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Oh Deer! Analyzing the Impact of RIT Expansion and Development on White-tailed Deer (Odocoileus Virginianus) and Vehicle Collisions from 1993-2014

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OH DEER! ANALYZING THE IMPACT OF RIT EXPANSION AND DEVELOPMENT ON WHITE-TAILED DEER (*ODOCOILEUS VIRGINIANUS*) AND VEHICLE COLLISIONS FROM 1993-2014

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Title: Oh deer! Analyzing the impact of RIT campus expansion and development on white-tailed deer (*Odocoileus virginianus*) and vehicle collisions from 1993-2014.

Abstract: Increases in both human and deer populations, combined with habitat loss, habitat fragmentation, and decreased predation, have led to increases in deer-vehicle collisions (DVCs). The development of RIT over the past 20 years mimics typical urban/suburban development patterns, with documented deer-vehicle collisions. This research examines deer-vehicle collisions in regards to campus development, notably Park Point, to determine whether collisions are increasing or decreasing and to evaluate landscape variables that might be contributing factors. Data from 1993-2014, contributed by the RIT Campus Safety Office and the Monroe County Sheriff Office are modelled using ArcGIS software. This research builds on a previous research project and includes data collection via a social media survey. Findings show that strike counts are down, and that the areas of focus have shifted more toward the south. People are currently seeing more deer toward the south side of campus, indicating that the deer are possibly shifting their habitat preferences toward the south side of campus, which identifies several potential focus areas for RIT. It is recommended that RIT's Facilities Management Services consider adding speed bumps or an alternative method such as flashing lights to alert drivers when deer are in the area along the southern loop to reduce driver speed and reduce the possibility of a deer strike in this area.

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1. Introduction

1.1: Deer Strike Statistics

Increases in the populations of both humans and deer have led to increases in deer-vehicle collisions (DVCs) (Putman, 1997; Hussain et al., 2007; Morellet et al., 2007). Statistics indicate that ninety percent of animal-vehicle collisions are attributed to deer, as opposed to other animals (Hussain, 2007). From July 1, 2010 to June 30, 2011, for example, it is estimated that there were 1.09 million deer-vehicle collisions in the United States (State Farm, 2011).

These collisions come at a price. Frequently, striking a deer while the vehicle is in motion will cause damage to the vehicle. In Canada, property damage due to ungulate collision (including moose and caribou - the damages are still comparable) cost approximately $300 million per year. In the United States, the cost of damages may reach as high as $6 billion per year due to the larger US population. Ninety percent of DVCs end in the death of the deer, and 56-65% of DVCs end in human injury (Huijser et al., 2009; Transport Canada, 2003; Conover et al., 1995). In 2002 alone, over a billion dollars in damage were caused from 1.5 million DVCs in the United States. 150 humans were killed, while at least 1.5 million white-tailed deer died (Curtis & Hedlund, 2005). Statistically, there are approximately 4,100 DVC accidents every day, with a daily damage of over $2.7 million (Gosner et al., 2008), however there is a strong chance that the figures may be higher, since as many as half of all DVCs go unreported (DeerCrash, 2008).

Clearly, animal-vehicular interactions are significant roadside safety hazards. They are expensive, dangerous, and increasing with habitat destruction and overpopulation of both humans and white tailed deer (Knapp, 2008; Knapp et al., 2004). A review of fatal crash statistics from the National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis Reporting System (FARS) between 1995 and 2004 indicated that an average of 165 people were killed on roadways

annually as a result of an Animal Vehicle Collision (AVC) (Langley et al., 2006). By 2008, however, the average had climbed to 210 persons per year (National Highway Traffic Safety Administration, 1995-2008). In 2003, one study reported an increase in fatal DVCs of about 5.23 crashes per year from 1991 to 2000 (Khattak, 2003).

With the disconcerting increase in DVCs, Khattak normalized a decade's worth of annual AVC crash counts, from 1991 to 2000, to estimate the total annual vehicle miles traveled (VMT), obtained from the Federal Highway Administration (FHWA), in order to estimate the crash rate. The data were grouped into rural and urban areas. The normalized crash rate per 100 billion VMT seemed to be stable (Khattak, 2003). While this may seem inconsistent with what Khattak found from 1991-2000, there was also an increase of cars and drivers on the road. Once the data had been normalized, no increase in fatal DVCs was found. Furthermore, the shift in VMT seems to indicate more vehicle miles traveled in urban areas, such as suburbs and cities (Federal Highway Administration, 2010). This may indicates that with urban sprawl, whitetail deer are forced to share their habitat with humans more frequently and are struck more often in urban areas.

In urban areas, there are many reasons why deer-vehicle interactions occur, such as an increase in the number of miles traveled for the vehicle, a larger number of deer in the area, and habitat destruction (Gkritza et al., 2010). In urban settings, these factors lead to more DVCs, as white tail deer's seasonal and daily movements and activities frequently coincide with traffic patterns and human activities. Moreover, urban sprawl means many people are potentially traveling further to reach their workplaces or schools, increasing the risk of deer strikes.

Research and statistics show that the majority of DVCs in urban areas were typically vehicles with up to two occupants, in areas with speed limits under fifty-five miles per hour, dry roads, roads with poor lighting, and roads with no medians. However, DVCs on roads that had a

gravel shoulder and more traffic were more likely to have no injuries to the vehicular occupants, probably due to low impact speeds (Gkritza et al., 2010). In order to keep the incidence of DVCs low and ensure that measures to manage deer herd sizes are successful, it is important to keep herd size at a controllable level. Many urban areas are beginning to apply deer herd management plans to keep deer populations sustainable while maintaining safety for the citizens (Gkritza et al., 2010).

1.2: Community Responses and Strategies

Without controlling actions, deer populations can grow anywhere from 20 to 40% each year, depending on the habitat. With this type of growth, deer populations have the ability to encompass more than a hundred deer per square mile before reaching the carrying capacity limit and natural population control occurs (Iowa Department of Natural Resources, 2006). Researchers in 1999 suggested that DVCs could be reduced through a variety of methods, including deterrents, hunting, sterilization, and relocating to different areas where culling the herd was not possible. They also recommended removal of vegetation and making the topography more level in areas where deer were more likely to be concealed (Finder et al., 1999). Alternatively, communities can take matters in their own hands to reduce the deer populations in the areas. Options to reduce deer numbers in urban areas include 1) capture and removal, 2) sterilization, 3) culling by sharpshooters, 4) fencing, and 5) planting vegetation not attractive to deer. Lethal approaches often end up with strong protests and resistance from locals who may prefer alternative non-lethal options (Dandy et al., 2011; Fulton et al., 2004; Koval & Mertig, 2004; Lauber & Brown, 2006; Urbanek et al., 2011; Warren, 2011; West & Parkhurst, 2002).

Many surveys have been conducted with communities to find out which population management options they prefer. A typical community survey usually includes several categories and variables, such as 1) driver-focused measures (deer warning signs, technologies, reduced speed

limit); 2) animal-focused measures (herd management, vegetation control, alternatives to salting the roads in the winter); and 3) driver and animal-focused measures (roadway lighting and management) (Knapp, 2005). In three studies, the "deer reduction category" had hunting as an option, as well as "letting nature take its course" (Dandy et al., 2011; Fulton et al., 2004; Lauber et al., 2007). Other non-lethal options included capture and removal and contraception (Kilkpatrick et al., 2007; Lauber et al., 2007; Stout et al., 1997).

Alternatively, one study offered a behavior-change category. This category indicated that with the knowledge of deer movements and behavior during certain times of the year (such as rutting season, which occurs in the fall), drivers could adjust their speed to avoid collisions (Dandy et al., 2011). To reduce attraction to urban areas, individuals could replant yards with plants that deer were more likely to avoid and plant native species (Dandy et al., 2011; Johnson, 2014).

In one study, a researcher surveyed members of an urban area and found that there was a strong negative correlation between deer acceptance and support for lethal practices, contraception, and relocating deer populations, but there was still a positive correlation for letting nature take its course. (Johnson, 2014; Manfredo et al., 2003).

Deer exhibit adaptive behavior, however. In 2004, researchers documented this phenomenon and the consequences of deer-human interactions (Porter et al., 2004). They analyzed the ungulates' movement, dispersal, and potential need for local management of the animals in a suburban environment. The researchers found that the major cause of deer mortality was DVCs, and that there was a strong overlap between summer and winter home ranges (Porter et al., 2004). Summit County, Ohio recorded the effects of implementing a deer management plan in the City of Akron (Metro Parks, 2006). Issues included DVCs, overpopulation, and damage due to browsing deer. The management plan included proposals to relocate the animals, contraception, fencing, and

limited planting of ornamental bushes (Metro Parks, 2006). Ultimately, the City of Akron selected to cull the herd via sharpshooters (Metro Parks, 2006). Unfortunately, this plan may not be appropriate or suitable for many communities, including the Rochester Institute of Technology (RIT) campus (Nau, 2013). This is mainly due to safety concerns and/or attitude toward discharging firearms on or near campus, and the potential for community members to witness the cull. Additionally, local regulations may be in place regarding the use of firearms near such communities.

1.3: Roads

Without roads, there would be few, if any, DVCs. Roads crisscross the landscape and fragment every type of habitat. Due to roads, the interactions between humans and animals frequently end badly (Gosner et al., 2008). Due to the construction of roads, there has been an increase in wildlife being disturbed by human activities (Adams et al., 2006; Donaldson & Bennett, 2004; Fahrig et al., 1995; Forman & Alexander, 1998; Jaeger et al., 2005; Trombulak & Frissell, 2000). Generally, according to Trombulak and Frissell (2000), roads of all kinds will result in seven general ecological effects:

- Fatalities resulting from road construction,
- Fatalities from AVCs
- Changes in animal behavior
- Alterations of physical environment
- Alteration of chemical environment
- Spread of exotics, and
- Increased use of habitats by humans.

However, there are options to avoid wildlife-vehicle collisions (WVCs), or specifically DVCs, ranging from road signs to roadside or in-car technologies, to wildlife management (Forman et al., 2003). Unfortunately, during planning or construction of roads, 77% of transportation agencies surveyed reported that they rarely or never utilized strategies to avoid

WVCs (Kociolek & Clevenger, 2007). Specific strategies to mitigate WVCs that can be employed by those who design and engineer roads include 1) keeping roadside vegetation manageable and a considerable distance from the roads, so that visibility may be increased, 2) visible signs warning drivers of wildlife crossing, 3) creating fences that have the ability to keep wildlife away from the roads, and 4) wildlife crossing structures, such as animal-only bridges, coupled with fencing that keep wildlife from approaching roads. Barrier and constructed strategies are, however, the most expensive (Tardif, 2003; Dodd et al., 2007). Research indicates that deer will tend to prefer clearings that are close to wooded areas, rather than areas that have no clearings, which may explain why deer seem to be attracted to roads that cut through forests (Stewart et al., 2007; Farrell & Tappe, 2007). Managing landscapes adjacent to roads to keep deer away from roadways is therefore an important prevention strategy.

1.4: Landscape Characteristics and Fragmentation

Studies suggest that there is a correlation between DVCs and a set of four factors: 1) road type and nearby topography; 2) season of the year and time of the day; 3) surrounding landscape and wildlife habitat; and 4) county-level characteristics, such as deer population density, deer harvest regulations, number of hunting licenses sold annually, number of farms and proportion of land under various uses and population density (Hussain, 2007). Hussain (2007) hypothesized that a county could expect to have a higher incidence of DVCs annually if it was part of a metropolitan area, had a higher vehicle volume per road-kilometer, had a high deer density per square kilometer, and a wildlife habitat that was no longer pristine. His research findings indicated that an increase in pasture and urban land use relative to woodland increased the likelihood of a DVC. This can be explained due to further fragmentation of deer habitat, forcing deer to move greater distances to

meet their needs to survive (Hussain, 2007). Fragmenting forests also creates edges and open spaces, which deer prefer.

1.5: Time of Day, Vehicle Detection Technology and Risks of Strikes

The above research supports the knowledge that DVCs are more likely in areas with shorter distances from the road to forest cover (Finder et al., 1999). This can be incredibly dangerous, especially at night, when visibility is limited. In the daytime, drivers can see much farther than the end of a headlight beam, keeping in consideration traffic or terrain. At night, however, driver visibility is limited to what they can see in the headlights. Car headlight beams can only reach so far, and while it is feasible to perhaps raise the headlights (similar to high-beams) in order to extend the visibility of the roadway, evidence shows that there has not been much difference in an extended roadway preview and avoiding DVCs (Hedlund et al., 2004).

On average, a driver will be able to see only about fifty meters in front of the car in the dark, but it takes nearly 110 meters to come to a full stop if the driver is traveling at 100 kilometers, or approximately 60 miles, per hour ("Safer Driving in the Dead of Night," 2006). This reduces driver response time, and drivers are also possibly not aware of their own limitations with regards to visibility (Leibowitz et al., 1998). Odds of a WVC increase when cars are traveling faster, in accordance with a higher posted speed limit (Sullivan, 2011). At higher speeds, this means that the driver has less time to stop or avoid the animal. Additionally, there is an increased risk for DVCs an hour after sunset due to lower ambient light (Haikonen & Summala, 2001). This is also a period when deer are most active.

Via remote sensing, a group of researchers from Sweden found that the dominant factors in moose-vehicle collisions were travel speed, fences, and volume of traffic (Seiler, 2005; Gunther et

al., 1998; Sullivan, 2011; Bissonette & Kassar, 2008). With nineteen years' worth of AVC data, it was found that fatal crashes were more likely to occur in darkness (with a 2.3% increase for each mile per hour increase in speed) (Sullivan, 2011). Bissonette and Kassar, however, found no relationship between posted speed limit, DVCs, and average daily traffic (Bissonette & Kassar, 2008).

Limited visibility is compromised further when roadside plants are dense, but management of roadside vegetation may allow animals to be more easily seen by drivers, even if it opens up areas adjacent to wooded habitat. Research indicates that trimming vegetation further back from the roads resulted in a marked decrease in DVCs (Found & Boyce, 2011). Additionally, doing so may actually help the roadside sites become less attractive to deer by reducing "deer bedsites" and hiding spots for fawns close to roads. If trees need to remain close to roads, bushes, shrubs, and scrubs should be removed from under the trees, increasing visibility for drivers (Found & Boyce, 2011).

