Animal Alliance
of Canada

March 2010.

Culling Deer In Iroquoia Heights Conservation Area
Proposed by the Hamilton Conservation Authority (HCA) and the Ontario Ministry of Natural Resources (OMNR)

Description of the area where there is a proposed cull:

In the Site Summary for Iroquoia Heights Conservation Area (Appendix #1-separate pdf), the Hamilton Naturalist Club describes Iroquoia Heights as follows: *"The Iroquoia Heights Conservation Area is an irregularly shaped block of land on the rim and upper slopes of the Niagara Escarpment at the southeast corner of the Dundas Valley re-entrant. A small remnant of sub-mature escarpment woods is present but most of this area consists of regenerating agricultural lands that are now largely covered with tall shrub thickets, second-growth woods, and plantations."* (Appendix #1)

The Flora and Fauna Summary of the report covered vascular plants, butterflies, fish, herpetofauna, breeding birds and mammals:

Vascular Plants: 271 vascular plant species were recorded. Eighty, or 30%, were non-native species, six were locally uncommon and one locally rare. The flora includes 11 Carolinian species.

Butterflies: Surveyors documented seven common species of which three were newly recorded to the area but also noted that the coverage for butterflies was inadequate.

Fish: No fish assessment was done.

Herpetofauna: The report states that there was inadequate coverage in both 2001 and 2002. In 1991 eight species were documented and surveyors recorded only two incidental sightings of common species.

Breeding birds: Surveyors recorded 46 species, including two interior forest species. Also recorded were 10 locally uncommon

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species, nine of which were newly recorded for the area and there was one new locally rare species.

Mammals: The report states that there was inadequate coverage for mammals. There were incidental sightings of six common species.

Overview:

In a March 31, 2009 Memorandum and power point presentation, Shari Faulkenham, Ecologist with the Hamilton Conservation Authority (HCA) set out the justifications for culling deer in two documents, the March 31, 2009 Memorandum by the Hamilton Conservation Authority and the *Deer Monitoring Initiatives for 2008 and 2009*. (Appendix #2 and #3 respectively – separate pdfs)

Dundas Valley and Iroquoia Heights Conservation Areas were cited as areas with "too many" deer, followed closely by Borer's Falls-Rock Chapel and Tiffany Headwaters.

Summary of HCA's assertions:

According to the HCA, the issue of "too many deer" has been driven by "numerous complaints in [the] last 6 years." (*Deer Monitoring Initiatives for 2008 and 2009*) Complaints include destruction of gardens, ornamental trees and turf, fouling of yards, loafing and aggressive deer.

In the power point presentation, the HCA suggests two reasons for the complaints. The first is that deer are overpopulated, particularly in Iroquoia Heights. According to the HCA, Iroquoia Heights has an overpopulation of deer with a one deer to every 0.6 hectares. A "healthy deer population" is measured at one deer to every 6 or7 hectares. The reasons for current deer numbers cited by the HCA are mild winters, few to no natural predators and no hunting because of firearms discharge restrictions and property ownership. Overpopulation is defined by the HCA as "The condition where an organism's numbers exceed the carrying capacity of its habitat, such as to cause environmental deterioration, an impaired quality of life or a population crash." (IBID)

The second reason given by the HCA is habituation of deer by deer feeders, bird feeder attractants and palatable ornamental plants. The HCA claims that "Diet supplementation by humans, by far, is the greatest factor contributing to the habituation of wildlife, which in turn affects how we as humans perceive the acceptable line where wildlife can and cannot cross." Habituation is defined by the HCA as "A learned behaviour in which as animal exhibits a lessened response with repetition of a stimulus." (IBID)

The HCA lists the consequences of habituation of deer which includes:

- lack of fear toward humans;

- ❖ aggression toward humans, association of food with humans;
- ❖ poor quality diet resulting in poor health;
- ❖ congregations of deer in "unacceptable" places;
- ❖ increased vehicle strikes; and
- ❖ too many deer in a small area.

The document states that the HCA will combine deer census data with its deer exclosure monitoring, compare number of deer hunted verses non-hunted areas and "quantify their effects on natural lands".

According to the HCA, the deer exclosure programme is designed to protect vegetation in order to:

- ❖ observe changes in plant community structure, diversity and biodiversity
- ❖ compare results to areas outside the exclosures that are exposed to deer; and
- ❖ allow for vegetation monitoring parameters

Critique HCA documents:

Despite the fact that neither the HCA nor the Ontario Ministry of Natural Resources (OMNR) have completed their studies, made them public, provided any scientific peer-reviewed justification, the HCA has concluded and declared that the deer in Iroquoia Heights are seriously overpopulated, and cites concerns about deer densities in the Dundas Valley, Tiffany Headwaters, and Borer's Falls-Rock Chapel conservation areas.

It should be of concern to Hamilton Councillors and members of the public that the HCA has expressed a bias against the deer and in favour of lethal management prior to the release of peer-reviewed scientific material and reports.

1. **Rationale for killing deer in Iroquoia Heights – Complaint driven management:**

   The HCA suggests that management considerations are in large part being driven by the numerous complaints from communities around the Dundas Valley and Iroquoia Heights Conservation Areas. These complaints are largely about aesthetics. They result in conflicts between humans and deer who share Iroquoia Heights Conservation Area and surrounding properties. Of the six complaints listed in the HCA's report, five involve destruction of gardens, ornamental trees and turf, fouling the yards and loafing. There is an additional complaint about aggressive deer. Virtually all of these complaints have been encountered in other municipalities and can be managed here through non-lethal measures.

