

Deer Management at Eagle Creek Park

The Issue: Deer Overabundance

For nearly 20 years the increase in deer density at Eagle Creek has been causing damage to the park's forest and ecosystem. Although the deer are popular with many visitors, in order to responsibly manage the park we must take into account the long-term health of the forest and reservoir and ALL of the wildlife that live here.

This issue is not unique to Eagle Creek Park. Parks and communities throughout Indiana and indeed, most of the United States where white-tailed deer and their relatives are found, have grappled with the issue of deer overabundance and what to do about it.

Causes of Overabundance:

So where did all these deer come from in the first place? By changing the structure of Indiana's forests and eliminating top predators, humans have altered the ecological balance that used to keep deer from becoming too crowded.

1. Elimination of natural predators of deer like cougars and wolves from Indiana.
2. Dense, unbroken forest habitat replaced by small patches of forest with abundant edge habitat, perfect for deer.
3. Farm crops provide a supplemental food source.

Indiana Deer Timeline:

Pre-1800's: Prior to European settlement, much of Indiana was densely forested, and the deer population was likely much lower than it is today. Deer prefer edge habitats, where they can seek shelter in the forest but still browse on the abundant plants found along the edges, where the forest meets the field.

1800-1900: Most of Indiana is deforested and converted to farmland.

1893: White-tailed deer are extirpated, or no longer found in the state, due to loss of habitat and unregulated hunting. Two of their main natural predators, wolves and cougars, are also extirpated from Indiana.

1930's: Re-growth of Indiana's forests in small patches and fragments, rather than one large, dense swath, creates abundant edge habitat, perfect for deer. Deer are reintroduced into Indiana and the population rebounds quickly.

1947: Aldo Leopold's famous work "A Sand County Almanac" is published, demonstrating the growing ecological awareness in the United States of the long-term damage caused by too many deer.

"I now suspect that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer. And perhaps with better cause, for while a buck pulled down by wolves can be replaced in two or three years, a range pulled down by too many deer may fail of replacement in as many decades."

1951: Deer population in Indiana rebounds to the point where localized damage to crops and orchards becomes an issue. First open hunting season in 58 years held in 17 counties in Indiana. Data collected from these early hunts is used to refine hunting policies over the years, leading to modern regulations that prevent overhunting of any one area.

1960-1980: Deer population continues to increase in State Parks, Eagle Creek Park, and other areas that do not allow hunting.

1990: The almost complete lack of forest understory and emaciated appearance of overcrowded deer in Brown County State Park finally spurs natural resource managers and a concerned public to take action.



Malnourished deer at Brown County State Park in 1992, one year before the first controlled hunt.

<http://indianaeconomicdigest.com/main.asp?SectionID=31&subsectionID=161&articleID=66322>

1993: The first controlled hunt, although highly controversial at the time, is held at Brown County. In the following two decades controlled hunts become routine in Indiana State Parks, resulting in the successful recovery of understory plants and forest communities and fewer, but healthier, deer. Eagle Creek Park, as a city rather than a state park, is not included in these controlled hunts.

1996: Concerns about increasing deer abundance in Eagle Creek Park are raised. Deer enclosure studies set up in three locations in the park to monitor damage to the forest.

2003-2007: Five year deer browse study shows heavy to severe deer browse damage to the Spring Pond Nature Preserve on the east side of the park, and moderate to heavy deer browse damage to the Eagle's Crest Nature Preserve on the west side.

2013: Follow up deer browse study confirms that study sites at Eagle Creek continue to show a degraded plant community due to heavy long-term browse pressure.

Counting the Deer – how do we know there is an overabundance?

How many deer, exactly, are there in Eagle Creek Park? It is a question that is surprisingly hard to answer! In natural resource management it is very rare to get an exact count of the population of a particular species of wild animal except in rare circumstances: for example seals collected on a breeding beach, or waterfowl congregating in the middle of a lake. Instead, wildlife managers use estimates and indexes – counting subsamples or indirect counts of nests, dens, scat, and other signs to come up with an estimate of population.

