during the spring of 2015. Prescribed burns were conducted in management units OO4 and OO29 prior to sampling lupine study plots in 2015 which influenced the amount of vegetation and number of flowering stems observed within these plots.

In May 2016, all research plots were again sampled for both lupine vegetative cover and number of flowering stems. There were no significant differences in lupine vegetative cover between control and enclosure plots for any of the three management units ($p>0.08$). However, for management units OO4 and OO29, there were significantly fewer flowering stems in control plots open to deer browse compared to the enclosure plots excluded from deer browse ($p<0.05$). A summary of lupine plot data for 2014 and 2016 is included in Figure 4. When combined with previous lupine browse damage observed by Metroparks staff, the results of this study clearly indicate that deer exerted a significant negative impact on lupine populations at OOPM, even after 165 deer were removed from the preserve in January and February 2016.

C. 4. Deer Damage to Spring Ephemeral Wildflowers

Spring ephemeral wildflowers include multiple species of herbaceous plants that emerge from the forest floor early in the spring and produce flowering structures prior to widespread shading by the emergence of tree leaves in the forest canopy. Certain spring ephemerals, notably wild trillium (consisting of several perennial species within the genus *Trillium*) are highly preferred by deer, causing declines in trillium populations in the presence of increased deer population densities (Anderson 1994, Pavlovic et al. 2014). At high densities, deer are known to cause population declines in *Trillium* spp. by preferentially browsing flowering plants (Rooney and Gross 2003), thereby prohibiting seed production. Additionally, deer preferentially browse taller plants (Koh et al. 2010) causing declines in survival and fecundity of adult plants following repeated browsing.

Large white trillium (*Trillium grandiflorum*) and sessile trillium (*Trillium sessile*) were once common at Swan Creek Preserve (D. Gehring pers. com.). Today, populations of large white trillium are greatly reduced compared to their extent in the 1990s. Sessile trillium is now largely absent from the preserve, occurring only in small, isolated stands (K. Menard pers. com.). While the impacts of deer on trillium populations at Swan Creek Preserve have not

been formally documented prior to 2016, there is a strong body of scientific evidence linking the loss of trillium at Swan Creek Preserve with overabundance of deer at this park, as supported by evidence of widespread damage to woody plants throughout the preserve.



Examples of deer browse damage at Swan Creek Preserve (2016).

In 2016, Metroparks staff established new research plots to evaluate recovery of *Trillium grandiflorum* populations using fencing to exclude deer from one half of each research plot. During establishment of research plots, it was noted that flowering plants were nearly absent in the research plots (K. Menard pers. com.), likely due to previous deer browse.



Photo of non-flowering Trillium grandiflorum in recently established research plots at Swan Creek Preserve.

D. POPULATION ESTIMATES OF THE AREA TO BE MANAGED

In 2009, Metroparks began tracking the size of its deer herd using aerial infrared camera surveys, contracted through Davis Aviation, Kent, Ohio. For this sampling method, a thermal imaging, infrared video camera was mounted to a fixed-wing airplane and flown in a grid pattern over targeted parklands at 1,500 feet elevation at night. Video footage was analyzed on the ground from a video monitor and the number of deer was recorded, noting both positively confirmed deer sightings and possible deer sightings. For Metroparks population estimates, only positively confirmed deer sightings were included in population estimates. In addition to internal park areas, a 1,500-ft buffer surrounding each park was surveyed to account for movement of resident deer herds outside of park areas.

Beginning in 2013, Metroparks initiated aerial snow count surveys of targeted parklands in addition to aerial infrared surveys. Park personnel were flown in a small helicopter over park areas in a grid pattern during daylight hours and direct counts were made of all deer observed. A 1,500-ft buffer surrounding each park was also surveyed. For this survey technique, a minimum of eight inches of snow cover on the ground is desired for optimizing deer counts. Metroparks staff implemented snow counts with a minimum of three inches of snow cover, which may have elevated the risk of missing some deer during counts. The snow count method is considerably less expensive than infrared surveys and will be utilized as the primary survey technique when suitable ground conditions allow.