2. **Claims of overabundant deer population:**

   The HCA asserts that there is an overabundance of deer in several conservation areas, specifically focusing on Iroquoia Heights. In fact the numbers provided by

the HCA vary wildly. One HCA document states that there are 102 deer in Iroqouia Heights but in a January 8, 2010 Hamilton Spectator Article, the Authority staff are reported as saying that there are “an estimate 168 to 182 deer”. It remains unclear exactly how many deer the HCA claims reside in Iroqouia Heights. In fact, deer move in and out of the conservation area so their numbers would vary on a daily basis. As Ms. Yagi OMNR’s management biologist for the Niagara area states, “If there is no food they will leave and go to another place.” (Overpopulated deer can’t be moved, ministry biologist says, Richard Leitner, Hamilton Spectator, May 29, 2009)

In addition, the HCA does not site scientific, peer-reviewed papers to justify the classification. How does the HCA arrive at the determination that a healthy deer population is on deer per 6 to 7 hectares? Where are the scientific papers to justify such a statement? Contrary to popular myth, there is historical evidence that deer were at least as abundant, probably significantly more abundant, in primal times than now.

In fact, the measure of overabundance according to the HCA is "environmental deterioration, impaired quality of life or population crash". The HCA claims that three indicators establish overabundance.

However, there is no suggestion in the HCA material that the Iroquoia Heights deer are sick or compromised or that the populations are about to crash. The HCA provides no evidence of environmental deterioration caused by deer, only observations of deer habitat interactions and the obvious influence herbivores naturally exert upon their environment.

The exclosure studies are fundamentally flawed because they completely exclude deer, thereby establishing false outcomes. In addition, concerns have been raised that in fact exclosures may attract deer and result in increased grazing around the prohibited area thus exaggerating herbivore influence on local vegetation. Deer quite naturally impact their environment, as does any large and reasonably common herbivore, and given that they are native, their impact should be considered quite normal.

Finally, the HCA's definition of overabundant is a biological impossibility. The HCA defines overabundance as " The condition where an organism's numbers exceed the carrying capacity of its habitat...". But animals, lacking technology, cannot exceed "carrying capacity" as that is the capacity at which they are able to survive. Exceeding it leads to reduced health, reduced fecundity and ultimately death. There is with herbivores, a "predator prey" relationship wherein vegetation is the "prey". When deer reach their peak population, they impact the vegetation until there is not enough left to sustain them at their peak capacity. At that point, the deer would move to different areas or die, reducing the numbers and their impact on the vegetation. The vegetation which has far more reproductive capability than deer begins to regenerate. Such population swings are "cyclic".

The real impact on deer numbers, aside from hunting pressures, occurs with harsh winters and deep snow. Such episodes are rare but do occur. The main strategy deer have to survive at such times is to "yard", to gather in quiet sheltered areas thereby reducing movement and conserving energy.

The problem with the HCA's evaluation of deer impacts is that it is based predominantly on deer/vegetation interaction instead of the broader ecological relationships between deer and the environment. In fact, a new study done by the Ohio State University suggests that larger deer numbers may in fact enhance ecological diversity. (Appendix #4)

> *"A recent study by researchers at Ohio State University and National Park Service found that higher deer activity is modifying forest ecosystems in unexpected ways. Out of several species of snakes, salamanders, and invertebrates studied, a greater diversity of animals were found in areas with deer populations than were in areas with no deer activity.*
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> *"The study, which comes at a time when many states have begun to selectively control deer populations, challenges previous research that has suggested deer populations can negatively impact forest ecosystems through eating plants that many smaller animals may depend on.*
>
> *"Instead, researchers found that high numbers of deer may in fact be attracting a greater number of species. This may be because their waste creates a more nutrient-rich soil and as a result, areas with deer draw higher numbers of insects and other invertebrates. These insects then attract larger predators which thrive on insect lava such as salamanders, and the salamanders in turn attract even larger predators such as snakes." (http://researchnews.osu.edu/archive/deer.htm - Oct 20, 2008)*
>
> *"Katherine Greenwald, co-author of the study makes the following observation, 'We need to be aware of what's happening in these forest ecosystems. Culling deer may cascade into affecting plants, salamanders, and other creatures in ways we can't even imagine. So before we start removing deer we should study what's really happening in these areas because there are a whole host of other issues that go along with culling'." (IBID)*

Failure to identify and consider human caused stressors:

The HCA does not consider stressors affecting Iroquoia Heights which is bordered on the north and west by Highway 403 and on the south and east by residential communities.

The HCA does not consider the effects of salt, gasoline and oil runoff from the highway. It does not consider the impact of high human use of Iroquoia Heights by area residents and visitors who walk their dogs, feed the birds, exercise and enjoy nature. High volume human activities impact this natural area, although these impacts are not considered in the HCA material.

It does not consider the impacts of non-native plants that frequently populate residential gardens that are in direct contact with and often spread into this natural area.

It does not consider the impact of non-native plant species. 30% of all the vascular plants are non-native including garlic mustard which hinders the growth of other plant species and affects forest ecosystems.