Car manufacturers are attempting to rectify visibility limitations by offering an optional feature, night vision, on specific car lines. Night vision has been available since 2000, when Cadillac introduced it with the DeVille, but consumer demand has been so low that Cadillac no longer offers the option ("Safer Driving in the Dead of Night," 2006). There are two types of night vision available for luxury car lines, as offered by Lexus, Mercedes, Toyota, Audi, BMW, and formerly Cadillac: near and far infrared. Near infrared technology uses a bulb that is mounted next to the headlights to assist the near infrared detector detect any infrared signature beyond the headlights. The signature will then be converted to a device inside the car to warn the driver ("Safer Driving in the Dead of Night," 2006). Far infrared technology, however, does not need any assistive devices (such as a mounted bulb). It relies on detecting heat energy, and can detect

the heat signatures of animals and pedestrians, which are much stronger and identifiable than the surroundings ("Safer Driving in the Dead of Night," 2006).

There are concerns about using infrared technology to help detect objects beyond the headlight beams, however. For example, a driver may have to take their eyes off the road to check the detector ("Safer Driving in the Dead of Night," 2006). There are concerns that the range for near infrared systems are shorter (150-200 meters) than far infrared systems, and that near infrared systems would not work nearly as well in fog or rain. The sensor for far infrared systems is larger than that for near infrared systems, and the image may be grainy, with lower resolution ("Safer Driving in the Dead of Night," 2006).

1.6: The Use of Social Media in Tracking Deer Movement

Webb (2012) discussed the use of social media with Geographic Information Systems (GIS) to map deer activities. He utilized Google Maps and Flickr, an online image sharing service. He noted that when people posted pictures of deer sightings online, it led to the ability to predict segments where there were higher indices of DVCs. This method came in useful in "warning" drivers and other citizens of the possibility of encountering a deer. This method of predicting high-risk areas has been reliable to the point where communities and organizations are now making maps of DVCs available, and citizens can use features on Google Maps to collect information (Webb, 2012). This technique can then be applied to identify clusters where DVCs occur, and find areas where deer management efforts should be focused (Diaz-Varela et al., 2011). Two researchers studied how similar bobcat habitats were to road habitat, and created a method to map WVC risk. They concluded, "Unlike other modeling techniques used to identify risk of road mortality, our method requires little field data collection and relies on readily available digital

spatial data" (Kolowski & Nielsen, 2008). This approach offers a new way to expand DVC models to engage citizens and science in collaborative approaches to wildlife issues.

1.7: Timing of Sightings and Strikes

Deer movements vary from season to season, and even from day to day. Typically, deer are most active shortly after sundown, which coincides with rush hour during the fall and winter. Peak amounts of vehicles on the road are on weekdays around seven in the morning, and four to five in the evening (Federal Highway Administration, 2009). During the fall, deer are also searching for mates and breeding. Deer herds tend to migrate in late May or early June, and yearlings leave their mothers in October. These times of the year are also peaks for fatal crashes (Williams & Wells, 2005). It is important to keep in consideration the timing of DVCs to seasonal variations of sunrise and sundown times, since this is likely to influence the ability for drivers to see clearly and accounts for fluctuations in animal behavior (Diaz-Varela et al., 2011).

Figure 1 shows the number of daylight hours per month at 43.9°N latitude, the approximate latitude of Rochester, New York. The hours of daylight vary by season, with the most hours of daylight being at the summer solstice, and the least at the winter solstice. Figure 2 is a graph showing the sunrise and sunset times per month at 43.15°N latitude, where Rochester, NY is located. Additionally, Figure 3 is a table showing the change in sunrise and sunset times by day, week, and month at 43.15°N latitude, with "Today" being 22 October 2014. These data help explain why the incidence of deer strikes during the fall and winter seasons may be attributed to reduced visibility due to shorter daylight times.

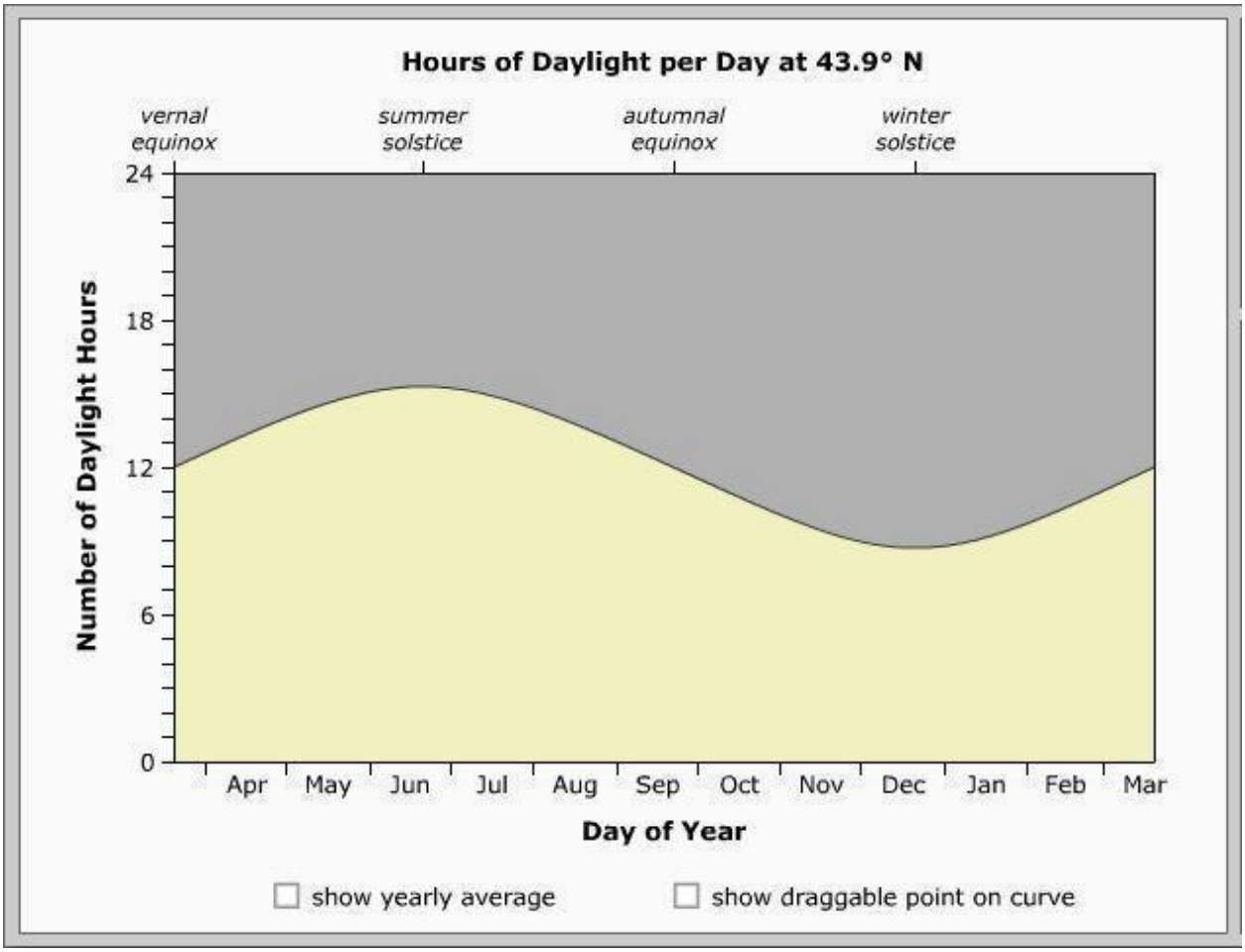

Figure 1: A graph depicting the number of daylight hours per month at 43.9° N latitude. Image retrieved with permission from the University of Nebraska – Lincoln (http://astro.unl.edu/classaction/animations/coordsmotion/daylighthoursexplorer.html). Last accessed 14 January 2016.

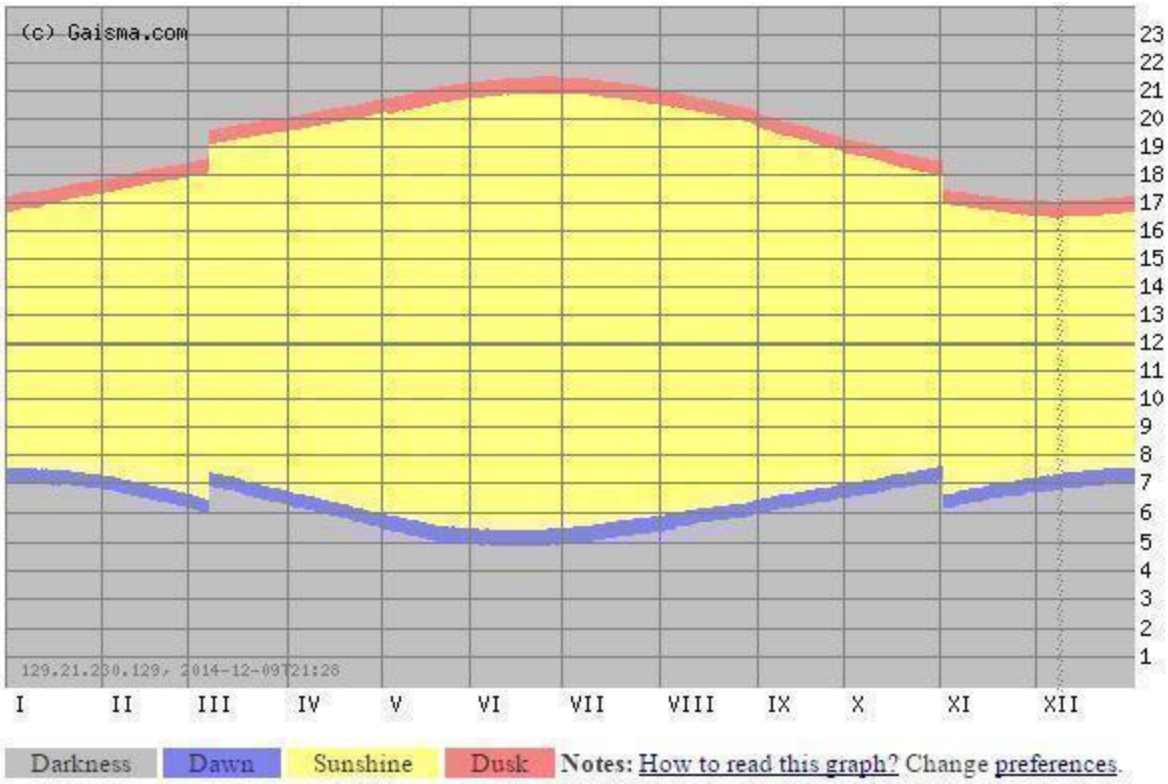

Figure 2: A graph showing sunrise and sunset times per month (I being January, II being February, and so forth), as well as dawn and dusk times at 43.15° N latitude. Image retrieved with permission from Matti Tukiainen (http://www.gaisma.com/en/location/rochester-ny.html). Last accessed 14 January 2016.

Date	Sunrise	Sunset	Length	Change	Dawn	Dusk	Length	Change
Today	07:30	16:35	9:05		06:58	17:07	10:09	
+1 day	07:31	16:35	9:04	00:01 shorter	06:59	17:08	10:09	00:00 equal length
+1 week	07:36	16:36	9:00	00:05 shorter	07:04	17:09	10:05	00:04 shorter
+2 weeks	07:40	16:39	8:59	00:06 shorter	07:07	17:12	10:05	00:04 shorter
+1 month	07:42	16:53	9:11	00:06 longer	07:10	17:25	10:15	00:06 longer
+2 months	07:19	17:31	10:12	01:07 longer	06:49	18:00	11:11	01:02 longer
+3 months	*07:33*	*19:09*	11:36	02:31 longer	*07:05*	*19:38*	12:33	02:24 longer
+6 months	*05:31*	*20:49*	15:18	06:13 longer	*04:56*	*21:24*	16:28	06:19 longer

Notes: *Daylight saving time*. * = Next day. Change preferences.

Figure 3: A table showing the change in sunrise and sunset times by day, week, and month at 43.15° N latitude. Image retrieved with permission from Matti Tukiainen (http://www.gaisma.com/en/location/rochester-ny.html). Last accessed 14 January 2016.

1.8: New York, Monroe County, and RIT

Research indicates that the following states are leaders in the absolute number of fatal AVCs: Texas, Wisconsin, Pennsylvania, Ohio, and Michigan. New York State is ranked ninth in crash incidences, while ranked third in population (Sullivan, 2011). Land use land cover analysis of 2001 data show 1,134,717 hectares of land had been converted to urban land covers. By 2011, 1,178,381 hectares had been converted to urban land covers, for a total increase of 43,664 hectares (4%) over the decade.

Overall, in 2008, the United States population was rising, but not uniformly. In New York State, the population increased 2.1% in the ten years 2000 and 2010 (Nau, 2013). However, in Monroe County, the population arose at a maximum of 1.2% through the same time period. As a result of urbanization in communities surrounding the City of Rochester, developed land use change in Monroe County has increased (Nau, 2013). The population of Rochester tends to radiate out from the city into the suburbs (Ewing, 2003; Nau, 2013), even with a marked decrease in population from 2000 to 2003 (Nau, 2013). So fewer people are taking up more land, resulting in greater habitat disturbance.

The RIT campus is similar to a small city and models Monroe County and adjacent towns. Buildings are erected close together, with open parking areas "surrounded by large recreational fields, agricultural fields, and relatively undisturbed natural habitats (forests, wetlands, shrub areas, fields and meadows)" (Nau, 2013). While the institute is much older, the current campus was established in western Henrietta, NY in the early 1960s. Throughout campus, there are thirteen kilometers of interior roads, with nine kilometers of roads on the boundaries of the property. The deer population on campus is similar to those in the neighboring municipalities (Nau, 2013) such as Brighton, Chili, Honeoye Falls, Irondequoit, and Wheatland.