Deer population surveys can be costly, labor intensive, and sometimes even hazardous to the deer and damaging to the habitat. Rather than count deer, park managers nationwide rely on deer browse and vegetation surveys as much more accurate and useful indicators of whether deer numbers are at healthy or unhealthy levels.

Since 2003, scientific surveys of the vegetation in the park have consistently and repeatedly shown heavy to severe deer browse damage at Eagle Creek Park. When vegetation damage reaches severe levels, it indicates deer densities as much as 10 times above what is considered healthy for the forest (5-30 deer per square mile is recommended), and that long-term negative impacts to the ecosystem and forest health and diversity are taking place.

Other evidence of deer overabundance:

Informal roadside counts of 40-100+ deer by park staff, volunteers, and visitors on the east side of Eagle Creek Park, an area of approximately 2 square miles. The informal roadside counts support the scientific vegetation study evidence that deer populations are 10 times above recommended levels.



“Deer resistant” New England Aster browsed to height of 12 inches, Eagle Creek Park. Fails to produce any blooms. September 2014.



Unbrowsed New England Aster in area protected from deer at height of 7 feet, providing nectar for migrating monarch butterflies. September 2014.



Native plants grown in cages at Ornithology Center in attempt to protect from deer browse. Summer 2014.



Oak sapling with extensive browse damage browsed to a height of five feet at Eagle Creek Park Picnic Area 5. Second sapling in background has been bent and girdled from male deer rubbing antlers. August 2014.

Browse lines are visible throughout Eagle Creek Park – where all edible vegetation within the park has been nibbled and eaten to a distance of five to seven feet from the ground, the furthest an adult deer can reach. Any green beneath the browse lines is generally made up of spicebush, paw paw, and white snakeroot, plants that deer do not eat. Visible browse lines are unmistakable evidence of deer overabundance.



Browse line at Eagle Creek Park, corner of Eagle Creek Parkway and Walnut Point Rd. August 2014.



Browse line along the border of Eagle Creek Park, intersection of 56th St. and Reed Rd. October 2014



Stock photo of healthy white-tailed deer from Wikipedia.



The condition of deer in the park can vary quite a bit among individuals and at different times of the year: some appear healthy while others are clearly underweight. Thankfully we have not yet reached the point where Eagle Creek deer are visibly emaciated, and one goal of the Deer Management Program is to prevent that from ever happening.

Effects of Deer Overabundance:

Long-term damage to forest regeneration:

Tree seedlings and saplings are consumed, and as older trees begin to die or are knocked down in storms, nothing is available to replace them.

Oak tree seedlings and saplings are a preferred food source for deer in overabundant conditions and in Eagle Creek Park can no longer survive unless fenced. Oak trees are a particularly valuable tree in the ecosystem – they support over 500 species of moths and butterflies, providing caterpillars which are the main source of food for baby songbirds (<http://www.bringingnaturehome.net/what-to-plant.html>).

Decimation of understory plant and animal diversity:

As native wildflowers are devoured, important sources of pollen and nectar for numerous insect species disappear. Fewer insects means less food for small birds, amphibians, reptiles, and mammals that depend on them.

Lack of understory plants decreases the humidity and cover on the forest floor, making the forest inhospitable for numerous reptiles, amphibians, invertebrates, and small mammals.

Lack of understory plants can increase forest soil runoff and erosion, and cause issues with water quality in streams and watersheds.

Lack of understory plant diversity decreases habitat for ground-nesting birds like Wood Thrush and Wild Turkey.

Negative effects on deer and humans:

Overabundant deer must search all hours for food, and often are forced to graze on tough grasses which wear down teeth prematurely and lead to starvation.

Severely overbrowsed forests lead to malnourished deer heavily laden with parasites and more susceptible to disease.

Increased incidents of deer being hit by cars, causing human injuries or even deaths, as well as millions of dollars of property damage every year.

Damage to landscaping and agricultural crops.

Solutions to Deer Overabundance:

1. Reintroduce natural predators

Pros:

Wouldn't that be cool?!

Cons:

Wolves and cougars roam over large areas and would not stay confined to Eagle Creek Park.

Local humans would probably have strong objections to wolves and cougars in their backyards.