Garlic mustard is particularly invasive. The New York Invasive Species Information states, *"Researchers have found that garlic mustard is allelopathic (it releases chemicals that hinder the growth of other plant species) and has inhibited growth of both grasses and herbs in laboratory settings (Michigan State University, 2008). Some researchers also believe that these compounds may hinder the beneficial relationships some plant species have with soil fungi (Roberts and Anderson, 2001). Experimental trials have shown that removal of garlic mustard leads to increased diversity of other species, including annuals and tree seedlings (MSU, 2008)."* (http://nyis.info/plants/GarlicMustard.aspx)

The University of Guelph had similar findings to those of New York State. Lori Bon Hunt, in an article for the university reported that "The scientists discovered that the weed garlic mustard (*Alliaria petiolata*) releases chemicals under the soil that are detrimental to the fungi that native trees — including the beloved Canadian maple — depend on for growth and survival."

She goes on to say, "This noxious weed is disrupting an intimate symbiosis between native species and fungi that has been going on for millions of years. Garlic mustard targets and poisons arbuscular mycorrhizal fungi, the main fungal allies of native trees such as maple, ash and other hardwoods. The fungi have long microscopic threads that create a subterranean network, allowing for the exchange of nutrients with indigenous trees. The fungi rely on the trees for energy, and the trees rely on the fungi for food. "
(Chemical Warfare' by Invasive Weed Jeopardizes Native Trees in North America, Study Finds *Garlic mustard disrupts intimate symbiosis between native species and fungi* - http://www.uoguelph.ca/atguelph/06-05-17/newstrees.shtml)

The HCA has ignored the impact of garlic mustard, a non-native species which negatively impacts native trees and forests, instead focusing on a naturally occuring species deer and declaring them overabundant and environmentally destructive and in need of culling.

It has not taken into consideration the impact of unauthorized activities within Iroqouia Heights Conservation Area. November 9, 2009 minutes of the Conservation Areas Advisory Board confirm illegal deer hunting. The minutes state**, "***Duke O'Sullivan noted that there had been considerable newspaper coverage on illegal deer hunting activities in the Iroquoia Heights Conservation Area and requested HCA Chair Chris Firth-Eagland to provide some information on the situation. The Chair confirmed there had been unauthorized hunting in the Conservation Area and that the Area had been closed for a period of time for public safety reasons. The CAO has been communicating with Hamilton Police Services, Six Nations, Ministry of Natural Resources and the neighbourhood to resolve the issue."* **(**HAMILTON CONSERVATION AUTHORITY MINUTES CONSERVATION AREAS ADVISORY BOARD Minutes of the Conservation Areas Advisory Board meeting held on Thursday, November 19, 2009 at Woodend, commencing at 7:10 p.m.)

3. Habituation of deer driven by food availability:

The HCA lists seven consequences of feeding deer without determining whose doing the feeding. From the HCA documents it appears that there are two distinct group of people who "attract deer" with food, those who purposefully bring food into the area for the deer and those who have unwittingly have deer attractants in those yards that are accessible to Iroquoia Heights. This information is important in developing a successful plan to address deer feeding.

The HCA requires an aggressive education and enforcement programme to deter the purposeful feeding of deer. The HCA also needs to develop a programme to assist homeowners to address impacts of deer on their gardens, including fencing, planting non-deer attractant gardens and re-naturalizing yards.

However, the HCA provides no evidence that the deer are in poor health because of the feeding. In fact, Ms Yagi states "The deer are not starving." (IBID Hamilton Spectator, May 29, 2009 – Appendix #), confirmed by our observation in February 2010. The HCA provides no evidence that there are increased vehicle strikes or incidents of deer aggression.

In addition the HCA has provided no data to suggest that large numbers of deer are present in Iroquoia Heights because of the feeding and in fact we are concerned with assertion that there are 102 deer in this conservation area. Such a statement suggests that the number is static and the animals contained. The HCA does not suggest that the animals are "trapped" in this area so clearly they move in and out depending on the time of day and the time of year. This was certainly true at Sifton Bog where deer have been numbered as high as 52 and as low, this year, as 4. Observation of Iroquoia Heights Conservation Area in February 2010 showed a highly permeable perimeter with deer tracks leading in and out of the conservation area.

4. Concerns about exclosures:

The HCA's documents do not examine the role of deer in the environment. The relationship between deer and the plant communities is not linear, in the sense that if a large number of deer are removed from an area, then the ecological integrity will in some objectively demonstrable manner, "improve". Interactions between deer and their environment are significantly more complex than the simplistic approach suggested by the OMNR and the HCA.

Ecosystems like Iroqouia Heights Conservation Area are complex and exclosure research simply fails to capture the complexity. Indeed, it perverts the ecosystem by excluding all deer and some other species from the fenced area and therefore creates a contrived, artifical situation on a miniscule scale. In addition, the studies only examine the effects on plant communities not the entire ecology of the exclosures. Finally, the exclosure at Iroquoia Heights is easily accessible to conservation area visitors.