The main campus is located on a former dairy farm, based on aerial photos from the 1930s until the early 1960s ("History of RIT," 2013). The photos illustrate that the land was mostly cleared, with some areas of timber, likely used for woodlots (Nau, 2013). Fields were used for croplands and grazing pastures. Many of the wetlands within the area were drained using field ditches. After RIT purchased the land in 1961, development began in 1964 ("History of RIT," 2013). With the establishment of the campus in 1968, the management plan for the grounds allowed many of the fields to revert back to the forests, wetlands, and grasslands. This provided plenty of habitats for wildlife, especially deer, and increased the travel corridor size in the region. This habitat is very fragmented, however, due to the infrastructure of the RIT campus. Roads significantly crisscross the landscape, serving as a barrier to animal movement (Nau, 2013).

In 2008, an apartment complex, along with a small shopping center, was established where some of the forests, fields wetlands were, bounded by John Street, Jefferson Street, Perkins, Lowenthal, and East Memorial Drives. This complex is now known as Park Point. At that point, RIT management could only speculate on the impacts of the development on campus deer populations. It was expected that there would be increased traffic flow, and concerns were expressed about an increase of deer on RIT property, potentially leading to more DVCs (Nau, 2013). On campus, deer graze on the fields, and spend the rest of their time within the woodlands and wetlands for other activities such as sleeping and traveling. Deer frequently enter human populated area, typically to feed on the decorative bushes and shrubberies and grass (Nau, 2013, see Figure 4).

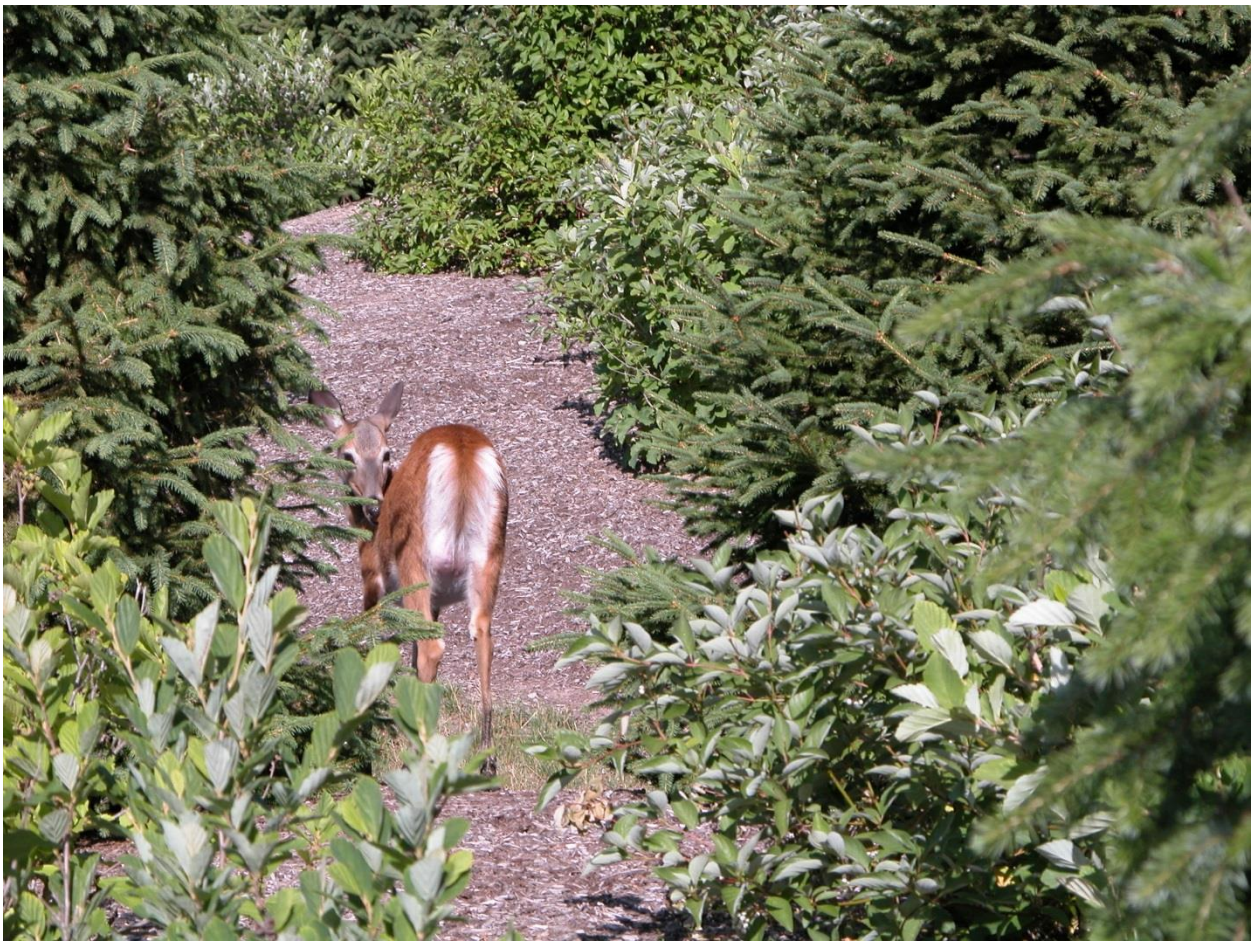

Figure 4: A deer browsing landscaped vegetation by Orange Hall, July 2, 2007. Photo used with the permission of Dr. Karl Korfmacher.

1.9: Prior Research

Philip Nau, a former environmental science graduate student at RIT, explored and collected data preceding the development of Park Point for his thesis. His data indicate that the bounding roadways of the RIT Super Block (John Road to Bailey Road to East River Road to Jefferson Road) showed higher deer-vehicle collisions than roads within the Super Block. This may be due to higher speed limits on these roads, reducing reaction time, especially when visibility is poor (Nau, 2013). Nau recommended that RIT implement a notification system to inform drivers of increased dangers at certain times of the year (Nau, 2013). Reminding drivers of potential hazards, not constantly but periodically, produces the best regards (Al-Ghamdi & Algadhi, 2004). The system could range from the simplicity of an e-mail to the community, to erecting roadway signs warning drivers of deer (Nau, 2013).

In the seven years since the completion of the Park Point complex, no research or data collection has been done to explore the impact of the land use change from Park Point's development on RIT's deer population. Additionally, the effectiveness of collision avoidance strategies has not been evaluated. During these years, the RIT campus has transformed, with the establishment of many buildings and facilities such as Global Village, the Simone Center of Innovation and Entrepreneurship, and the Golisano Institute of Sustainability, all toward the west boundary of campus. With these landscape changes in mind, this project follows up on Nau's recommendations and reviews the latest deer vehicle collision records to assess whether there has been a marked increase or decrease, and to assess whether suggested management strategies, if implemented, were having an effect.

1.10: Project Goals

The purpose of this study is to assess the trends of deer-vehicular strikes on the RIT campus. This expands on previous research by conducting an online survey of the RIT community (faculty, staff, students, and alumni) to collect their observations and experiences with the deer population on campus, including any strikes that may have gone unreported. Three initial research questions were proposed:

1. Have deer-vehicle collisions increased or decreased over time in response to campus growth?
2. Do a significant number of collisions go unreported?
3. What strategies might RIT employ to minimize DVCs on campus, and how effective are current practices (if any)?

2. Materials and Methods

2.1: Maps

Analyses of previously collected data were performed using ArcMap 10.1. These data were obtained from Phil Nau's thesis project, and then updated with more recent data from the NY GIS Clearinghouse. These updates included 2012 and 2015 Digital Orthophotos (DOPS), 2011 Land Use Land Cover (LULC) files, and files showing 2010 roads. The projected coordinate system was maintained as NAD 1983 UTM Zone 18.

Maps illustrating deer strike totals by road segment were recreated in order to compare deer strikes from 1993-2000, and from 2001-2007. Phil Nau's map files had become corrupted due to software changes and there was no clear documentation on how to assign attribute values to road segments to completely reconstruct his map images, so deer strikes were reassigned to road segments with revised unique IDs for this project, creating similar maps. Data were obtained from RIT Public Safety and Monroe County Sheriff's Office (MCSO), tabulated into an Excel document, and joined to updated ArcGIS documents. These data were then imported onto the appropriate map image (photo or land cover raster) for the time period.

The deer strike counts were organized by sections of road (for example: John-Jefferson, John-Perkins, John-Wiltsie), and then color coded according to strike totals. This illustrates the total number of deer strikes along road segments by time period. Additional deer strike data were obtained from campus safety and the Monroe County Sheriff's' Office for the years 2008-2014 and were added to the spatial analysis to extend the period of record.

These three time periods were then analyzed for changes over time in both the frequency and location of the deer-vehicle incidents. Aerial imagery around the "hot" segments were assessed to determine if landscape variables, such as tree cover, hills, or landscaping, are

associated with deer strikes and if those have changed over time. These maps are important assessment tools to evaluate any changes in deer strike frequency, and are key to creating an appropriate deer management strategy.

Figures 5 and 6 display deer strike totals and identify "hot spots" along stretches of RIT roads from 1993 to 2000 (5A and 5B) and 2001 to 2007 (6A and 6B). The maps are color coded to show strike totals. The grayscale maps help show the distribution of the strikes along RIT's roads, and how the distribution changes over the years. These represent collision totals before the development of the Park Point area, and the current research expands on this earlier analysis by analyzing collision data following construction.

2.2: RIT Community Digital Survey

To develop a database of campus deer sightings and deer interactions, an online survey was designed and distributed to query the RIT community about their deer observations and any collisions with deer. Embedded in the survey are maps to help quantify locations, providing additional spatial components and confidence, and serve as a comparison analysis to the reported deer strike data from RIT campus safety and the MCSO. The survey (see Appendix A) was distributed via e-mail and social media to the RIT community using the RIT Message Center interface, Facebook and Twitter. This survey was designed to help determine if deer strikes are under-reported, and to quantify areas of high deer activity. The survey data helped to compare the "hot spots" determined by the MCSO and RIT Campus Safety data with "hot spots" generated by the social media survey of deer sightings on campus and the frequency of strikes to see whether there is a correlation.

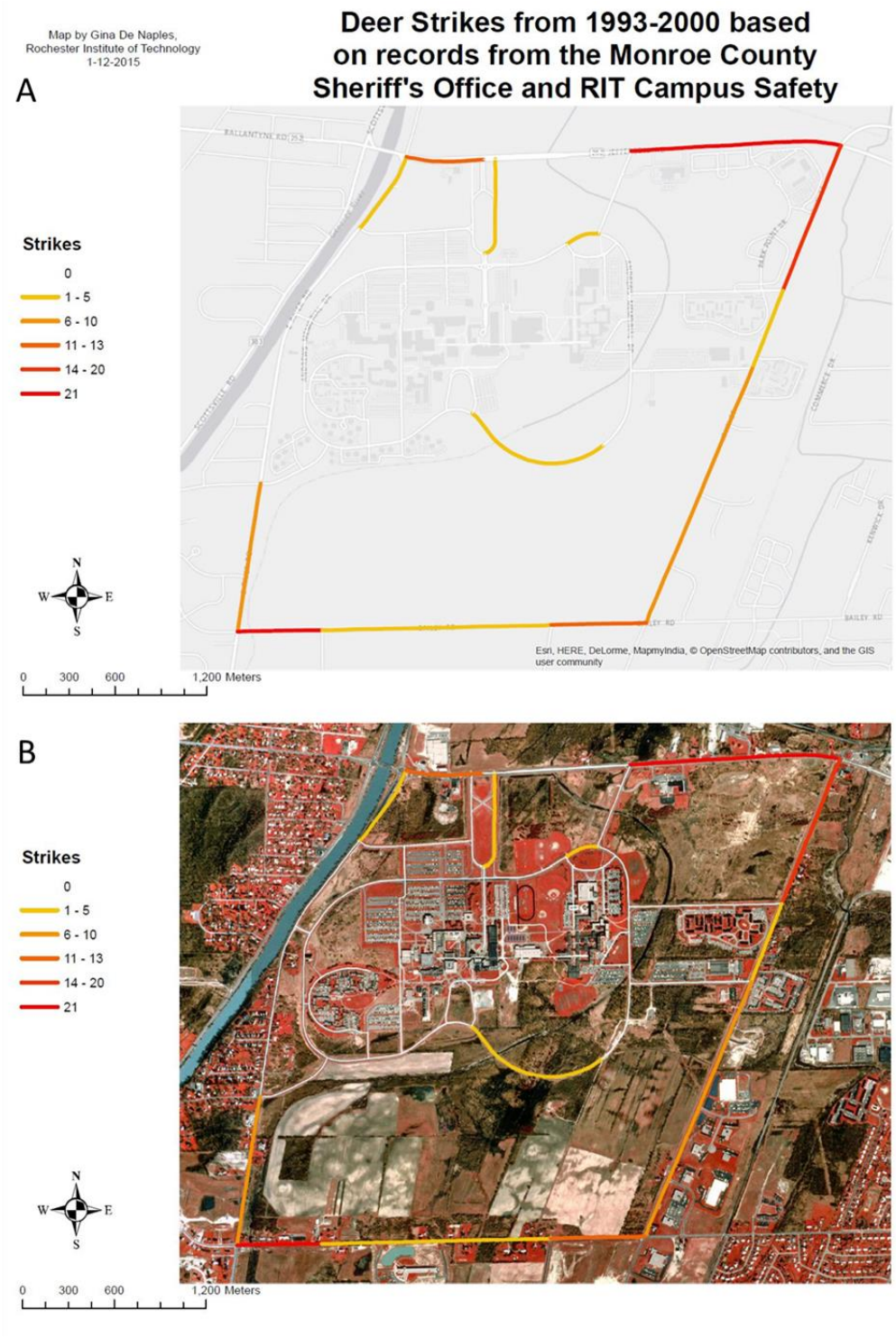

Figure 5: Deer Strikes from 1993-2000 based on records from the Monroe County Sheriff's Office and RIT Campus Safety. Figure 5A showcases the distribution of strikes along campus roads using a gray scale basemap. Color coded road segments show the total strikes along sections and road intersections for the time period. The date of the imagery is 1996.