Experimental – effectiveness of reintroducing predators would be a gamble. How many predators would need to be introduced? How much would it cost? How long would it take for them to reduce deer numbers significantly? How much habitat would they require in Indiana to breed and maintain a steady population?

Not a viable option for Eagle Creek Park at this time.

2. Provide deer with supplemental food

Pros:

Park visitors would be able to see lots of deer.

Some deer would benefit directly from the additional food.

Cons:

Long term expense.

Feeding deer would make the overabundance issue worse, as deer in better condition can have and successfully raise even more fawns.

Congregation of large numbers of deer at feeding areas can increase the risk of diseases spreading.

Feeding deer does not prevent them from also browsing on natural foods. As deer become more and more crowded, the severe damage to the forest would continue and even get worse, and disease outbreaks and negative interactions with humans (hit by cars, property and agricultural damage) would also increase.

Not a viable option.

3. Relocate deer somewhere else.

Pros:

Considered humane by the general public.

Immediate reduction in deer numbers, allowing habitat to begin recovery.

Cons:

Expensive and labor intensive to capture and transport deer.

Most of the US has the same problem of deer overabundance – very difficult to find somewhere willing to take them.

Relocating wildlife runs the risk of also transferring diseases and parasites to new areas.

Arguably inhumane and risky for the deer - deer are herd/prey animals that tend to panic if captured or restrained and can suffer injuries as well as a condition known as “capture myopathy” where deer die due to stress.

“Studies have shown that approximately 4% of the deer die in transport, as many as 25% of translocated deer die within the first two months of trapping and translocation, and more than 85% of deer may not survive longer than one year. These deer tend to have high mortality rates resulting from capture-related injuries, unfamiliarity with the release site and encounters with new mortality agents.” Joint City of Bloomington-Monroe County Deer Task Force.*

* O'Bryan and McCullough, Beringer, J., L/P. Hansen, W. Wilding, J. Fischer, and S. L. Sheriff. 1996. "Factors Affecting Capture Myopathy in White-Tailed Deer," *Journal of Wildlife Management* 60: 373-380; New Hampshire Fish and Game Department, An Evaluation of Deer Management Options. Publication No. DR-11. 16p.

Not a viable option for Eagle Creek Park at this time.

4. Contraception – PZP and GonaCon vaccines are the two methods available.

Pros:

Considered humane by the general public.

In two experimental island populations of white-tailed deer (Fripp Island, South Carolina, and Fire Island, New York), numbers were successfully reduced by 50-60% over the course of 5 to 14 years.

Cons:

Does not immediately reduce deer numbers – will take several years for deer numbers to decline, allowing damage to the habitat to continue.

Deer treated with contraception must be tranquilized/restrained and tagged to show they have been treated, causing stress and a risk of injury and capture myopathy.

A large proportion of deer (70-90%) need to be treated to be effective – possible in closed or fenced off populations (like the Fripp Island and Fire Island studies) but impractical to achieve in an open population like Eagle Creek Park, where deer can migrate in and out of the park borders. Even if we achieved a reduction of 50-60% as in the island studies, that would still not be enough to bring our deer numbers to healthy levels.

Contraception is not endorsed by IDNR as a viable method in open deer populations in Indiana; Eagle Creek Park is highly unlikely to receive authorization from IDNR to use.

Contraception is expensive (\$600-\$1000+/doe plus ongoing maintenance) and labor intensive.

Both vaccines are still approved only for experimental use. GonaCon and the single-dose formulation of PZP are not available in Indiana:

GonaCon currently classified as a pesticide, and not approved for use in Indiana by the Indiana State Chemist. In order to be used in Indiana, GonaCon must be registered by the state and administered by USDA or state game and fish department staff members. As of 2012 GonaCon was only registered for use in two states: Maryland and New Jersey.

Studies of deer treated with GonaCon show decreased effectiveness over time (from 88% first year to less than 50% second year).

A yearly single-dose formula of PZP known as “SpayVac” was in testing and development but, due to failures in trials, ImmunoVaccine Technologies Inc. of Nova Scotia, which owns the

patent and rights to manufacture SpayVac, is no longer funding the project. Even if SpayVac was available it would still not be considered a viable option for Eagle Creek Park, even by its developers:

“Are there limitations to using SpayVac™ to manage wildlife fertility?”