5. Concerns with the OMNR statements:

In a May 29, 2009 article in the Hamilton Spectator, Richard Leitner reported the following:

"A controlled hunt is the only viable way to reduce an overpopulation of deer in the Dunda Valley and Iroquoia Height[s] Conservation Area[s], says government scientist who helped oversee an aerial survey earlier this year. Anne Yagi, the Ministry of Natural Resource's management biologist for the Niagara area, said she's already verbally recommended such a hunt to the Hamilton Conservation Authority. Although the authority is awaiting a written recommendation. she ruled out non-lethal options like moving the deer or injecting females with birth control." (Appendix #)

Absolute statements such as this demonstrate a closed-minded attitude on the part of the OMNR to consider non-lethal alternatives. We agree with Ms. Yagi that moving the deer and injecting birth control are not options. Both negatively impact the individual deer. But so does hunting which she promotes as the best option to reduce the population.

We urge Ms. Yagi to include the scientific justification for arriving at stated optimal deer densities and to produce baseline floral and faunal data for the conservation area prior to the killing.

"Ms. Yagi said deer are a concern when they become overpopulated because, apart from creating traffic hazards, they eat and destroy the habitat for other sensitive species and can spread Lyme disease through their ticks." (IBID)

The OMNR demonstrates the same bias as the HCA. Ms. Yagi has already "sentenced" all but 20 of the deer to death without providing any evidence of "traffic hazards", "destruction of habitat" and "Lyme disease".

Even though prevention is an important part of the "management of deer", no preventive programmes are explored. Prevention is the key to reducing conflict between vehicles and deer. The Canada Safety Council pitches prevention on its web site and the City of Ottawa found that its "Speeding costs you deerly" campaign was a resounding success. The City of Ottawa web site states "Between 2003 and 2005, the average number of deer-vehicle collisions during the months of October and November – the peak period for the movement of deer – was 344. The number dropped to 298 in the fall of 2006, 236 in the fall of 2007 and further dropped to 214 last fall. These collision reductions result in an estimated social cost savings of $1.1 million." (Appendix #5 & 6 respectively)

And just as exclosures are used to study the absence of deer from a given area, so to can they be used to protect unusual plants from deer and human disturbance such as plant collection. In addition, exclosures should be used to protect the new plants in the rehabilitated areas. Deer Fence Canada provides an inexpensive, mobile fencing solution.

With regard the Lyme disease, the City of Hamilton's Public Health Services has confirmed only one case since 2007 and in previous years confirmed 0 to 2 cases, all acquired outside the Hamilton area. (http://www.hamilton.ca/Hamilton.Portal/Templates/Generic1.aspx?NRMODE=Published&NRORIGINALURL=%2fNewsandPublications%2fNewsReleases%2f2007News%2fJuly%2f07-30-07vm%2ehtm&NRNODEGUID=%7bBDF9C164-F47B-415A-B653-508BB2F90F69%7d&NRCACHEHINT=Guest)

6. Method of killing:

Bow hunting is cruel, results in 50% wounding rate and will need to be ongoing (Appendix #7)**:** The Conservation Authority raises the following concerns with bow hunting: bow hunting is not as effective as sharpshooting; there are problems with acquiring cost-effective liability insurance for bow hunting activities; mortally wounded deer can travel 100 yards or more before collapsing in public view; other wounded deer may die over a longer period of time, may be permanently disabled or may recover; and there is strong opposition from animal welfare advocates.

According to a study presented at the Annual Conference of Southeast Associations of Fish and Wildlife Agencies, of the twenty-two deer who were shot in this study, 11, or 50%, were wounded and not recovered. As the study indicates "The 50% wounding rate from our data is similar to data reported from other studies. Downing (1971) and Boydston and Gore (1987) reported wounding rates of 50% with archery equipment for white-tailed deer in Georgia and Texas. Similar wounding rates have been reported in Georgia (44%; Croft 1963), Indiana

(58%; Stormer et al. 1979), New Jersey (55%; Lohfield 1980), Wisconsin (31-37%; Herron 1984), South Dakota (48% McPhillips et al. 1985), and Michigan (43%; Langenau 1986)."

Deer move in and out of the conservation area. If the OMNR and the HCA recommend culling, Hamilton City Council will be required to cull repeatedly as has been demonstrated in places like the Pinery and Presqu'ile Provincial Parks and will face huge controversy each time.

Appendix #4

http://researchnews.osu.edu/archive/deer.htm - Oct 20, 2008.

SNAKES, SALAMANDERS AND OTHER CREATURES THRIVE IN AREAS WITH HIGHER DEER POPULATIONS

COLUMBUS, Ohio – Reducing the number of deer in forests and parks may unexpectedly reduce the number of reptiles, amphibians and insects in that area, new research suggests.

A recent study by researchers at Ohio State University and National Park Service found that higher deer activity is modifying forest ecosystems in unexpected ways. Out of several species of snakes, salamanders, and invertebrates studied, a greater diversity of animals were found in areas with deer populations than were in areas with no deer activity.

The study, which comes at a time when many states have begun to selectively control deer populations, challenges previous research that has suggested deer populations can negatively impact forest ecosystems through eating plants that many smaller animals may depend on.

Instead, researchers found that high numbers of deer may in fact be attracting a greater number of species. This may be because their waste creates a more nutrient-rich soil and as a result, areas with deer draw higher numbers of insects and other invertebrates. These insects then attract larger predators which thrive on insect lava such as salamanders, and the salamanders in turn attract even larger predators such as snakes.