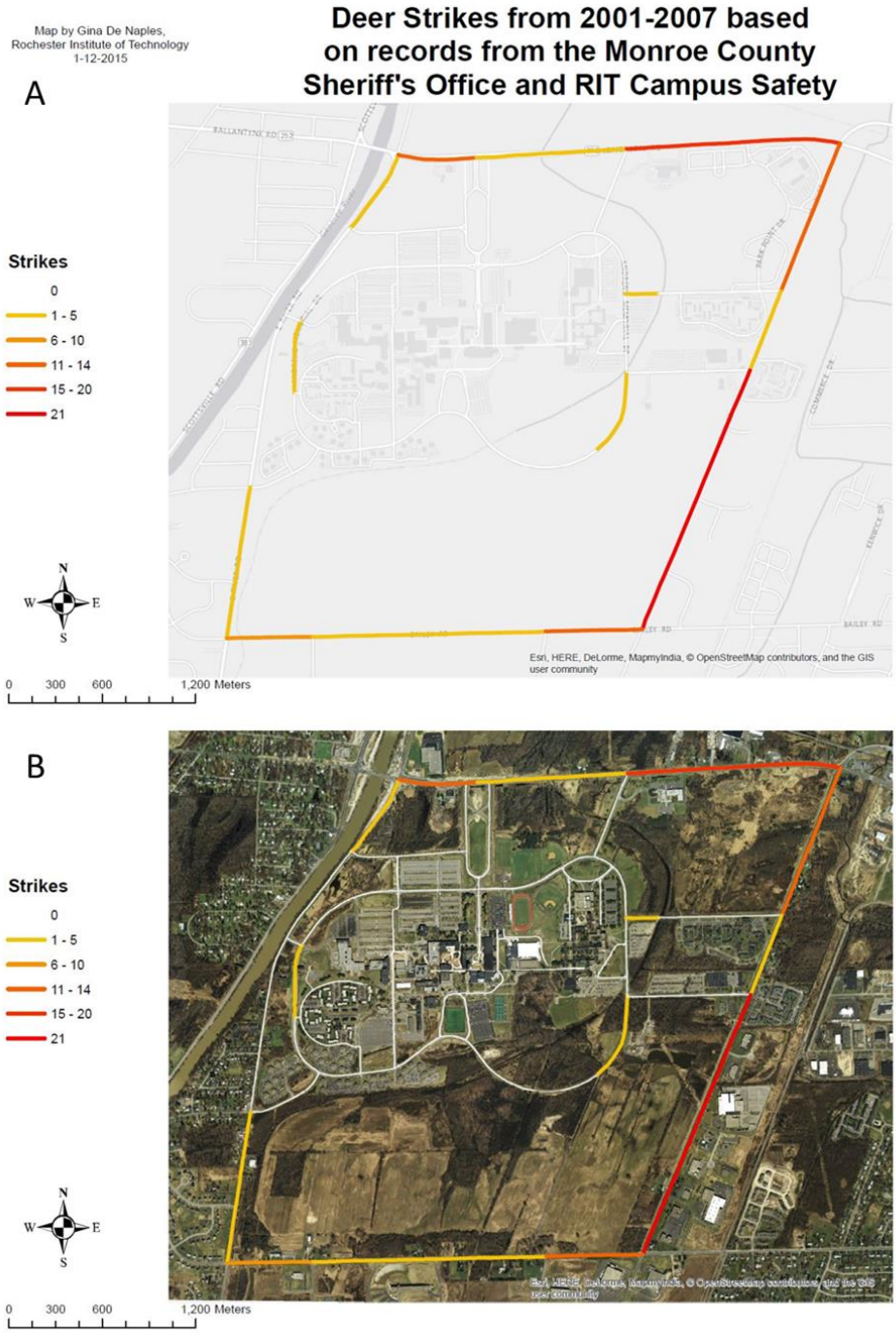

Figure 6: Deer Strikes from 2001-2007 based on records from the Monroe County Sheriff's Office and RIT Campus Safety. Figure 6A showcases the distribution of strikes along campus roads using a gray scale basemap. Color coded road segments show the total strikes along sections and road intersections for the time period. The date of the imagery is 2005.

3. Results and Discussion

3.1: Maps

Figure 7 shows the number of deer strikes in the seven years between 2008 and 2014 on campus and along the RIT Superblock, as reported by RIT Campus Safety and the Monroe County Sherriff's Office. During this seven year period, the maximum total number of strikes for any stretch of road was five, down significantly from previous periods (a maximum of 21 strikes for any section of road in 1993-2000 and 2001-2007 – see Figures 5 and 6). The locations of the "hot spots" are fairly stable in the first time periods (Figures 5 and 6), but in the last period the deer appear to be shifting away from the John Street-Jefferson Road intersection, moving south and into campus (Figure 7). The highest hit segments, according to RIT and MCSO data, are along Wiltsie Drive and the South Loop.

While Figure 7 does not necessarily suggest "hot spots" segments as in previous periods (due to low total strikes), the reduced collision counts were unexpected and suggest that some factors have changed, leading to fewer deer strikes. Several questions were raised at this point –

1) Did traffic patterns change?
2) Were people no longer reporting collisions when they occurred?
3) Was campus expansion displacing the campus deer elsewhere?
4) Have campus landscape and roadway modifications reduced the likelihood of deer strikes?
5) Were the strike numbers reduced due to the effectiveness of RIT's efforts to alert drivers when deer activity increased?

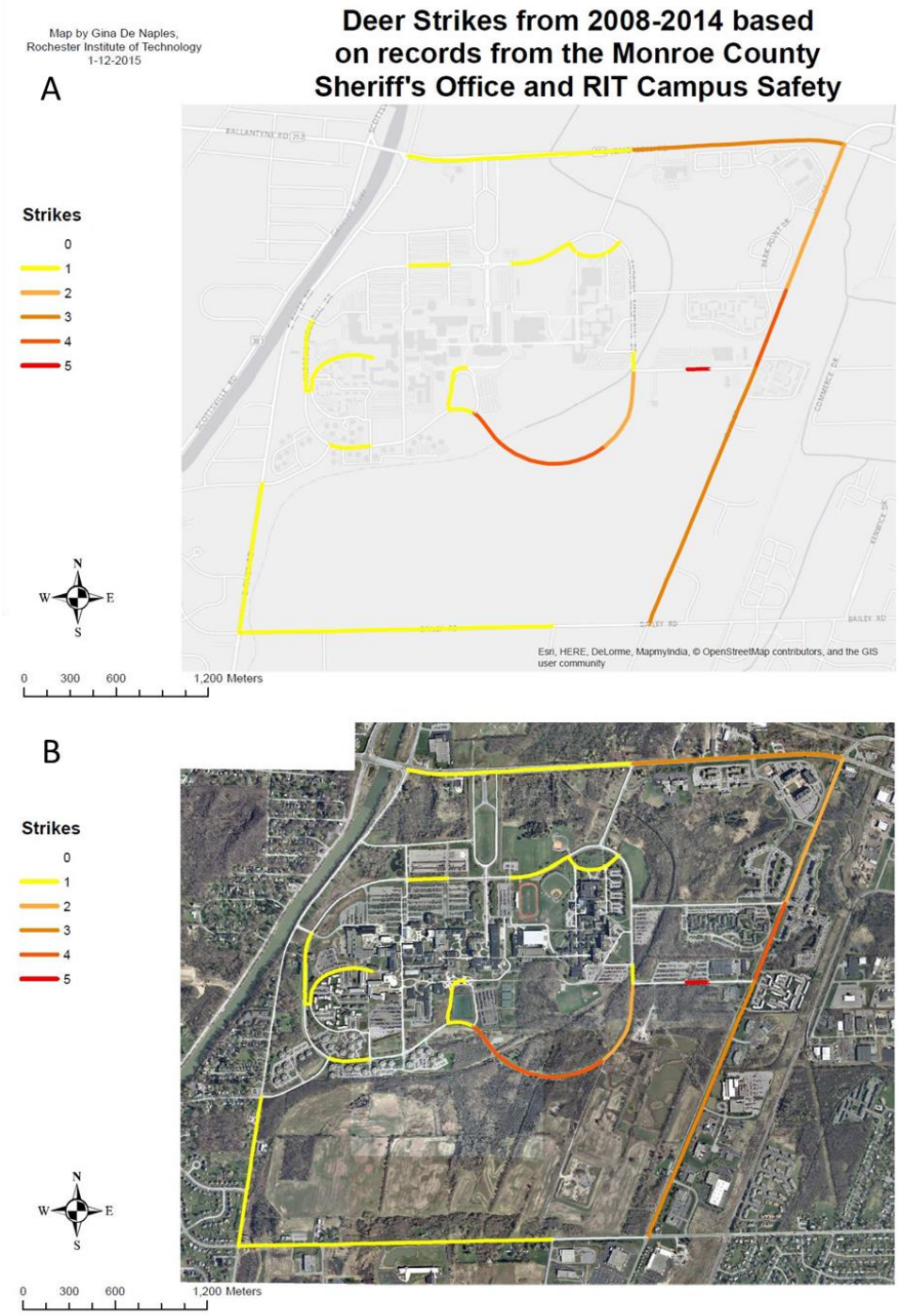

Figure 7: Deer Strikes from 2008-2014 based on records from the Monroe County Sheriff's Office and RIT Campus Safety. Figure 7A showcases the distribution of strikes along campus roads using a gray scale basemap. Color coded road segments show the total strikes along sections and road intersections for the time period. Date of the imagery is 2012.

Annually, strike counts do not appear to follow a pattern. However, the data shows that after a record-high year in 2004, there has been a decline in strikes (Figure 8). The data shows some increases and decreases between 2005 and 2014. However, numbers have remained relatively low compared to previous years.

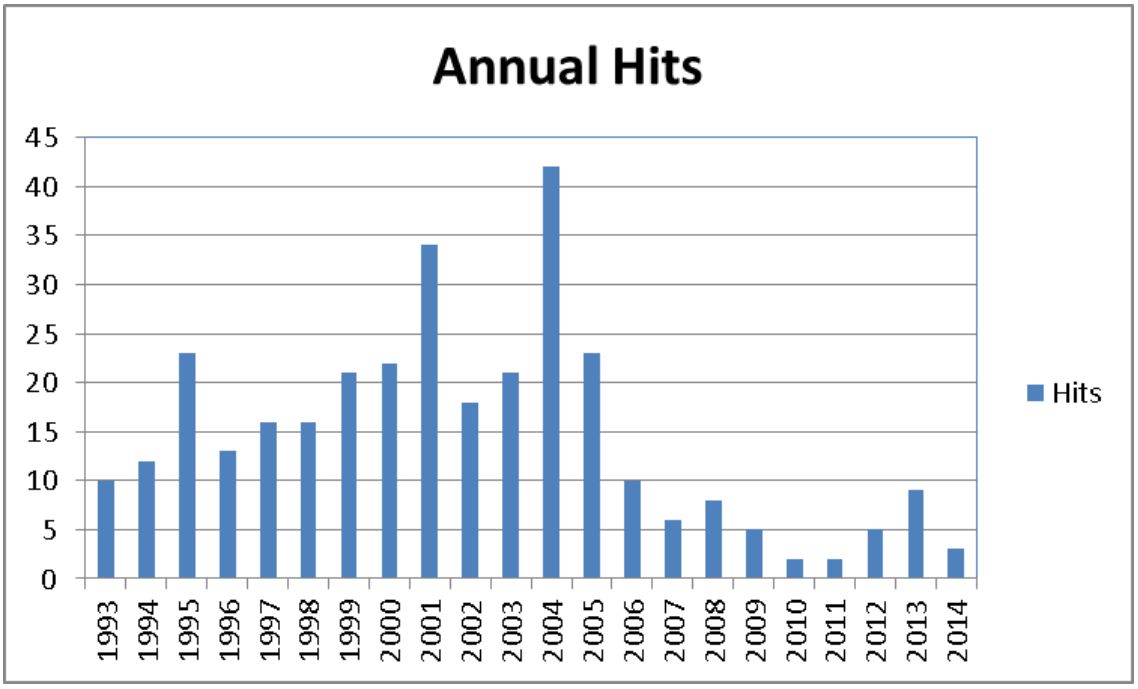

Figure 8: A graph showing the annual counts of strikes from 1993 to 2014. Data courtesy of RIT Campus Safety and Monroe County Sheriff's Office.

3.2: Historic Traffic Patterns Along Area Roads

The locations where collisions most often took place were primarily along John Street and Jefferson Road, sections of Bailey and East River Roads (1993-2000 and 2001-2007) and expanding into the southern portion of the RIT loop (2008-2014), as shown in Figures 5-7. Most of these locations are consistent with the heavy traffic and higher speeds along the boundary roads, relative to most RIT roads. The average daily traffic counts for the major roads surrounding RIT in 2013 can be seen in Figure 9, which correlates with Table 1, showing the seven year daily vehicle averages for the three time periods in this study. The biggest changes appear in the 2008-2014

period for the Jefferson Road segments intersecting with John Street and between Park Point and the main RIT entrance (RC_ID 43_0252 and 43_0126), which each increased by around 5000 vehicles per day. This is likely due to commercial activity at Park Point. The rest of the boundary roads (Bailey Road, John Street, and East River Road) show much smaller totals, ranging from 4,302 to 5382 daily vehicles trips during this time period (NYSDOT, 2015). So traffic volume, at least along Jefferson Road, appears to have increased over time, counter to the pattern in deer strikes.

According to the NYSDOT daily traffic data, other bounding roads, such as Bailey and East River Roads, are less traveled, so it is possible that drivers may not be as aware of the deer population along these roads. RIT's interior roads also indicated localized strikes, along sections of Andrews Memorial Drive, or colloquially "The Loop," near heavy woods or parking lots, close to deer trail entrances, increasing the likelihood of encountering a deer. Figure 10 is an image showing trailheads along RIT's road edges, which aligns with the frequency of strikes depending on how heavily used the trails are (Nau, 2013).