Yes. For the foreseeable future, it will be practical to treat only small populations that are isolated and accessible. The present state-of-the-art requires that all treated animals be captured and marked before being treated, and this will be difficult to achieve in many situations. By itself, contraception cannot quickly reduce the size of a population of concern.”
SpayVac™-For-Wildlife, Inc. terramar.bc.ca/faq.html

PZP normally requires two doses of vaccine the first year and a booster vaccine each year thereafter, making it cost-prohibitive and extremely impractical to use in free-ranging deer populations. Experimental trials of a third version of the PZP vaccine followed by booster darts (darting only already-tagged deer per state regulations) of PZP with time-release pellets to provide 1-3 years of reduction in fertility were conducted from on Fripp Island and showed moderate success in limiting deer numbers in a closed population.

Not a viable option for Eagle Creek Park at this time.

Update 2016: Starting in 2014, the Village of Hastings-on-Hudson in New York began an experimental study utilizing the PZP vaccine with time-release pellets, the first sustained effort to control deer using contraception in an open population. Due to legal restrictions on hunting and firearms in that area, the only other option for deer control was hiring professionals to trap and lethally cull the deer. With the addition of grant money and the support of Tufts University, the contraceptive study was considered to be potentially more cost effective than the professional trap-and-cull option, if successful. The use of contraceptive drugs is authorized in New York only if part of an authorized, experimental study. In the first year of the study, only 8 of the estimated 120 deer in the area were successfully tranquilized, tagged, and treated with the contraceptive. As of April 2015, 21 deer were successfully treated – results on the success of this project in controlling deer in an open population are pending over the next several years.

http://www.hastingsgov.org/sites/hastingsonhudsonny/files/uploads/hoh_project_summary_2016.pdf

5. Sterilization – surgery to permanently sterilize does (tubal ligation, ovariectomy, hysterectomy).

Pros:

Generally considered humane by the general public, although some find the idea of performing surgery on wildlife objectionable.

Cons:

Does not immediately reduce deer numbers – will take several years for deer numbers to decline, allowing damage to the habitat to continue.

Deer undergoing sterilization must be tranquilized/restrained and tagged to show they have been treated (Indiana state requirement), causing stress and a risk of injury and capture myopathy.

Sterilized deer show increased mortality rates in some studies, mainly due to increased risk of vehicle collisions.

A large proportion of deer (at least 80% recommended) need to be treated to be effective – possible in closed or fenced off populations but extremely impractical in an open population like Eagle Creek Park, where deer can migrate in and out of the park borders.

Sterilization is not endorsed by IDNR as a viable method in open deer populations in Indiana; Eagle Creek Park is highly unlikely to receive authorization from IDNR to use.

Sterilization is expensive (\$800-\$1500+/doe plus ongoing maintenance to sterilize new deer migrating into the population and young of the year produced by untreated does) and labor intensive.

Although sterilization seems like a straightforward solution, using it to reduce deer population results can be unexpected: an initial study of deer sterilization by Cornell University showed no net decrease in population in the study area. Even though fewer fawns were born, more bucks were attracted to the area by does that experienced extended heat cycles due to the sterilization. Three does that were sterilized still gave birth to fawns later despite tubal ligation, and in one case, removal of the ovaries.

Not a viable option for Eagle Creek Park at this time.

Update 2016: Beginning in the fall of 2016, Staten Island in New York will attempt to control deer overabundance on the island sterilize male deer to reduce the population, at a cost of approximately \$2 million dollars. This plan has received widespread criticism from wildlife experts (http://www.silive.com/news/index.ssf/2016/05/experts_think_citys_staten_isl.html http://www.silive.com/news/index.ssf/2016/06/anthony_denicola_staten_island.html)

Because Eagle Creek Park is not an island, this option would be extremely unlikely to succeed even if funding were available, due to immigration of new deer from surrounding areas, and the fact that a single unsterilized male is capable of breeding with multiple does (deer are not monogamous).