The results, which were published recently in *The Journal of Wildlife Management*, highlight how recent attempts to control deer populations in and around forests may indirectly affect other animals in the forest.

“By just reducing the number of deer in the forest, we’re actually indirectly impacting forest ecosystems without even knowing the possible effects,” said Katherine Greenwald, co-author of the study and doctoral student in evolution, ecology, and organismal biology at Ohio State.

“Smaller creatures like salamanders and insects are all part of the base of a larger food web that can be affected by small changes.”

Research was conducted in Cuyahoga Valley National Park, a 51-square-mile park in northeastern Ohio with an estimated deer population of 2,300 to 4,600. The park's large population of deer and varying landscape made it an ideal place to test for the effects of these animals, she said.

Researchers studied the forest by pairing 12 unfenced sites with 12 fenced sites, called exclosures, based on similar habitat type, forest cover, soil type, and slope. The exclosures, which are used frequently to test for differences in plant growth between grazed and untouched areas, prevent deer from grazing in certain areas. Both unfenced and fenced areas measured 10 meters by 10 meters (approximately 33 feet by 33 feet).

Five square wood boards measuring almost one square foot (30 centimeters square) were placed in random spots in each fenced and unfenced site. These boards are placed on top of the soil and act as rocks or other ground cover for salamanders, slugs and other animals to hide under for protection.

The researchers then counted the number of invertebrates and vertebrates under each board every three to four weeks from May through December in 2004 and monthly from May through September the following year.

They identified a variety of species during the study including snakes, salamanders, earthworms, slugs, spiders, ants, beetles, and many more invertebrates. Species diversity was determined by comparing the variety of insect groups and invertebrates found in each area.

The results, Greenwald said, were completely unexpected.

"We thought the salamanders especially would be very sensitive to areas with deer because in those areas the whole undergrowth is basically gone. So we thought these creatures were going to be much more abundant in the fenced exclosures because it is just bursting with plants and other studies have shown that amphibians prefer damp, covered areas," she said.

Instead, they found that many of the species studied favored the unfenced areas where deer grazed frequently. Pill bugs, centipedes, millipedes, and beetles were found equally in grazed and fenced areas, but many other creatures were found in greater numbers in grazed areas.

Researchers found nearly three times as many red-backed salamanders and five-and-a-half times more snakes in sites with deer than those without deer. Among invertebrates, snails were 11 percent more abundant in grazed areas than in exclosures and the diversity of arthropods was also 14 percent greater in these areas.

Greenwald speculates that the areas with higher deer populations may appear to lack the high variety of low-lying plants found in exclosures, but the deer may be creating a richer soil mixture through their droppings. This rich soil may be benefiting some

plants in the area, which in turn is attracting a larger diversity of insects and invertebrates.

Salamanders and snakes may then be following these creatures, creating a more diverse animal population overall in areas with deer.

“Another possibility is that we are observing a ‘refuge effect,’ where animals in the grazed areas are more likely to use the cover objects than animals in the ungrazed areas. If the ground in the exclosures really is more favorable, as we originally thought, maybe the animals there just have no need for our artificial cover boards,” Greenwald said.

But no matter what the reason, she cautions that the take-home message of the study is that officials need to understand the forest ecosystem before making decisions about wildlife management.

“We need to be aware of what’s happening in these forest ecosystems. Culling deer may cascade into affecting plants, salamanders, and other creatures in ways we can’t even imagine. So before we start removing deer we should study what’s really happening in these areas because there are a whole host of other issues that go along with culling,” she said.

Greenwald conducted the study with Thomas Waite, former associate professor of evolution, ecology and organismal biology at Ohio State, and Lisa Petit of the Cuyahoga Valley National Park.

Appendix #5

Speeding Costs You Deerly Campaign Wins MTO Award
http://www.ottawa.ca/residents/onthemove/driving/road_safety/integrated/mto_award_en.html
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The Ontario Ministry of Transportation (MTO) recently recognized the Integrated Road Safety Program for its 'Speeding Costs You Deerly' initiative. The program won the 2006 Road Safety Achievement Award in the category 'Road Safety Achievement of the Year'.

An extensive communications campaign was undertaken in the fall of 2006. The focus was to increase awareness among drivers of the high incidence of deer-vehicle collisions. Drivers were educated about the importance of reducing speed, being alert, staying in control and understanding deer traffic patterns as ways to reduce the number of collisions. The award winning program committee included members from Ottawa Police, the City's rural health team and Public Works and Services, community residents, MTO, OPP, CAA and Ontario Federation of Anglers and Hunters.

City of Ottawa 2008 Ottawa Road Safety Report
(http://www.city.ottawa.on.ca/residents/onthemove/driving/road_safety/integrated/annual_reports/report_2008_en.html)

Speeding Costs You Deerly Campaign Continues to be a Success

Deer-vehicle collisions decreased by 38 per cent while the IRSP's *Speeding Costs You Deerly* campaigns ran in the fall of 2006, 2007 and 2008. Between 2003 and 2005, the average number of deer-vehicle collisions during the months of October and November – the peak period for the movement of deer – was 344. The number dropped to 298 in the fall of 2006, 236 in the fall of 2007 and further dropped to 214 last fall. These collision reductions result in an estimated social cost savings of $1.1 million.