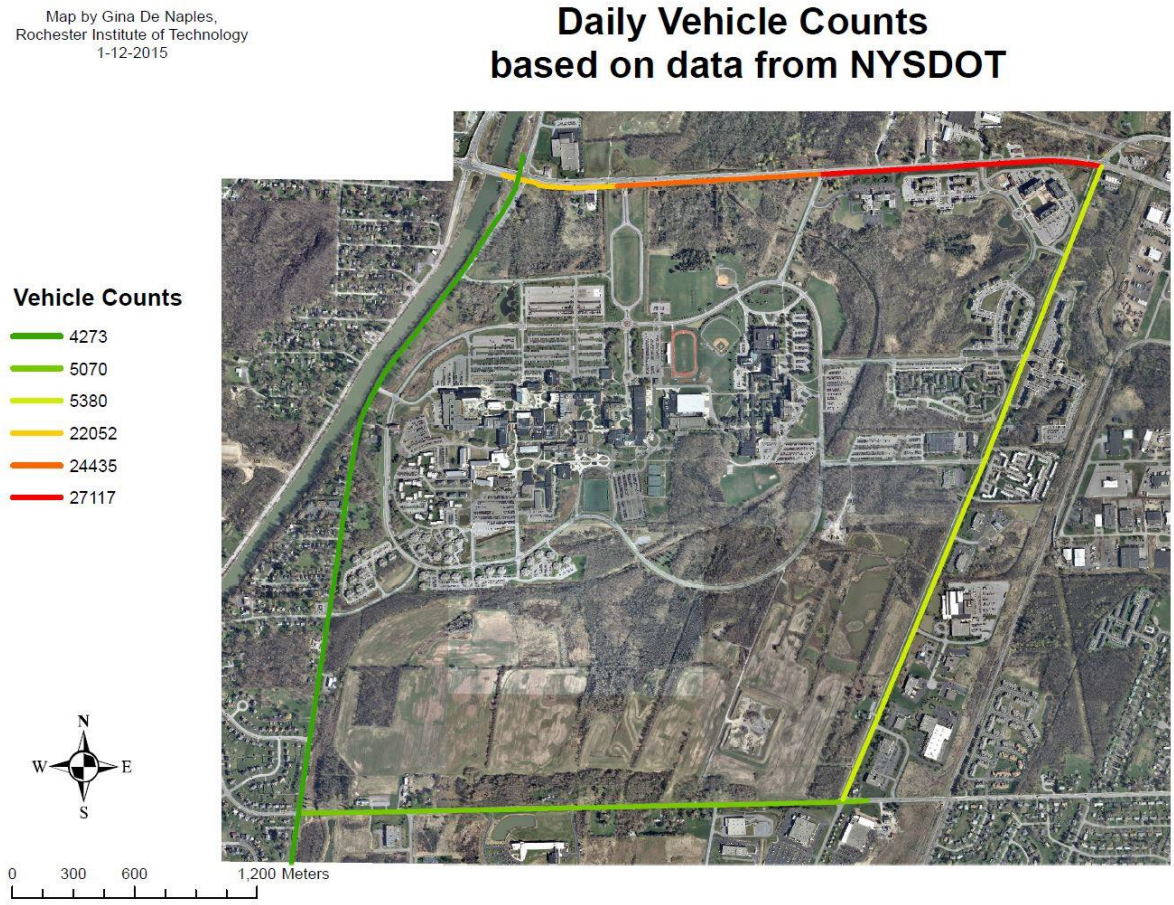

Figure 9: Daily vehicle counts based on data from the New York Department of Transportation. The data are based on 2013 counts.

Table 1: Seven-year daily vehicle counts along RIT's boundary roads based on data from the NYSDOT.

RC_ID	Road Name/Segment	1993-2000	2001-2007	2008-2014
43_0125	West Jefferson Rd	20,485	23,540	22,044
43_0126	Central Jefferson Rd	19,237	19,315	24,287
43_0252	East Jefferson Rd	23,838	21,120	26,952
43_6194	E River Rd	N/A	6,680	4,302
43_8045	Bailey Rd	N/A	N/A	5,087
43_8109	John St	N/A	N/A	5,392

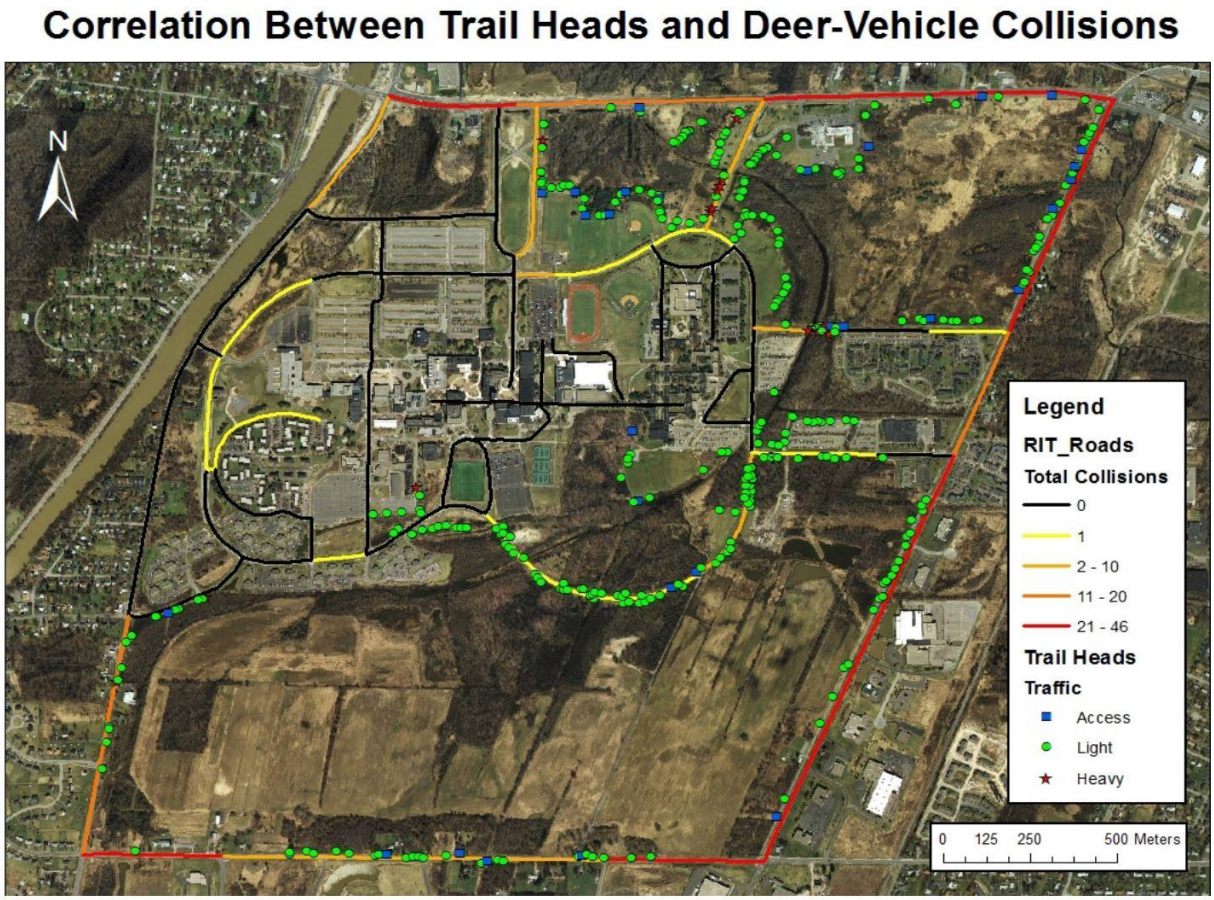

Figure 10: Deer trailheads along road edges, from Phil Nau's 2006 data (Nau, 2013). Blue markers indicate trail access. Green markers indicate lightly used trails, while red markers indicate heavily used trails.

3.3: Campus Deer Sightings

The target response total for the survey was 500 individuals (approximately 5% of the estimated commuting population on campus). The survey (Appendix A) was open July 7-20, 2015 and received 883 responses. The responses and data were mapped on separate maps in order to compare the incidence of sightings, reported strikes, and unreported strikes. These data were also analyzed using Microsoft Excel to generate pivot tables. Campus demographic data from respondents were also compiled and are provided in Appendix B.

Figure 11 illustrates deer sightings data tabulated from the online community survey. Participants were asked to list the top five locations where deer were most frequently spotted.

Results suggest that campus deer prefer the interior areas of campus, away from the main boundary roads, and favor grassy and forested areas, particularly along the southern loop. Comparing the sightings (Figure 11) with the maps of strikes in Figures 5-7, there appears to be minimal correlation between the sightings and strikes along RIT's interior roads except along the southern loop. Areas where deer are most frequently spotted do not necessarily indicate a higher number of strikes. This suggests that hot spots are more likely to show up in areas where drivers do not expect to see deer or can't react in time when they see a deer, and that drivers may be more aware of deer along the high sighting segments area and drive more cautiously. Figure 12 shows the southern loop in more detail, featuring the concentration of wooded and scrub/shrub cover.

When the survey sighting results were divided by affiliation to RIT – students, alumni, faculty, and staff – and by time of day, trends emerge that follow not unexpected lifestyle patterns (Table 2). For example, student arrival times were often dependent on the time of their classes, which typically don't start before 8 am (9 am is common) and are more likely to stay on campus late due to classes, computer labs, library time, and meetings. This correlates well to their deer sighting patterns in Table 2. On the other hand, staff members, such as campus safety and FMS employees, were often on campus very early in the morning and leave in the evening, rather than night. Faculty arrive in the morning at variable times (class and meeting dependent) and leave during the evening. These times correspond well with deer activities from the literature.

Table 2: A table showing sighting counts by RIT affiliation in relation to times of the day.

	Students	**Alumni**	**Faculty**	**Staff**
Dawn	98	9	59	297
Morning	134	28	67	177
Afternoon	124	9	23	85
Dusk	592	160	184	468
Night	550	145	14	64

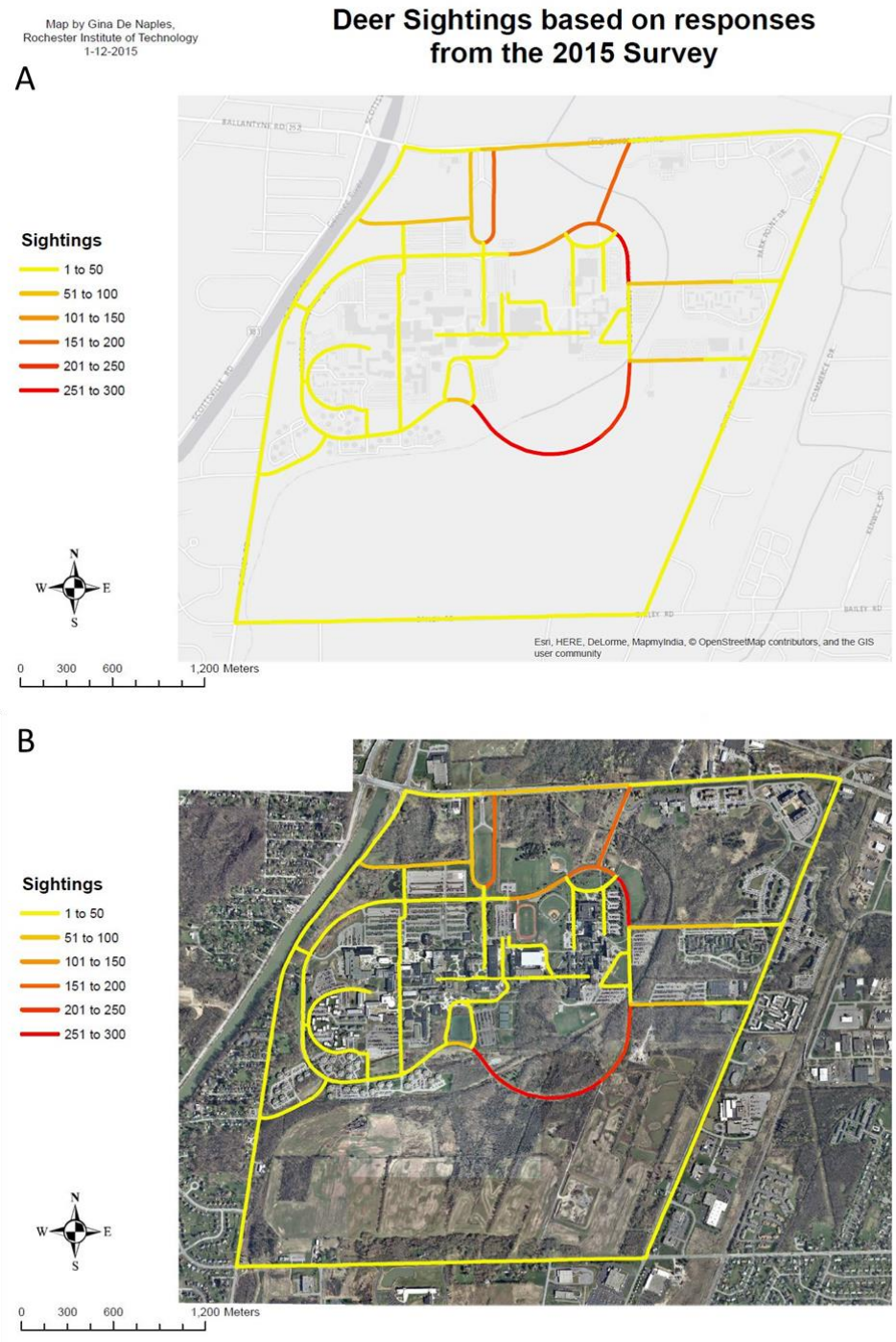

Figure 11: Deer sightings based on the responses from the survey released in July, 2015. This survey encompasses responses from alumni, current students, faculty, and employees. Figure 11A showcases the distribution of strikes along campus roads using a gray scale basemap.

Figure 12: The stretch of Andrews Memorial Drive between Wiltsie Dr and U Lot known as the southern loop. Date of imagery is 2015.

Furthermore, when the survey results were again grouped by RIT affiliation, the data showed a seasonal pattern, that once again, may present a bias with the sightings data (Table 3). For example, staff members are on campus year-round while students and faculty members are typically not, due to winter and summer breaks.