6. Lethal Control – sharpshooting, bow hunt, rifle hunt, trap-and-euthanize

Pros:

Managed hunts have been used as a population control method in Indiana State Parks for the last 20 years, and have proven to be safe, cost-effective, and successful at keeping deer populations at healthy levels.

Immediate reduction in deer numbers, allowing habitat to begin recovery.

Because it causes instantaneous death, sharpshooting is considered a humane method of euthanasia by the American Veterinary Medical Association. Use of bait stations and silencers minimizes stress to deer, and the use of specialized equipment, highly trained professionals, and shooting from elevated positions into natural backstops means this method is considered one of the safest.

Controlled public hunts (bow hunting, rifle hunt) are the most cost-effective option for managing deer populations.

Harvest of venison provides high-quality, environmentally-friendly protein source (lean, organic, free range, sustainable, no damage to environment as is found in many large-scale farming operations) to hunters and their families or to food pantries through donation programs.

Cons:

Lethal control is a highly emotional topic to many people, who view the deer as pets and friends and consider any option that results in the death of an animal as unacceptable.*

Discharge of firearms in a city park requires additional approval of the parks board. (Bow hunts do not require additional approval.)

Trap-and-euthanize, although perceived to be safer by the general public, may cause significant stress to deer depending on method, and runs the risk of capturing non-target animals.

Bow hunts are considered safer by the general public, but less humane. Hunts using firearms are considered more humane, but less safe. Many of these concerns can be mitigated by having clear-cut safety protocols, requiring hunters to have a certain level of proficiency before being allowed to participate in a controlled hunt, and public education.

Sharpshooting, although considered the safest and most humane method, may have higher costs associated although still considerably more cost-effective than all methods of non-lethal control.

*Naturalist Note: often visitors raise the concern that fawns would be left orphaned and starving after a hunt. Deer mature very quickly, and by November, when hunting season

begins, the fawns-of-the-year are fully weaned and able to survive on their own. About 30% of the females will actually become pregnant and give birth the next spring as one year olds.

Only viable option for Eagle Creek Park at this time.

Eagle Creek Park Deer Management Plan 2014-2015

Following three presentations and opportunities for public comment, the City's Board of Parks and Recreation voted unanimously to allow the Director of Parks to contract with wildlife management experts to implement a long-term plan to address the overabundance of deer in the park.

Phase 1: Wounded Warrior Outdoors East Side

- 3-day managed hunt with recovering servicemen and women, accompanied by Wounded Warrior Outdoors staff and medical personnel.
- Indy Parks coordinated with Indianapolis Metropolitan Police Department, Indiana State Police, United States Department of Agriculture, and A&T Wildlife Management to secure the area and ensure safety of neighbors, visitors, and participants.
- Initial phase took place from November 28-November 30, 2014 on the east side of Eagle Creek Park, during daylight hours. Park closed to visitors for the duration.

Phase 1 Summary:

- Wounded Warrior Outdoors utilized 24 participants, including 11 local disabled veterans.
- A total of 148 deer were harvested (26 bucks and 122 does).
- Participants kept the venison from some of the deer for personal use, while the remaining venison, approximately 1,740 pounds, was donated to Gleaners Food Bank of Indiana, Inc. Processing fees were paid for by Farmers Feeding the Hungry, Inc.
- 87 deer were processed for donation, averaging 20 lbs of venison per deer.

"We can't begin to express how grateful we are to receive donations stemming from community partnerships like these," said Cindy Hubert,

President/CEO of Gleaners Food Bank of Indiana. "Food donations that focus on nutrition are exceptional, especially those that focus on high quality protein products like venison. We are truly thankful for all involved in this project for helping in the fight against hunger."

Phase 2: USDA West Side

- Highly trained USDA professional marksmen employed to reduce deer on the west side of Eagle Creek Reservoir, January 12-15, 20, 2015.
- Because the reduction area was primarily on the west side of the main park area and took place after dark, when park is closed, there was no disruption to regular park activities.
- Park Rangers and IMPD created a perimeter to ensure safety. USDA Wildlife Services used techniques and equipment selected to allow for safe, humane, and effective operation, including night vision technology.