Total number of deer counted inside each park was combined with number of deer counted within a 1,500-ft buffer outside each park to determine a total population index adjusted for park size, reported as number of deer per square mile for each park. Additionally, a surplus population index was established using an initial range of 15 to 25 deer per square mile as a tolerable upper limit population threshold for Metroparks deer herds. This range was established as a preliminary population target based on multiyear observations from other Ohio park districts that have previously implemented deer management programs as well as expert opinion gathered from wildlife biologists from state and federal agencies, other Ohio park districts, and Metroparks staff. A complete summary of deer survey data for Oak Openings Preserve Metropark (OOPM) and Swan Creek Preserve Metropark (SCPM) is attached as Table 3.

For OOPM, the total population index has remained greater than 25 deer per mile² since 2013 (Table 3). Despite removing 165 deer from OOPM in January and February of 2016, the total population index for OOPM now stands at 548 deer (56 deer per mile²) based on aerial infrared surveys flown by Davis Aviation during the evenings of November 26 and 27, 2016. This includes 294 deer counted inside the preserve and an additional 254 deer counted within a 1,500-foot buffer surrounding the preserve. This apparent increase in the deer population nine months after culling was completed in February 2016 might be at least partly explained by a possible increase in survival rates among the post-culling population due to decreased competition for resources after the initial culling. It is also possible that

deer in the surrounding areas were subject to higher population densities and moved to occupy vacant home ranges within OOPM following the cull. Metroparks staff will carefully evaluate demographic data collected during 2017 to help elucidate population trends within the vicinity of OOPM and will use this data to inform future management actions.

For SCPM, the total population index has remained greater than 25 deer per mile² since 2011 (Table 3). The total population index now stands at 121 deer (51 deer per mile²) based on aerial infrared surveys flown by Davis Aviation during the evenings of November 26 and 27, 2016. This includes 80 deer counted inside the preserve and an additional 41 deer counted within a 1,500-foot buffer surrounding the preserve. This is the first infrared count completed for SCPM since March 2013 when the total population index was 91 deer (39 deer per mile²). While helicopter snow counts flown in 2015 and 2016 show a lower population index (71 and 72 deer, respectively). Conditions during these snow counts were less than optimal due to thin / melting snow cover, therefore it is likely that staff undercounted deer during these surveys.

While actions at Wildwood Preserve Metropark (WPM) are not being considered as part of the 2016-17 deer management plan, it is worth noting that the total population index for WPM now stands at 39 deer (17 deer per mile²) based on aerial infrared surveys flown by Davis Aviation during the evenings of November 26 and 27, 2016. This constitutes a greater than 50% decrease in the population index since January 2015. This follows a reduction of 30 deer through culling at WPM in January 2016. Additionally, as part of its controlled archery program, the Village of Ottawa Hills has removed an additional 23 deer from areas adjacent to WPM since the start of the 2016-17 archery season (M. Thompson, pers. com.). Metroparks will continue to monitor the deer population at WPM and may take future management actions should populations again increase to unacceptable levels.

E. DESIRED LONG-TERM GOALS

The desired long-term goal for the Metroparks deer management program is to reduce deer-related damage to ecological resources at OOPM and SCPM (as well as across the entire park district) to sustainable levels. Metroparks staff will need to carefully evaluate the ecological response at OOPM and SCPM following planned culling in 2017. Through adaptive resource management, Metroparks staff will continually review ecological indicators of deer damage on at least an annual basis to develop and refine both short-term and long-term goals.

F. MANAGEMENT TECHNIQUES TO BE USED

Metroparks intends to implement a culling program at OOPM and SCPM between January 1 and March 31, 2017 to reduce deer populations using trained marksmen from USDA APHIS Wildlife Services. Metroparks commissioned law enforcement officers will also serve as marksmen during 2017 culling operations. A more detailed description of planned deer culling operations is included as Attachment A.

Prior to pursuing a culling program at these parks, Metroparks staff carefully considered other available management techniques, both lethal and nonlethal, to accomplish Metroparks deer management objectives at these parks. Following is a brief summary of other management alternatives that were evaluated prior to selecting deer culling as the best available management technique to accomplish Metroparks deer management objectives at OOPM and SCPM.