Table 3: A table showing sighting counts by RIT affiliation in relation to seasons.

	Students	**Alumni**	**Faculty**	**Staff**
Autumn	382	102	124	271
Winter	157	68	27	108
Spring	608	32	113	326
Summer	311	24	51	299

3.4: Underreporting of Deer Strikes?

Of the 883 respondents in the survey, nine responded that they had struck a deer, or were on the scene and witnessed a deer being struck by another driver (Figure 13). While the locations of the self-reported strikes from the survey are not entirely consistent with the total strikes in Figures 5-7, the survey totals are consistent with the totals provided by RIT campus safety and the MCSO for 2008-2014. The data show that the strikes reported by survey respondents are primarily associated with road segments adjacent to wooded areas.

Figure 14 shows the totals of unreported deer strikes based on responses from the 2015 survey. They all occurred along road segments with the reported strikes from the survey and suggest that half of all deer strikes on campus went unreported in 2008-2014. Table 4 lists the road segment number and name associated with the unreported strike data as reported by survey participants. This table correlates with the maps in Figure 13, indicating where unreported strikes occurred. Again, this suggests that deer strikes in general are down on and around campus, and that half of all deer strikes may go unreported.

One of the questions in the survey was whether drivers go straight to their insurance agency after a deer strike, rather than report the deer strike to authorities. Out of thirteen people who responded to this question, ten said that they reported the strike to the authorities. While small, the responses suggest that most people reporting a deer strike do report the accident to authorities, helping to verify that the number of deer strikes provided by RIT campus safety and the MCSO in this last time period is accurate (10 reported deer strikes from the survey vs. 9 reports from RIT and MCSO records).

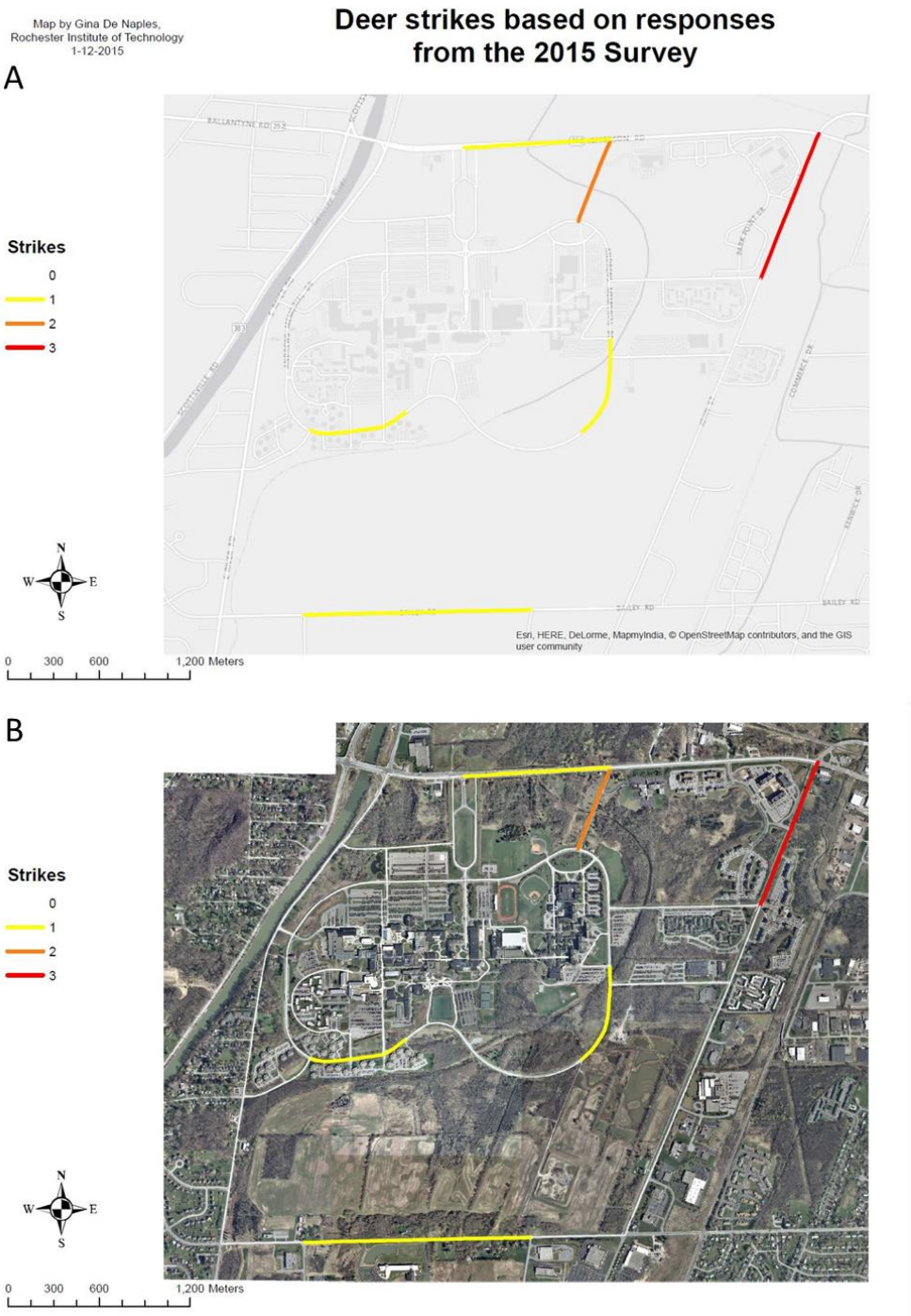

Figure 13: Deer strikes based on responses from the survey released in July, 2015. This survey encompasses responses from alumni, current students, faculty, and employees.

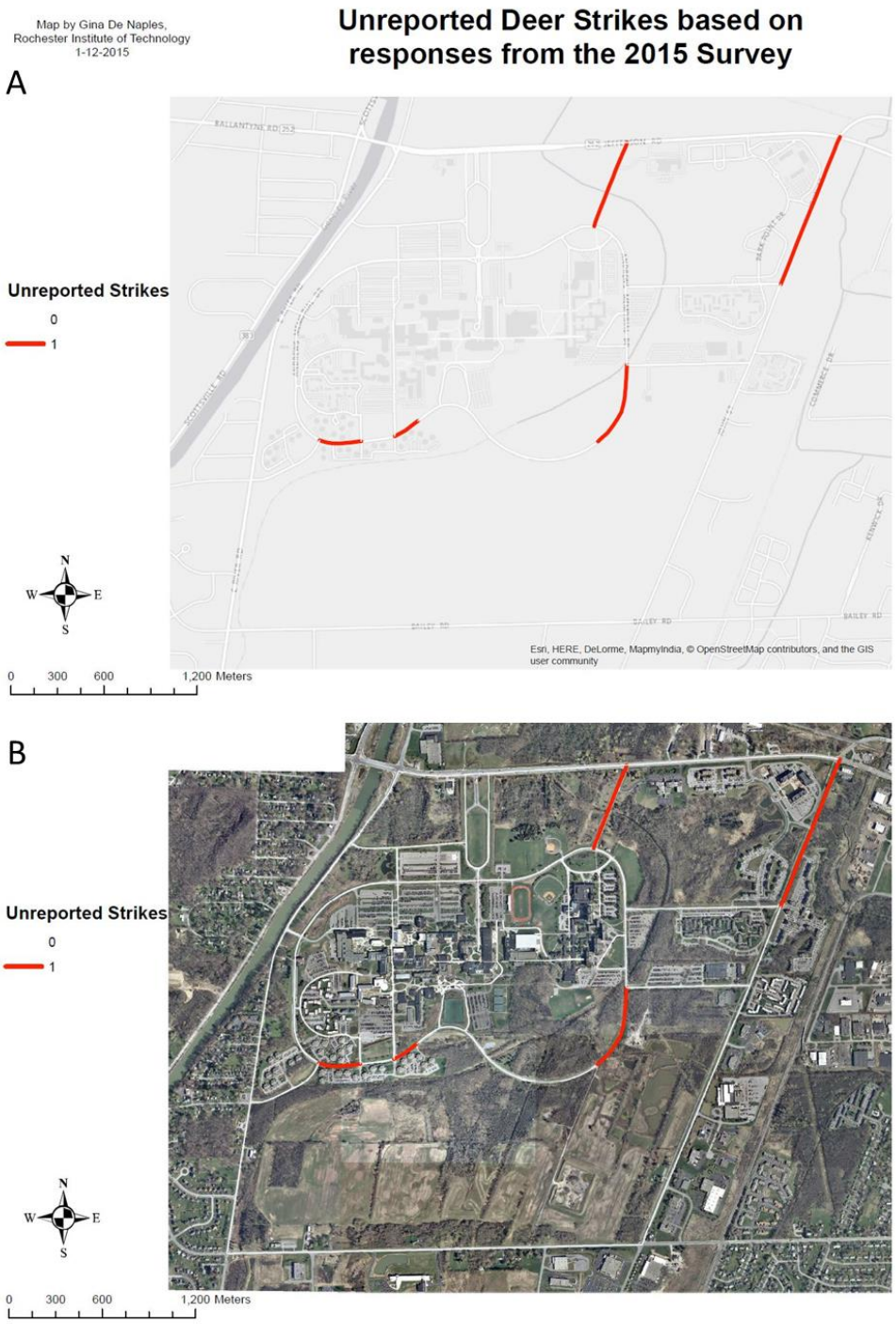

Figure 14: Unreported deer strikes based on responses from the survey released in July, 2015. This survey encompasses responses from alumni, current students, faculty, and employees.

Table 4: A table depicting unreported strike data, from the Summer Survey.

Road Segment Number	Road Segment Name	Counts of Strikes
2	Andrews Memorial R-Lot West	1
6	Andrews Memorial South Loop near Wiltsie	1
21	Andrews Memorial UC	1
36	Lowenthal Road	1
53	John/Jefferson	1

3.5: Aerial Imagery and the Evolving RIT Landscape

RIT in 1988 (Figure 15) looked somewhat like the campus today. The area within the red circle is largely comprised of fields, woods and wetlands and contains the area that became the South Loop. Large wetland and wooded areas that became Park Point in 2008 are present in the northeast corner of campus (circled in yellow), as well as to the south. The green rectangle shows an area of wetlands that is now a traffic hub (Gleason Circle near the Wallace Library) and the lacrosse field. Many on-campus apartment complexes (University Commons) are not yet built.

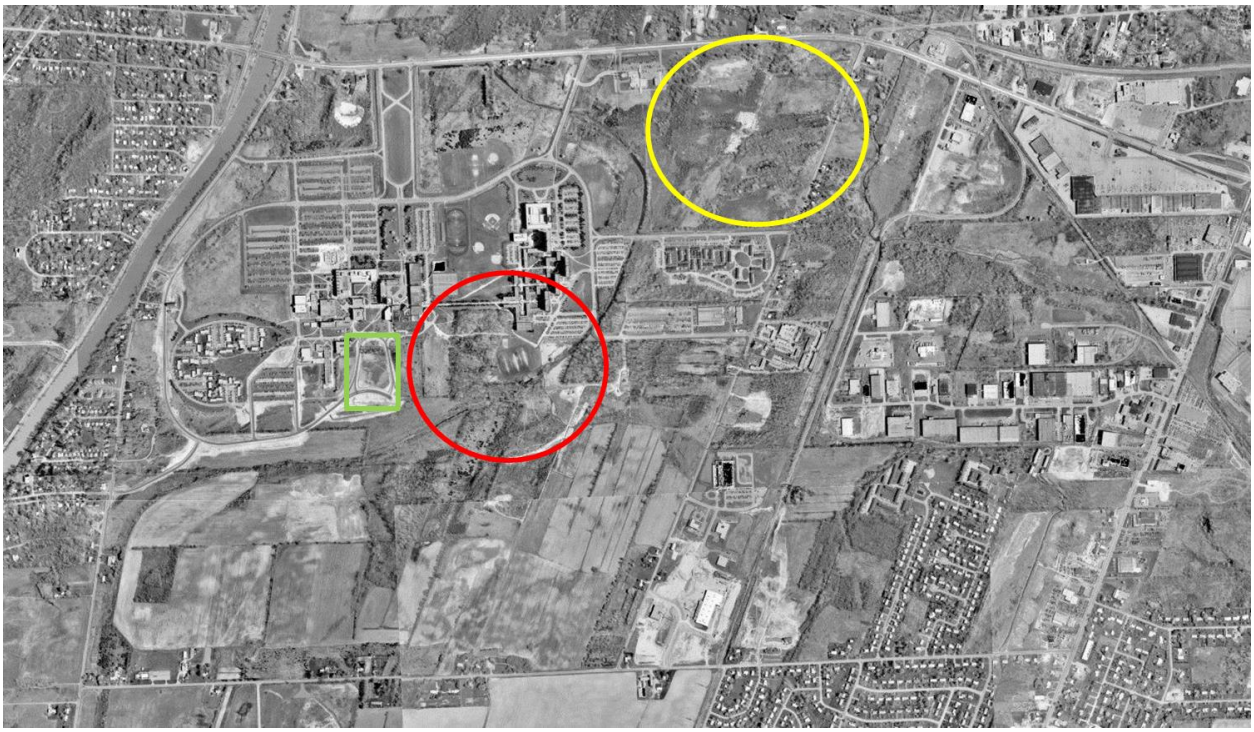

Figure 15: Aerial imagery of the RIT campus dating back to 1988. The yellow circle shows the northeast corner of campus, still heavily wooded. The red circle is where the South Loop will eventually be, but still wooded in 1988. The green rectangle shows what will become Gleason Circle.

In 1994, the South Loop (circled in red) clearly shows up as a gravel road (Figure 16). According to an FMS representative, FMS used this road segment for operations and storage of equipment and brush. The northeast corner of campus is still heavily vegetative. The imagery is consistent with the data in Figure 5, which shows one of the hot spots to be in that corner. The tree cover is heavy and close to the road, which may impact drivers' view of the road, slowing their reaction time if a deer suddenly darted out onto the road.