Phase 2 Summary:

- 101 deer were harvested (64 does, 37 bucks)
- All 101 deer were processed for donation, and an estimated additional 3434 lbs of venison was donated to Gleaners Food Bank.
- Deer from the Phase 2 west side cull averaged 34 lbs of venison per deer, compared to 20 lbs of venison per deer from the east side, supporting observations that deer on the east side of the park were in especially poor condition.

Will there be any deer in the park after the reduction?

Yes! They will, of course, take a little more work or luck to see. Herds of 40+ deer grazing along the roads in daylight were, sadly, an unnatural and unhealthy situation for the deer. So far informal observations on the east side of the park since the November 2014 reduction have found small groups of 2-10 deer along Walnut Point Rd., Picnic Area 5, 71st St, and 25-30 deer hanging out mostly near the Ice Skating Ponds, Spring Pond Nature Preserve, Circle Drive, and 65th St. Your best chances of seeing deer in the park are at dusk, or just before the park closes (be sure to check gate closing times, posted at 56th & 71st Gates).

Updated naturalist observations 2015-2016: park naturalists were pleased to observe recovery of vegetation at Eagle Creek, especially noticeable in the butterfly garden near the Earth Discovery Center, where compass plant, New England aster, and several other important butterfly host and nectar plants were able to grow and flower for the first time in summer 2015, rather than being browsed to their roots. Deer appear to the naturalists to be healthier than in years past, with fewer individuals with ribs showing. In 2016, herds of 7-20+ deer have been regularly seen in grazing along roadsides in the park, along with several fawns, and it is usually possible to see at least one or two deer even casually driving through the park in mid-day. In spring 2016 naturalists observed significant deer browse on several patches of spring wildflowers, and moderate browse in the butterfly garden, although most plants were able to recover and flower.

Deer management is a long-term issue: a single reduction will not solve the problem. New fawns will be born every year, and deer from uncontrolled areas outside the park will continue to reproduce and migrate to the park. Our goal is not to eliminate deer from Eagle Creek Park, but to return them to a level that is healthy for the forest and entire ecosystem, as well as for the deer themselves.

The USDA will provide analysis and further recommendations later this year. As the plan is implemented over several years, the City will continually evaluate all available control methods to determine the best options for the future of the Park. The City will adjust its plan accordingly based on the herd health, forest regeneration, and plant and wildlife viability in the Park.

2015 USDA Update

Deer density surveys conducted in April of 2015 (after initial deer reduction of winter 2014/2015 which removed nearly 250 deer from the population, but before fawns were born in spring of 2015) found an average deer density of 90.7 deer per square mile or approximately 553 deer in the park (the recommended or healthy density is 5-30 deer per square mile), with the potential to increase 20% annually.

Recommendations:

- Continue monitoring deer densities using standardized deer population surveys, records of deer-vehicle collisions and other incidents involving deer, and gauge deer-human conflicts by communication with surrounding residents. Also continue to monitor vegetation using standardized plot surveys. Select deer management actions based on these indices.
- Continue professional deer removal via sharpshooting to reduce deer densities consistent with goals in a reasonable time frame.

- Promote hunting on surrounding property wherever safe and legal. Persistently encourage private landowners to allow access to hunters.
- When and where suitable, allow controlled/managed hunting within selected areas of the park.
- Continue educational efforts. Upon the request of Eagle Creek Park, the USDA Wildlife Services is available to assist with education, continued monitoring of deer management goals, and implementation of deer management actions.

UPDATE: 2016 Deer Browse Study Results

Surveys of vegetation at study plots Eagle's Crest and Spring Pond Nature Preserves showed browse damage ratings still in the severe to heavy range for jack-in-the-pulpit and white baneberry, two indicator species of deer overabundance in Indiana (Webster and Parker 2000), but average increases in plant height and flowering for both species overall are a promising sign that some forest recovery is taking place. There were also large increases in the density of small ash and sugar maple seedlings. Woody twig browse rates remained constant at Eagle's Crest, but were significantly lower at Spring Pond, the site that exhibited greater rates of browse in 2013.