F.1 Nonlethal Alternative Management Techniques

A variety of nonlethal alternatives are available to private property owners to reduce deer damage and deter deer from harming their property. These techniques include use of odor repellents (ex. predator urine, soap), taste replants (ex. hot pepper), scare tactics (ex. noise makers), and fencing. However, within large natural areas such as OOPM and SCPM (with a combined area of over 7 miles²), deterrents are neither cost effective nor realistically feasible on a large scale. Currently, fencing is used throughout the park district to protect landscape trees, plants, and horticultural areas against deer browse. However, fencing is simply too cost prohibitive to protect natural areas within these parks on even a limited scale.

Other nonlethal alternatives to deer culling that were determined to be unsuitable for accomplishing Metroparks deer management objectives include:

- a) Live trapping and relocation: This practice was not considered as a viable option to accomplish Metroparks deer management objectives due to its high costs, risk of pathogen transmission (e.g., chronic wasting disease) from the source population to the release site, unavailability of suitable release sites, and concerns over stress to captured deer, as it has been found that most relocated deer survive less than one year after being released in a new environment (Conover 2002).
- b) Surgical sterilization: This practice was not considered as a viable option to accomplish Metroparks deer management objectives for many of the same reasons explained in F.1.a) above. Within a large natural areas context, it would be practically impossible to sterilize enough animals to have any significant effects on the overall population. Further, it does not address the underlying issue that immediate reductions in deer numbers are required to protect Metroparks ecological resources.
- c) Contraception: Chemical contraception is not authorized by the Ohio Division of Wildlife for use in Ohio.

F. 2. Controlled Archery Program

In 2013, Metroparks began implementing controlled archery hunting at various locations within its Oak Openings Corridor in an effort to prevent ecological damage from deer overabundance. Archery hunting was conducted on park properties not currently open for general public use. During the 2013-14 archery season, a total of 98 permits were issued to applicants selected at random through a lottery drawing for 3-week periods over the course of the archery season. All successful applicants were allowed to hunt with one invited guest

allowing for a total of up to 196 hunters to participate. All participants were required to demonstrate proficiency with a bow prior to hunting by hitting an eight inch target with four consecutive shots from 20 yards. Hunting areas were specifically designated by Metroparks staff at locations of known deer activity. During the 2014-15 archery season, a total of 108 permits were issued at 16 separate areas for three week periods over the course of the archery season. The same procedure was followed as during the 2013-14 archery hunt.

For the 2015-16 and 2016-17 hunting seasons, the controlled archery hunting program was expanded to allow hunting stations at Oak Openings Preserve Metropark and Secor Metropark. These stations were established by Metroparks staff in areas of known deer activity with the specific goal of removing deer from these parks. These hunting stations (referred to as “special opportunity” areas) are managed differently than Oak Openings Corridor “regular” hunting areas. For the special opportunity areas, Metroparks-owned deer stands were placed by staff and baited with shelled corn and apples by Metroparks staff while in use during the hunting season. Staff will continue to utilize these hunting stations at OOPM in future years in locations where hunting can be conducted safely and effectively without negatively impacting other park visitors. At this time, there are no plans to expand the controlled archery hunting program to include Swan Creek Preserve Metropark due to the high visitor use of this park and because hunting is currently not permitted within the City of Toledo.

Detailed information on the Metroparks controlled archery hunting program is included in Table 4. While Metroparks staff will continue to utilize this program as a management technique to help control deer numbers on park district lands, data collected from this program show that archery hunting alone cannot accomplish the immediate deer population reduction goal for OOPM needed to protect the ecological resources at this park.

G. PROGRAM EVALUATION

Following 2017 culling operations, aerial deer surveys will continue to be used by Metroparks staff to monitor population levels at OOPM, SCPM, and other parks throughout the district. The target for both OOPM and SCPM is a reduction in the population index to less than 25 deer per mile². The Metroparks deer browse monitoring program (see Section I.C.1) will be the primary evaluation tool to determine whether the 2017 culling program successfully reduces deer numbers to acceptable levels. Metroparks staff and volunteers will continue to evaluate deer browse damage to at-risk populations of endangered and threatened plant species at OOPM. Lupine browse monitoring will also continue to be conducted at OOPM. Trillium research plots will be used at SCPM to evaluate recovery of spring ephemeral wildflower populations after culling. If noticeable reductions in deer browse are not detected after initial population targets have been reached, deer population targets may need to be reevaluated.