2002 was near the beginning of the second dataset, and RIT had changed further (Figure 17). The University Commons apartment complex (circled in red) has been established toward the southwest side of campus, as well as Greek mansions (circled in yellow) in the Riverknoll complex, while the northeast corner of campus is still heavily wooded. The imagery is dated March 31, 2002; so much of the foliage has not come in yet due to Rochester's prolonged winters. During the summer of 2001, RIT reconstructed all of Andrews Memorial Drive and paved the South Loop, officially opening to the public in late September 2001 (RIT News & Events - http://www.rit.edu/news/newsevents/2001/Aug02/story.php?file=projects). Prior to this, access to the South Loop had to be authorized and was typically utilized only by FMS or contractors.

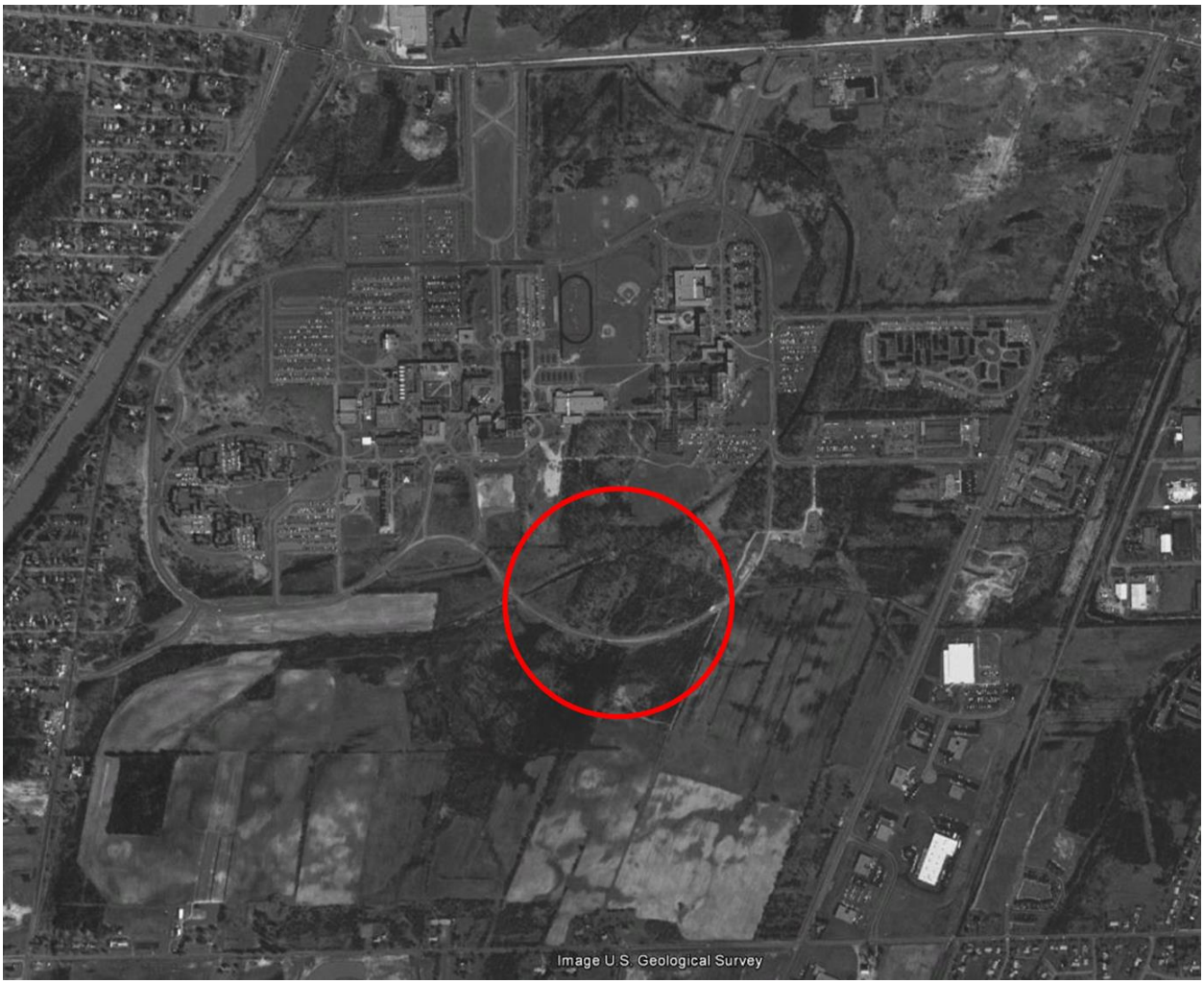

Figure 16: Close-up view of the RIT campus in 1994, as taken from Google Earth. The red circle indicates the changes done to the South Loop, still a gravel authorized access road in 1994.

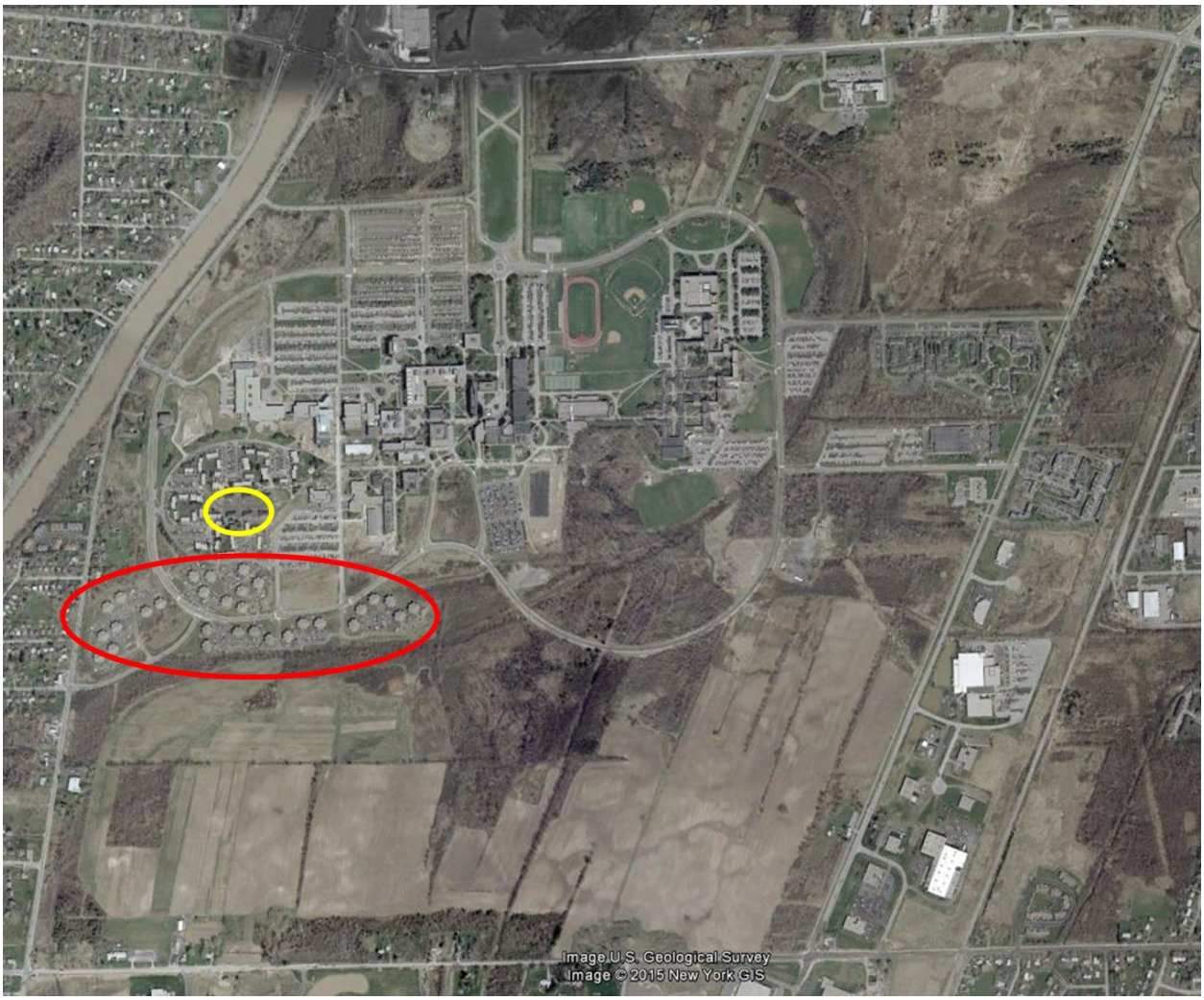

Figure 17: Aerial imagery of the RIT campus in 2002. The red circle illustrates the University Commons apartments. The yellow circle shows where the new Greek mansions have been established. U-Lot has also been completed in this image, near the center of the map, allowing parking near the newly opened southern loop.

Prior to 2002, there were no marked crosswalks on campus, based on aerial imagery analysis. New York State law 1151 (SafeNY: NYS Vehicle & Traffic Law Excerpts. http://www.safeny.ny.gov/peds-vt.htm) requires vehicles to yield to pedestrians in crosswalks, but accidents indicated that not everyone heeded this law, leading to the death of a student who was struck by a vehicle as she was crossing the street in 2002. In response to this event, the university added raised speed bumps to force drivers to slow down. The majority of the raised crosswalks

(circled in red on Figure 18) were constructed in September 2003, in an effort to increase pedestrian safety on campus; the feature circled in red to the south of the first speed bump is a raised crosswalk and the speed bump circled in red near the top of the image was added in order to slow drivers approaching the University Commons complexes. Additionally, these speed bumps increase driver awareness of pedestrian traffic in this area of campus, particularly as students move to and from apartments.

The painted crosswalks (shown in blue) indicate safe places for students to cross and may also slow down drivers even when no pedestrians are present. The painted crosswalks are typically placed at intersections with stop signs (Pedestrian Crossing: 50 State Summary), but can be placed at any location. As a result of the establishment of the speed bumps, drivers may have started driving slower overall and showed more alertness to their surroundings. However, Figures 5-7 do not show a correlation between the establishment of speed bumps or painted crosswalks and deer strike numbers. These areas already exhibit low to no strike incidences, possibly due to their proximity to the academic side of campus.

Figure 18: An aerial image of the University Commons complex in the southwest section of campus in 2006. Red circles indicate speed bumps and raised crosswalks, while blue circles indicate painted crosswalks.

Prior to groundbreaking and construction of the Park Point apartment complex, which began in 2007, the intersection of John Street and Jefferson Road was heavily vegetated (Figure 19). The woods, shrubs, and swampland are dense, without much trimming or roadside clearance especially along Jefferson Road (northern boundary in this photograph). Figure 19B shows the same intersection in 2009, after the apartment complex construction has been completed, and students had been living within these apartments for about a year. The habitat is fragmented, with commercial/retail/residential development replacing forests, shrubs, and wetlands. The loss of wetland, herbaceous, shrubland, and forested habitat may be shifting the deer population further to the south (towards the conservation wetland established alongside existing forested habitat) and other natural areas of campus. A significant amount of vegetation still exists along the John Street.

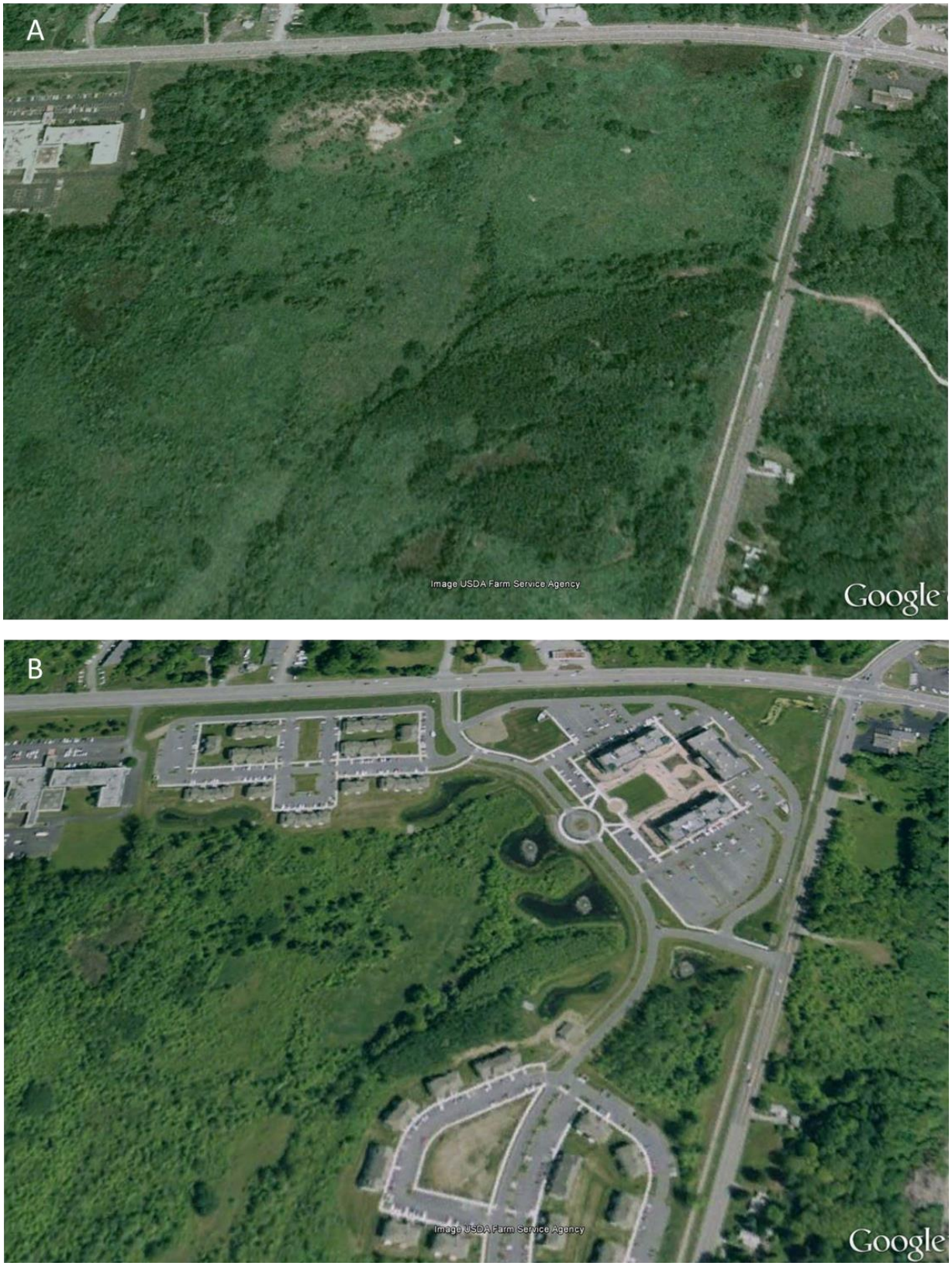

Figure 19: An aerial view of the intersection of John Street and Jefferson Road in 2006 (A) and 2009 (B).