Appendix #6

Canada Safety Council

http://www.safety-council.org/info/traffic/roadkill.html

CAUTION: Animals Crossing

The Season to be Wary / Avoid Ambush / Engineering Solutions / Statistics

If you've driven on North American roads, you've seen roadkill - animals that have been killed by passing traffic. At some time, you may have run over a small animal on the road. You may even have had the harrowing experience of striking a large animal.

Road collisions kill and maim wildlife, pets and humans, and result in millions of dollars in insurance claims. Incidents are under-reported. When a driver swerves or stops to avoid hitting an animal, the resulting mishap may not be recorded as a collision with an animal. Or, an animal that has been hit by a vehicle may move away from the road surface to die and not be recorded by the maintenance crews who remove the carcasses.

Deer and other big-game populations are on the rise. At the same time, the number of vehicles on the road goes up every year. The combination of animals with traffic has led to a rise in serious collisions. Public awareness campaigns warn motorists of the danger, and new ways to prevent vehicles from hitting wildlife are being explored.

The Season to be Wary

Collisions with wildlife are a hazard throughout the year, but they start to peak in the summer and fall. The majority of these crashes occur between dusk and dawn, when visibility is low. However, animal activity can be high during the daylight hours.

The route to a cottage or campground usually includes driving long distances on highways in forested and rural areas. Many vacationers start their trip in the wee hours of the morning or drive until well after dark.

Ungulates (hoofed mammals) that stand high on their legs, such as moose and deer, pose the most danger to vehicle occupants. If they are hit they can roll onto the hood and into the windshield or roof, resulting in extensive damage and serious or fatal injury. Moose pose a serious hazard to motorists because of their height. Deer usually “bounce” off the bumper. It is important to use the appropriate avoidance strategy for each.

Today's large deer populations pose a year-round hazard. However, deer collisions peak in October and November, which is the mating season and the time for migration to winter yarding areas.

Newfoundland and New Brunswick may be a moose hunter's paradise, but their abundant ungulates create a menace to unsuspecting motorists. (Equally, motorists are a menace to unsuspecting ungulates.) Those provinces report the most moose collisions during June, July and August. Moose are especially hard to see in low light because they are dark brown and their eyes do not reflect light like those of deer. Due to their height, their eyes are above most headlight beams.

Avoid Ambush

The sudden appearance of a large animal in the middle of the highway, seemingly out of nowhere, is any driver's nightmare. To protect themselves, defensive drivers adapt their speed to conditions and keep alert for wildlife.

Vigilance is the first and best defence, especially when driving on unfamiliar rural roads. Watch out for warning signs that indicate high risk areas. Use eye-lead time and take extra care. Ask passengers to help by scanning both sides of the roadway. Use your high beams when no traffic is approaching and never over-drive your headlights — you need to see an animal in time to avoid hitting it.

Should you spot an animal beside the road, slow down until you have safely passed it. Expect more animals to follow. Animals near the roadside may bolt suddenly, so approach with caution. Turn on your flashers to warn other drivers.

If the animal is in your path, brake firmly but do not swerve to avoid it. Sound your horn in a series of short bursts to frighten it away. Provided you can slow down with control, steer around the animal but stay on the highway. Watch out for oncoming traffic.

Engineering Solutions

Corridors which wildlife have used for millennia now intersect roads. Wildlife researchers and safety officials are seeking better ways to protect motorists from wildlife and vice versa.

Parks Canada erected an eight-foot high fence along the Trans-Canada Highway through Banff National Park. To redirect animal traffic, 22 underpasses (culverts) and two 164 foot wide overpasses were built. Highway kills dropped 96 per cent.

Reflector devices have not been shown to deter deer from crossing the road, although they may cause drivers to slow down by designating high risk road sections.

The Wildlife Warning System, developed by Saskatoon-based International Road Dynamics Inc., uses proven technologies to sense vehicles and then to warn the

animals. The system monitors traffic entering a problem area. Approaching vehicles trigger a sensor, which selectively activates deterrent devices (e.g. sounds or lights) to scare the animals away from the road and let traffic pass safely. The Saskatchewan government is testing the system on a stretch of highway notorious for wildlife-vehicle collisions. There are no official results yet, but during the first year of operation deer-vehicle collisions seem to have dropped.

Similar NASA infrared technology is available in some General Motors cars. *NightVision*TM enhances the driver's ability to detect potentially dangerous situations, such as the presence of animals or pedestrians, beyond the range of the headlamps.

These are a few of the techniques being tried to prevent collisions with wildlife. However, there is still no substitute for a defensive driver.

Appendix #7

Wounding Rates of White-tailed Deer with Traditional Archery Equipment

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Abstract: We captured and affixed radio collars to 80 male white-tailed deer *(Odocoileus virginianus)* during 1995-1997 to ascertain the wounding rate and proportion of deer that die from hunter-inflicted wounds. Our study population was hunted only with traditional archery equipment (recurve and longbows). Of the 22 deer shot by archers, 11 were recovered by the hunter, resulting in a 50% wounding rate (deer shot but not recovered). Only 3 (14%) of the 22 deer shot by hunters died and were not recovered. Based upon demographic and harvest statistics, these estimates indicate that approximately 4% of adult males in the population die from archery related wounds annually and are never recovered.