H. Supporting Documentation

Refer to Section V.

II. REQUEST FOR 2016 DEER DAMAGE CONTROL PERMIT

A. INTRODUCTION

Refer to Section I above.

B. NUMBER OF TAGS REQUESTED

Metroparks is requesting a total of 200 tags to be filled at OOPM and SCPM between January 1 and March 31, 2017. It is Metroparks' goal to fill at least 50 tags at SCPM. All remaining tags (up to 200 total tags) will be filled at OOPM. At least 75% of tags will be antlerless. No more than 25% of tags (up to a maximum of 50) will be antlered.

C. JUSTIFICATION FOR NUMBER OF TAGS REQUESTED

Based on the most recent aerial survey data from November 2016, the surplus deer population at OOPM exceeds 300 individuals, while the surplus population at SCPM exceeds 60 individuals using a population target of less than 25 deer per mile² for each park. While the number of tags requested in 2017 will not immediately achieve this initial population target for either of these parks, Metroparks staff will carefully evaluate demographic data collected during culling to determine trends in population dynamics and animal health. These data will be used to inform future population reductions that will likely be required at these parks to achieve acceptable long-term population levels needed to protect the ecological resources at these parks.

D. LOGISTICS OF HOW PROGRAM WILL BE CONDUCTED

Refer to the work plan included as Attachment A for a detailed outline of program logistics. All venison produced through this culling program will be donated to a local foodbank for immediate use by the general public.

E. PROPOSED SCHEDULE OF OPERATIONS

Culling operations shall occur between January 1 and March 31, 2017.

F. SUPPORTING DOCUMENTATION

Refer to Section V.

III. END OF CULLING REPORT - *will be submitted to Ohio Division of Wildlife by May 1st, 2017.*

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V. SUPPORTING DOCUMENTATION

The following supporting documents are attached to this management plan:

- Attachment A – USDA Wildlife Services Work Plan
- Table 1. Summary of deer browse survey results for Oak Openings Preserve Metropark, Wildwood Preserve Metropark, and Swan Creek Preserve Metropark by species group.
- Table 2. Summary of deer browse damage to populations of endangered and threatened plant species at Oak Openings Preserve during 2016.
- Table 3. Summary of deer survey data for Oak Openings Preserve Metropark and Swan Creek Preserve Metropark.
- Table 4. Summary of controlled archery program data from the 2013-14 hunting season to present.
- Figure 1. Overview map of Metroparks of the Toledo Area.
- Figure 2. Map of Oak Openings Preserve Metropark
- Figure 3. Map of Swan Creek Preserve Metropark
- Figure 4. Lupine flowering stems (mean + SD) measured in control plots subject to deer browse (grey) compared to fenced deer enclosure plots (white) in three management units at Oak Openings Preserve Metropark. P-values were taken from t-tests comparing control and enclosure plots for flowering stems (1-tailed, equal variance).

ATTACHMENT A WORK PLAN

Introduction

The U.S. Department of Agriculture (USDA) is authorized to protect American agriculture and other resources from damage associated with wildlife. The primary authority for Wildlife Services (WS) is the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C.426-426b) as amended, and the Act of December 22, 1987 (101Stat. 1329-331, 7 U.S.C. 426c). Wildlife Services activities are conducted in cooperation with other Federal, State and local agencies; private organizations and individuals.

The WS program uses an Integrated Wildlife Damage Management (IWDM) approach (sometimes referred to as IPM or “Integrated Pest Management”) in which a series of methods may be used or recommended to reduce wildlife damage. IWDM is described in Chapter 1, 1-7 of the Animal Damage Control Program Final Environmental Impact Statement (USDA, 1994). These methods include the alteration of cultural practices as well as habitat and behavioral modification to prevent damage. However, controlling wildlife damage may require that the offending animal(s) are killed or that the populations of the offending species be reduced.

Purpose

To assist the Metroparks of the Toledo Area (MPTA) with meeting the objectives of their White-tailed Deer Management Plan.

Planned APHIS WS Activities

This work plan is contingent upon an approved deer management plan between the MPTA and the Ohio Division of Wildlife, and the resulting permit issued by the Ohio Division of Wildlife and the issuance of an MPTA permit.

Through the implementation of management measures described below, APHIS WS will assist the MPTA with initiating the sharpshooting portion of their White-tailed Deer Management Plan. These objectives are to help reduce damage to natural resources caused by white-tailed deer in the MPTA. Operational areas currently covered by this agreement are Oak Openings Preserve and Wildwood Preserve. Additional areas in MPTA could be considered, but are subject to APHIS WS availability.

APHIS WS employees will be used to assist with initiating the sharpshooting portion of the White-tailed Deer Management Plan of the MPTA. WS will coordinate with the MPTA project coordinator and Ohio Division of Wildlife (ODW) staff to inspect, propose and certify baiting and shooting zones to be used. APHIS WS personnel will prepare and arrange any necessary deer damage management equipment. WS will conduct removal of white-tailed deer from the MPTA using rifles equipped with noise-suppression devices.

WS will conduct removal activities for up to 11 nights between January 1st-March 31st 2017. Every effort will be made to conduct removal activities during this time period but activities are contingent upon weather conditions.

MPTA will be responsible for the following:

- Obtain Deer Permits from ODW and any other necessary authorizations naming APHIS WS as subpermittee.
- Provide a Project Coordinator during all phases of the project. The Project Coordinator shall be reachable via cellular phone during removal activities.
- Provide yearly white-tailed deer population estimates as needed.
- Stock bait sites nightly, during an agreed upon time window, and for at least 10 days continuously prior to removal operations. Bait sites shall be agreed upon by APHIS WS and the MPTA.
- Law enforcement shall verify that shooting areas are closed and empty of visitors prior to removal operations.
- Law enforcement shall be available during removal operations and in direct communications with APHIS WS.
- Eviscerate, clean, and temporarily store deer carcasses immediately following daily operations.
- MPTA will pick up carcasses after sharpshooting activities have been conducted.
- MPTA will collect age, fetus counts, weights and sex of white-tailed deer removed.
- Transport deer carcasses to the designated venison processor each within 24 hours of removal.
- Maintain records as required by ODW and report results to ODW and APHIS WS upon completion of the program.

Monitoring of Accomplishments

APHIS WS will provide a final annual report to the MPTA no later than April 30 of the removal year.

Table 1. Summary of deer browse survey results for **Oak Openings Preserve Metropark**, **Wildwood Preserve Metropark**, and **Swan Creek Preserve Metropark** by species group. Plots with regeneration were recorded for a given species group when any number of seedlings of that group occurred within a given plot. For all plots where a species group occurred, total number and percent of those plots experiencing heavy or severe browse is shown.

Oak Openings Preserve								
	Plots with regeneration				Heavy to severe browse			
Species Group	2015		2016		2015		2016	
Oak	20%	(64)	29%	(92)	66%	(42)	45%	(41)
Ash	6%	(19)	8%	(25)	79%	(15)	60%	(15)
Maple	14%	(45)	8%	(25)	58%	(26)	36%	(9)
Cherry	37%	(116)	26%	(83)	38%	(44)	30%	(25)
Other Trees	22%	(69)	23%	(72)	51%	(35)	69%	(50)
Native Shrubs	39%	(123)	34%	(107)	47%	(58)	60%	(64)
Invasive Shrubs	24%	(74)	12%	(37)	60%	(44)	41%	(15)
Total plots		(313)		(314)				
No regeneration	16%	(51)	18%	(56)				
No browse ¹	4%	(11)	5%	(13)				

Wildwood Preserve							
	Plots with regeneration				Heavy to severe browse		
Species Group	2015		2016		2015		2016
Oak	1%	(1)	21%	(29)	100%	(1)	10% (3)
Ash	1%	(1)	5%	(7)	-	0	29% (2)
Maple	1%	(1)	9%	(12)	100%	(1)	25% (3)
Cherry	52%	(36)	54%	(75)	75%	(27)	9% (7)
Other Trees	22%	(19)	25%	(35)	17%	(17)	23% (8)
Native Shrubs	42%	(29)	50%	(69)	24%	(24)	30% (21)
Invasive Shrubs	6%	(4)	35%	(49)	2%	(2)	22% (11)
Total plots		(69)	(139)				
No regeneration	15%	(10)	6%	(8)			
No browse ¹	5%	(3)	16%	(21)			

¹ Percent calculated after excluding research plots with no regeneration.