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It has been speculated that wounds acquired during the hunting season are a major source of mortality for white-tailed deer *(Odocoileus virginianus),* yet existing information often is conflicting or based upon conjecture rather than science. In addition, data designed to determine the fate of wounded deer is difficult to obtain and is virtually nonexistent in the literature. Because intensive management practices rely upon accurate estimates of mortality, it is essential to have accurate estimates of wounding rates when modeling population dynamics. Our goal was to quantify wounding rates (proportion of deer shot by hunters but never recovered) of whitetailed deer with traditional archery equipment and to determine the proportion of wounded deer that actually die from their wounds.
Funding and support were provided by the U.S. Army and the Oklahoma Cooperative Fish and Wildlife Research Unit (Okla. Dep. Wildl. Conserv., Okla. State Univ., Wildl. Manage. Inst., U.S. Geol. Surv. Biol. Resour. Div., cooperating). B. J. Farrar, D. E. Townsend II, and S. Grubbs provided assistance in the field.

Methods

The study was conducted at the McAlester Army Ammunition Plant in southeastern Oklahoma during 1995-1997. The McAlester Army Ammunition Plant is an ammunition production and storage facility of the U.S. Department of Defense with 18,212 ha under a quality deer management program. Access onto the base is strictly controlled and hunting is limited to traditional archery equipment. Six 3-day hunts are conducted during October and

November and an average of approximately 1,300 hunters participate annually (Ditchkoff et al. 1996). All deer harvested on the base must be reported at the deer check station of the McAlester Army Ammunition Plant. The vegetation of the area is tallgrass prairie (60%) interspersed with post oak *(Qeurcus stellata)* and blackjack oak *(Q. marilandica)* forest (40%) (Duck and Fletcher 1943). Water oak *(Q. nigra)* and red oak *(Q. shumardii)* drainages and brushy draws bisect the area. Ditchkoff et al. (1996, 1997) provided a more complete description of the vegetation and management on the McAlester Army Ammunition Plant.

We captured 80 adult male deer during January 1995-1997 using drop nets (Ramsey 1968) on sites prebaited with corn and persimmons *(Diospyros virginiana).* We fitted each captured deer with a radio collar (Adv. Telemetry Sys., Isanti, Minn. 55040) equipped with a 4-hour mortality sensor. Total radio-collared deer alive at the beginning of each hunting season ranged from 37 to 47. We monitored deer daily during archery hunts using a 3-element Yagi antenna and portable receiver. Prior to each hunt, all hunters were instructed to inform the hunt coordinator when they shot a radio-collared deer. Each report of a wounded deer was verified by the presence of blood or a visual confirmation by the hunter that the arrow had struck the deer. We monitored wounded deer every 4-8 hours for > 5 days to enable timely necropsies of deer found dead. When we received a mortality signal, we waited until hunters had left the area (sunset) to locate the deer and ascertain cause of death. We left all wounded deer in the field and did not confer with hunters regarding the fate or location of wounded deer so as not to influence recovery rates.

Results and Discussion

During the study, 22 of the 80 bucks with radio collars were shot by archers, and 11 (50%) of those deer were recovered (Table 1). Of the 11 deer that were wounded but not recovered, 3 died from their wounds, resulting in a wounding loss of 14%. At the time of necropsy, we found wounds in the abdominal area and determined that integrity of the alimentary tract had been compromised. Two of the deer died within 24 hours of being shot, but the third deer survived 5-7 days before succumbing to his wounds. Of the 8 deer shot by archers that survived, we determined (e.g., visual sighting, necropsied at a later date, hunter information) that arrow entry was near the dorsal cavity (trapezius or lumbo-dorsal fascis muscles) or in the shoulder and had resulted in only a flesh wound.

Because a high proportion of wounded deer survive at the McAlester Army Ammunition Plant, population models are adjusted accordingly. Based on demographic calculations and annual census data (sex ratio, population density, etc.), approximately 15% of the adult males at the McAlester Army Ammunition Plant are harvested each year. This suggests another 15% of the males are wounded (50% wounding rate) by hunters but never recovered. After extrapolating wounding loss estimates to these values, we estimated approximately 4% of adult male deer at the McAlester Army Ammunition Plant die from archery related wounds annually and are never recovered by hunters. These estimates indicate that wounding losses due to archery hunting at the McAlester Army Ammunition Plant are negligible relative to other forms of mortality (e.g. hunter harvest, rut-related mortality, predation) (E. R. Welch, Jr. unpubl. data). However, in management strategies with higher archer densities, heavy pressure on the male portion of the herd, and elevated sex ratios (female: male), wounding loss could potentially be a significant source of mortality for male deer.

The 50% wounding rate from our data is similar to data reported from other studies. Downing (1971) and Boydston and Gore (1987) reported wounding rates of 50% with archery

equipment for white-tailed deer in Georgia and Texas. Similar wounding rates have been reported in Georgia (44%; Croft 1963), Indiana (58%; Stormer et al. 1979), New Jersey (55%; Lohfield 1980), Wisconsin (31-37%; Herron 1984), South Dakota (48% McPhillips et al. 1985), and Michigan (43%; Langenau 1986). Other studies have reported lower wounding rates in Wisconsin (10%; DeBoer 1958), New York (7%; Severinghaus 1963), Iowa (17%; Gladfelter 1982; Gladfelter et al. 1983) and Michigan (12%; Langenau and Aho 1983). With the exception of Gladfelter et al. (1983) and Severinghaus (1963) who noted traditional archery, these studies did not indicate the type of archery equipment (e.g., compound or traditional) used by hunters. We speculate that in studies before 1975 the predominant archery type was probably traditional, with a gradual shift to compound equipment during 1975-1985.