Table 1. (Cont.)

Swan Creek Preserve				
	Plots with regeneration		Heavy to severe browse	
<u>Species Group</u>	<u>2016</u>		<u>2016</u>	
Oak	4%	(5)	-	(0)
Ash	39%	(51)	24%	(12)
Maple	9%	(12)	50%	(6)
Cherry	9%	(12)	33%	(4)
Other Trees	12%	(16)	19%	(3)
Native Shrubs	23%	(30)	47%	(14)
Invasive Shrubs	27%	(35)	43%	(15)
Total plots	(130)			
No regeneration	17%	(22)		
No browse ¹	9%	(10)		

¹ Percent calculated after excluding research plots with no regeneration.

Table 2. Summary of deer browse damage to populations of endangered and threatened plant species at **Oak Openings Preserve Metropark** during 2016.

<u>Species</u>	<u>Common Name</u>	<u>Status</u>	<u>Populations Browsed</u>
Anemone cylindrica	Prairie thimbleweed	Threatened	1
Desmodium sessifolium	Sessile tick-trefoil	Threatened	3
Hypericum kalmii	Kalm's St. John'- wort	Threatened	1
Lithospermum carloniense	Plains puccoon	Threatened	3
Phlox ovata	Mountain phlox	Endangered	1

Table 3. Summary of deer survey data for **Oak Openings Preserve Metropark** and **Swan Creek Preserve Metropark**. Total population index was determined by counting all deer inside park boundaries as well as all deer within an approx. 1,500-foot buffer surrounding each park. The surplus population index is the total number of deer that would need to be removed from each park (based on the total population index) in order to reduce deer densities to either 15 deer per mile² or 25 deer per mile², respectively. Survey method used, either infrared or snow count, is shown in parentheses by year.

	Total Population Index		Surplus Population Index	
	No. deer	Deer per mile ²	15 deer per mile ²	25 deer per mile ²
Oak Openings Preserve				
March 2009 (Infrared)	225	23	79	-
Jan 2013 (Snow Count)	328	34	182	86
Dec 2013 (Snow Count)	549	57	403	307
Jan 2015 (Snow Count)	378	39	232	136
Jan 2016 (Infrared)¹	348	36	202	106
Nov 2016 (Infrared)	548	56	402	306
Swan Creek Preserve				
March 2010 (Infrared)	48	20	13	-
April 2011 (Infrared)	74	32	39	15
Feb 2012 (Infrared)	101	43	66	42
Jan 2013 (Snow Count)	73	31	38	14
Mar 2013 (Infrared)	91	39	56	32
Dec 2013 (Snow Count)	135	57	100	76
Jan 2015 (Snow Count)	71	30	36	12
Feb 2016 (Snow Count)	72	31	37	13
Nov 2016 (Infrared)	121	51	86	62

¹ A total of 106 deer were removed from Oak Openings Preserve through culling prior to completing the infrared count on January 23, 2016. An additional 59 deer were subsequently removed from the population in February 2016.

Table 4. Summary of controlled archery program data from the 2013-14 hunting season to present.

Hunting Season :	<u>2013-14</u>	<u>2014-15</u>	<u>2015-16</u>		<u>2016-17 YTD (12-9-16)</u>	
	Regular	Regular	Regular	Special Opp.	Regular	Special Opp.
Permits Issued:	98	108	90	21	78	55
Deer Harvested:						
Female	17	12	10	16	4	15
Adult Male	3	4	1	2	8	5
Yearling Male	2	3	2	3	6	3
Total	22	19	13	21	18	23
Harvest per hunter:	0.15	0.12	0.14	1.00	<i>data not yet available</i>	
Total Man-hours:	-	2,621	2,199	687	<i>data not yet available</i>	
Man-hours per harvest	-	138	169	33	<i>data not yet available</i>	

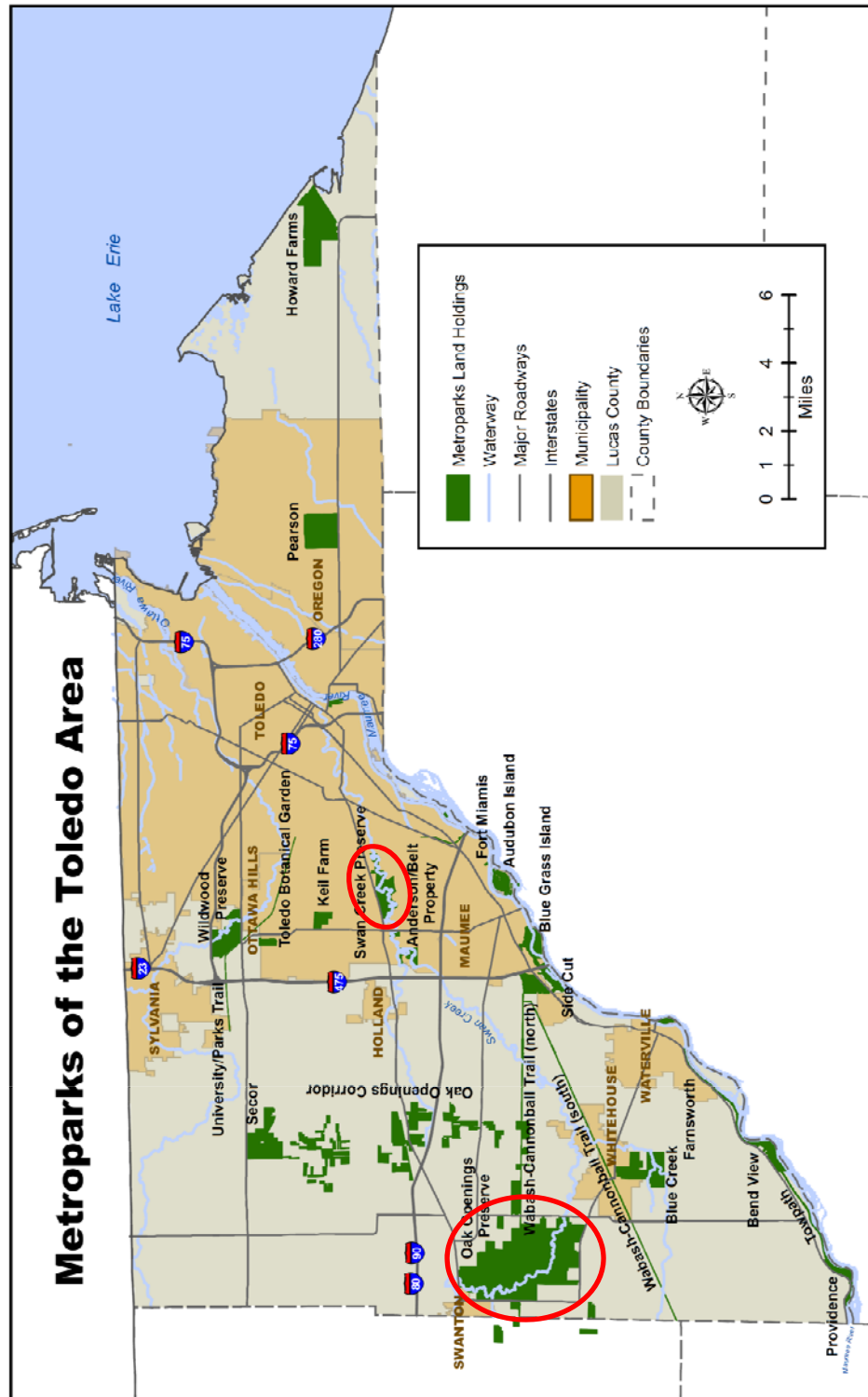


Figure 1. Overview map of Metroparks of the Toledo Area. Oak Openings Preserve and Swan Creek Preserve Metroparks are circled in red.



Figure 3. Map of Swan Creek Preserve Metropark.