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Although wounding data are valuable, they cannot be used to adjust demographic models without information on the fate of the wounded deer. The most comprehensive study of archery wounding rates to date has been the Camp Ripley study in Minnesota (Krueger 1995). Through a complex study design involving hunter surveys, ground searches for dead deer, and infrared video searches for wounded deer, Krueger (1995) calculated a wounding loss estimate of 13% and noted that 45% of these deer were recovered by other hunters. Similarly, Herron (1984) and Lohfield (1980) reported wounding loss estimates based upon ground searches of 9% and 11%, respectively.

Other researchers have attempted to document the fate of wounded deer, but their results have been conflicting and confusing due to the form in which the data were reported. Based on searches for dead deer after archery hunts, Severinghaus (1963) found that 0.67 deer died from archery related wounds for every 10 deer harvested. Stormer et al. (1979) reported that when bowhunting accounted for 25% of the hunting effort, 18% of deer carcasses located in searches had died from archery related wounds.

Although we feel our estimates for both wounding and the proportion of deer that die from their wounds are realistic, our data could potentially be biased in 2 ways. First, some hunters may have failed to report that they had shot a collared deer. If this occurred, the actual wounding rate would have been greater and the proportion of wounded deer that died would have been lower than our estimates. Another possible source of error could have been caused by hunters incorrectly reporting that they had shot a collared deer. However, we find this scenario to be unlikely because hunters were rigorously questioned to ensure their arrow had actually struck the deer, and wounded deer were monitored closely for signs of wounds (visual sightings, activity patterns, etc.).

Our data suggest that wounding rates of white-tailed deer approaching 50% are possible when using archery equipment, but the majority (73%) of those deer survive. These estimates corroborate other comprehensive studies that have reported wounding loss estimates below 20% (Lohfield 1980, Herron 1984, Krueger 1995). As a result, inflated estimates based upon conjecture (Dechert 1967, Benke 1989) rather than science should be accepted as opinion rather than fact. Hopefully, our data will be used to improve management programs by providing accurate wounding estimates to be incorporated into demographic models, and will help eliminate some of the confusion and controversy which surrounds archery hunting.

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News Article:

'Chemical Warfare' by Invasive Weed Jeopardizes Native Trees in North America, Study Finds

Garlic mustard disrupts intimate symbiosis between native species and fungi

BY LORI BONA HUNT

An invasive weed that grows abundantly in Canada and the United States is engaging in under- ground chemical warfare, jeopardizing native trees by poisoning their best allies, a U of G researcher has discovered.

The finding by Prof. John Klironomos, Integrative Biology, Kristina Stinson of Harvard University and a team of other researchers from Guelph, the United States and Germany was published in the May issue of the *Public Library of Science*.

The scientists discovered that the weed garlic mustard (*Alliaria petiolata*) releases chemicals under the soil that are detrimental to the fungi that native trees — including the beloved Canadian maple — depend on for growth and survival.

It's the first study to show that invasive plants are hurting indigenous species by thwarting the ecological relationship between roots and certain fungi, says Klironomos.

“This noxious weed is disrupting an intimate symbiosis between native species and fungi that has been going on for millions of years.”

Garlic mustard targets and poisons arbuscular mycorrhizal fungi, the main fungal allies of native trees such as maple, ash and other hardwoods. The fungi have long microscopic threads that create a subterranean network, allowing for the exchange of nutrients with indigenous trees. The fungi rely on the trees for energy, and the trees rely on the fungi for food.

Klironomos, who holds a Canada Research Chair in Soil Biology, noticed that some native tree seedlings had declined in forests where garlic mustard was

present and suspected that the alien weed was the culprit. The researchers tested the theory by collecting soil from five Ontario forests containing both native hardwood trees and garlic mustard.

They planted seedlings in both infested soil and garlic mustard-free soil and studied the young trees' ability to form relationships with fungi. The seedlings planted in infested soil grew at about one-tenth the rate of the other trees and had fewer fungal-root connections.

The researchers conducted the test numerous times to mimic different conditions in the wild: established forests, open fields, roadways, ditches, etc. Each time, they found growth was stunted due to the diminished microbial activity caused by the presence of garlic mustard.

“This is affecting current and future generations of trees and changing the habitat,” Klironomos says.

Mature forest systems are normally highly resistant to invasive weeds, largely because of the strength of fungi-tree relationships, he says. Fungi are so efficient at extracting nutrients from the soil that weeds like garlic mustard, which don't form symbiotic partnerships with fungi, typically don't stand a chance.

But garlic mustard's guerrilla tactics have allowed it to get a foothold in some well-established forests.

“There are entire carpets of this weed in some places,” Klironomos says. “It has found a way to survive by knocking out the competition.”

The researchers next plan to determine what chemicals in garlic mustard are killing the fungi, how these chemicals interact with other soil microbes, and how plants and fungi co-exist with the noxious species in its native European habitat.