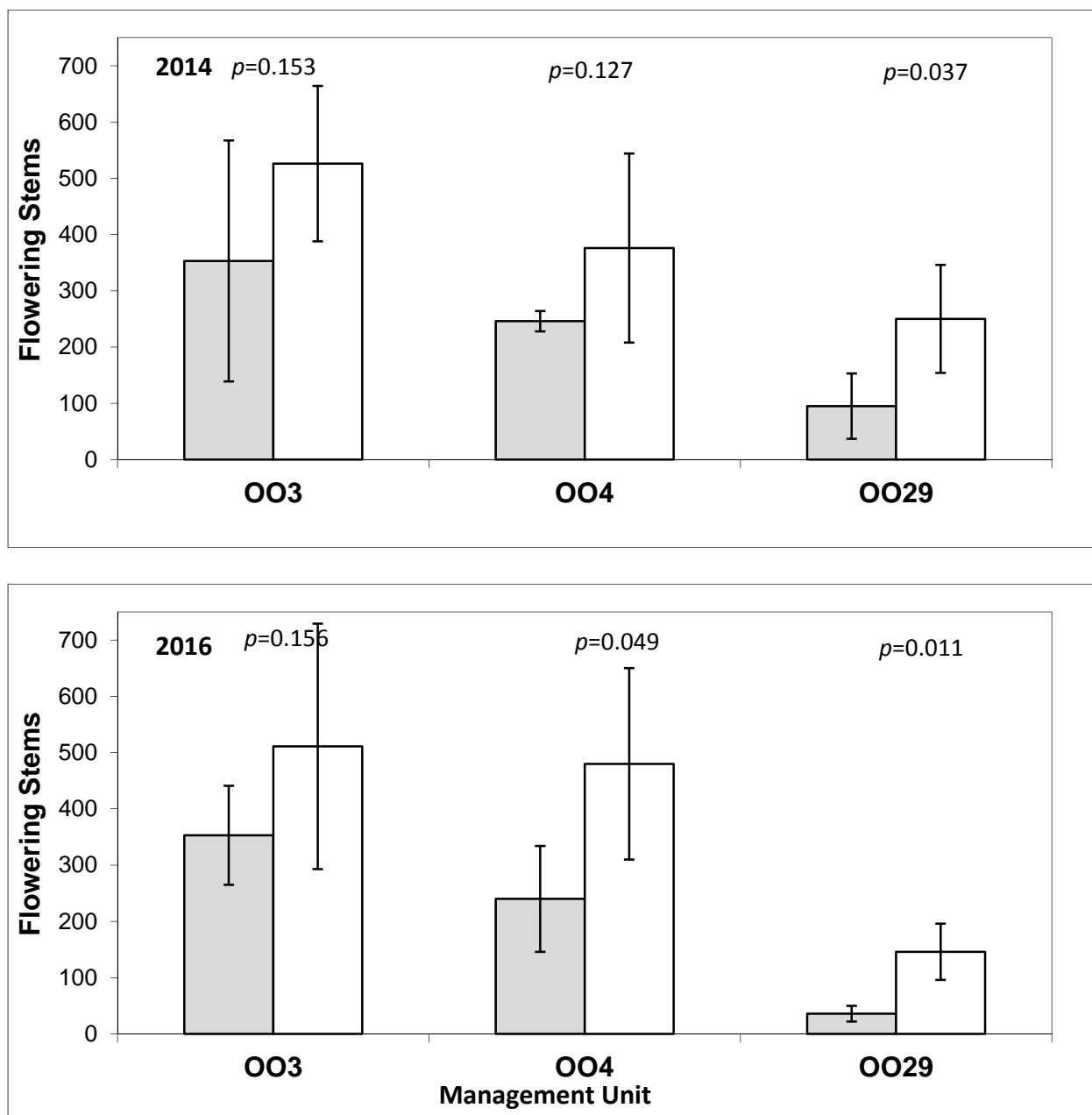


Figure 4. Lupine flowering stems (mean \pm SD) measured in control plots subject to deer browse (grey) compared to fenced deer exclosure plots (white) in three management units at **Oak Openings Preserve Metropark**. *P*-values were taken from t-tests comparing control and exclosure plots for flowering stems (1-tailed, equal variance).