Gleason Circle is primarily used as an area to pick up and drop off students who utilized public transportation. This is an area that sees both vehicle and foot traffic, with several buses idling in the loop at any given time and members of the community passing through, boarding buses, or waiting at the bus shelter. While this area saw less than five strikes during the 1993-2000 block, with that number dropping off to zero in subsequent time periods (see Figures 4- 6), deer were still seen in this area (see Figure 11) both on the right side of Gleason Circle and along the South Loop adjacent to U Lot. This indicates that while they were not being struck, deer are still active in this area. The face of this particular spot has transformed in five years from 2009 to 2014 (Figure 20).

Figure 21 depicts the current campus landscape (2014) and Figure 22 shows a close-up of the main campus. Much of the construction has been internal, razing part of the Riverknoll apartment complex to make way for the new Global Village complex, repurposing U-Lot for the new Polisseni Hockey Arena (shown incomplete here), and repurposing some of the lots toward the north for new academic buildings. As indicated on the map, circled in red, the new Innovation Center had been built, as well as a new on-campus apartment, the Global Village complex on the western side of campus. While no habitat had been damaged for the construction of the Innovation Center and Global Village (circled in red), there was now an increase in commercial activity in the formerly quiet residential areas and additional landscaping has been installed. Based on Figure 11, sightings in this area are already low. Additional academic buildings arising from parking lots in the northwestern area of campus include the new Institute of Sustainability, circled in yellow.

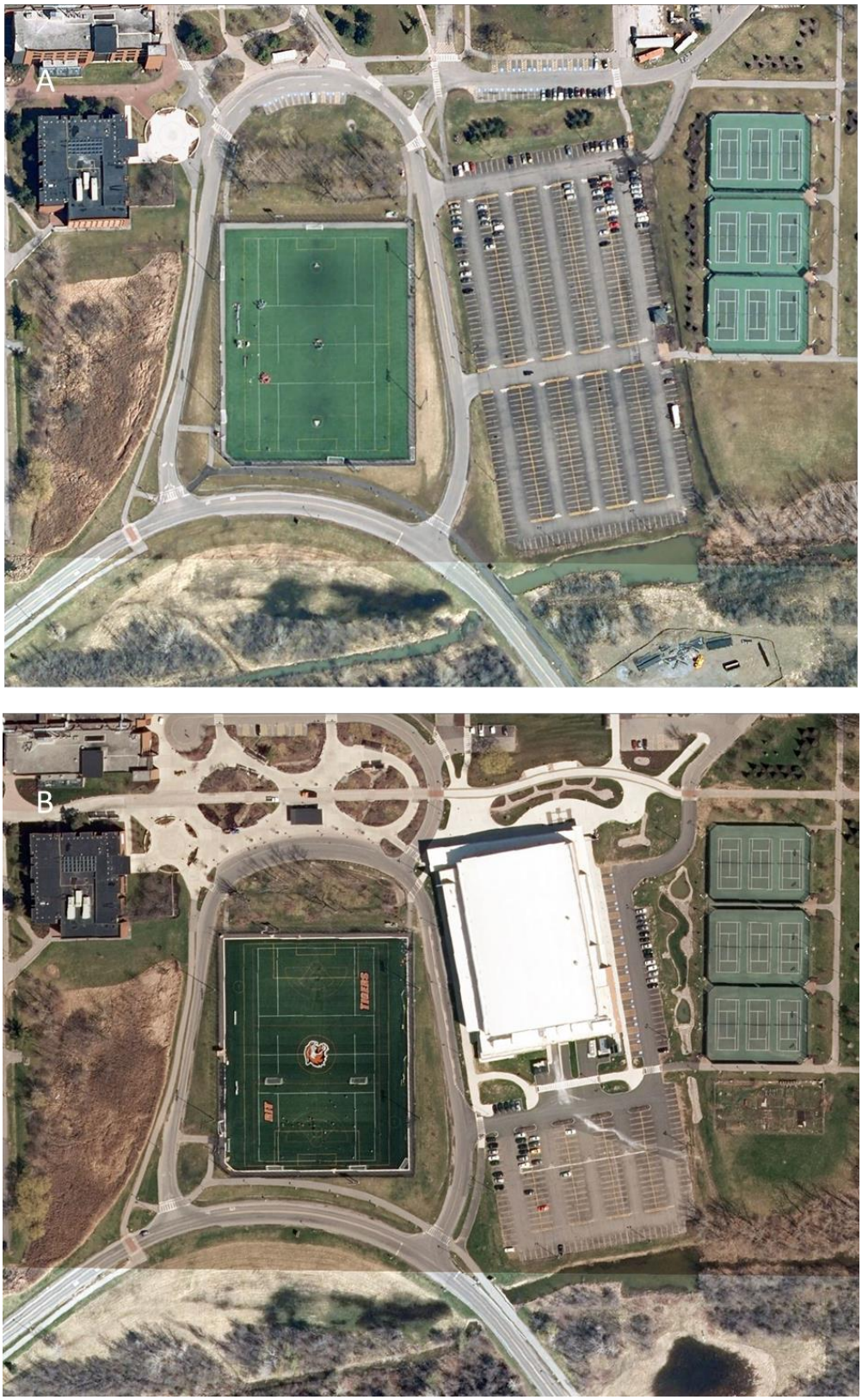

Figure 20: An aerial view of Gleason Circle and U-Lot near Wallace Library in 2009 (A) and 2014 (B).

Figure 21: An aerial view of the RIT campus in 2014.

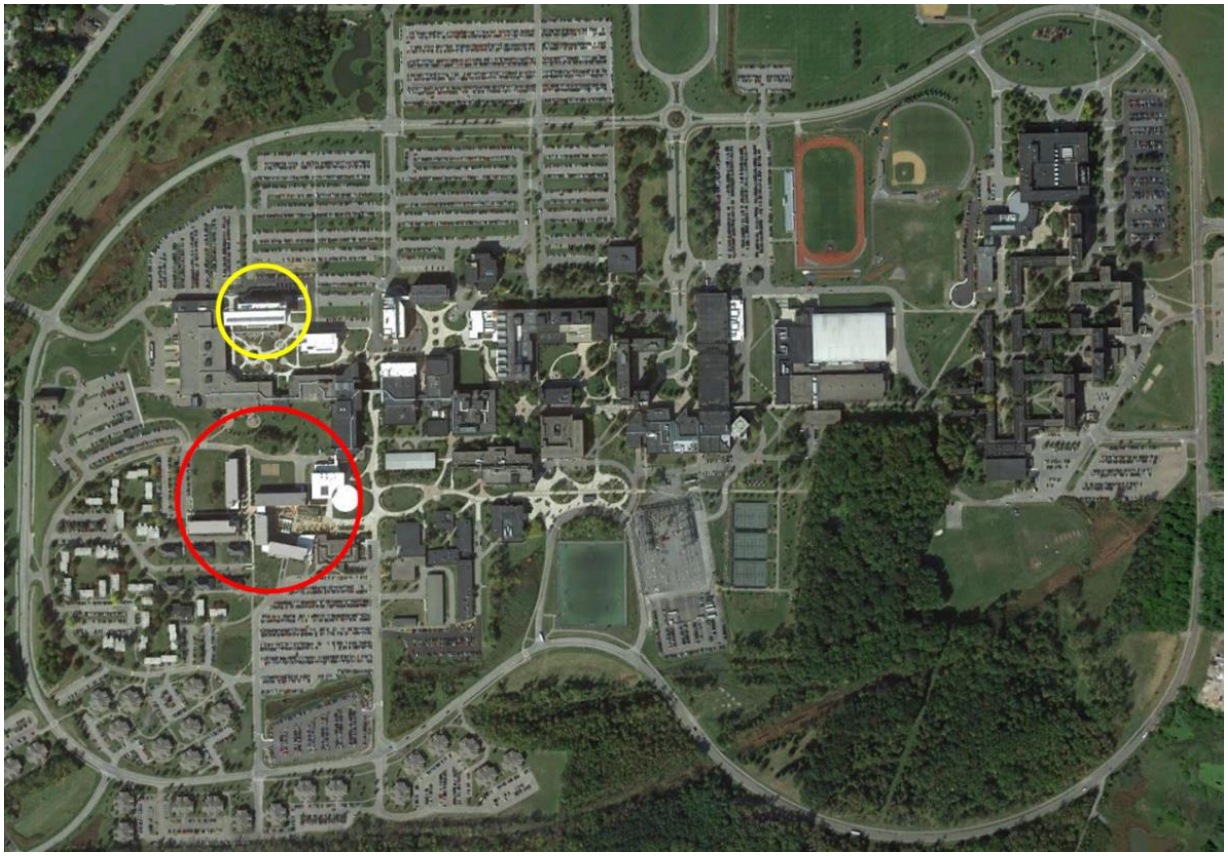

Figure 22: A close-up view of the RIT campus in 2014. The yellow circle indicates the Institute of Sustainability. The red circle indicates the Innovation Center and the Global Village complex.

Analyzing the strike and sightings data, the pattern that seems to be emerging is that as the deer's natural habitat on campus becomes developed, the deer are migrating south and towards the interior. From Figures 5and 6, earlier "hot spots" for strikes were primarily along the superblock boundary roads, particularly the John Street and Jefferson Road intersection. However, in Figure 7, the hot spots seemed to have shifted somewhat from that particular intersection to slightly more south – Wiltsie Drive and the southern loop. As suggested by Figure 11, these segments may be developing hotspots on campus and should be the focus of additional monitoring and/or control measures.

3.5: Roadside Landscaping and Vegetation Analysis

Another possible explanation for the drop in deer strikes can be attributed to the RIT Facilities Management Services (FMS) maintaining the roadside vegetation and trimming back tree cover to allow increased visibility. This may unintentionally be reducing deer strikes on campus roads. An analysis was done to measure the distance of the roadside vegetation from the road, as illustrated by Figure 23. The primary issue is tree cover. If a deer grazes on the grass next to the road, or pauses before crossing a road while in a grassy median, drivers may be more likely to notice it. Drivers are less likely to notice (and react in time) if a deer comes directly out from under the tree cover.

Figure 23: An example of how the distance between the road's edge and tree cover was measured. The line has been colored red for visibility.

Over the years, the distance between the road edge lines to the edge of the tree cover within the RIT SuperBlock has generally increased, based on the imagery analysis and Table 5. Focus for this analysis was given to the areas that had historically recorded high numbers of deer-vehicle collisions, based on data reported by the RIT Campus Safety and Monroe County Sheriff Office. Ignoring the major change at the Park Point intersection, generally it appears that the tree cover has been trimmed back and maintained, aiding driver visibility. This was most likely not done to reduce deer strikes, but in order to preserve the safety of drivers from falling vegetation. Regardless of intentions, trimming back and maintaining tree cover appears to have had an impact on the number of deer strikes, according to Figures 5-7. Additionally, the emergency blue box call system requires that a person, while standing at one blue emergency call box, will be able to see adjacent blue boxes to the left and the right. According to a representative, FMS trimmed back the vegetation to improve the sight line of drivers and increase visibility of the blue boxes, especially along Perkins Road.

Table 5: Indicates the measurements done from the white line of roads to the nearest tree cover surrounding and within the RIT SuperBlock.

Road Name	**1993**	**2001**	**2008**
Jefferson-John	8 meters	10 meters	465 meters
John-Jefferson	15.5 meters	30 meters	467 meters
Bailey-East River	5 meters	12 meters	12 meters
Bailey-John	4 meters	6.5 meters	11 meters
Jefferson-East River	4 meters	10 meters	8 meters
John-Wiltsie-Bailey	5 meters	23 meters	21 meters
South Loop (Wiltsie to Gleason Circle)	7 meters	8 meters	12 meters

3.6 Campus Alerts and Messages

According to Chris Furnare, grounds foreman for FMS, there is no official RIT deer management plan. RIT does, however, send out periodic e-mails through the RIT Message Center interface, an e-mail system that RIT students are automatically subscribed to, encouraging drivers

to watch out for deer especially during times of increased deer activity, such as during rutting season. Research has shown that the knowledge of seasonal and daily cycles in deer movement and behavior has helped drivers adjust their speeds and be more alert to deer. This, in turn, has helped to mitigate deer strikes (Dandy et al., 2011). RIT also has utilized social media – Facebook and Twitter, primarily – to remind users about deer movement on campus. Figure 24 features an example of a post that RIT periodically shares on social media. While the image was shared twenty-two times, none of the sharers made any comments about their experiences, and none of the commenters in both the original post and the shared posts mentioned anything about having struck a deer in the past. None of the participants in the Summer Survey mentioned the use of social media or periodic e-mails being effective in reminding them about the deer presence. Survey participants seemed to be aware of the deer population and some understood typical deer behavior and habitat preferences. Respondents have commented:

- "Always around dusk is when I see them on campus all the time all year round."
- "They seem to come out at night. I have seen families of deer roam around campus."
- "Most [deer] tend to keep to themselves and stand quietly by the side of the road, although they are quite close."
- "Once, I thought I saw about 10 of them [deer] in one group. When one starts running across the road, they all follow the leader."

Prior research has shown that it is possible to predict high-risk areas based on DVC maps that have been made available to the public (Webb, 2012). If the public is able to utilize these maps, such as Figures 5-7 and Figure 11, then it may be possible that the community members will become more aware of the "hot spots" and manage their speed and driving style accordingly. The effectiveness of this type of communication would be an excellent follow-up study to this research project.

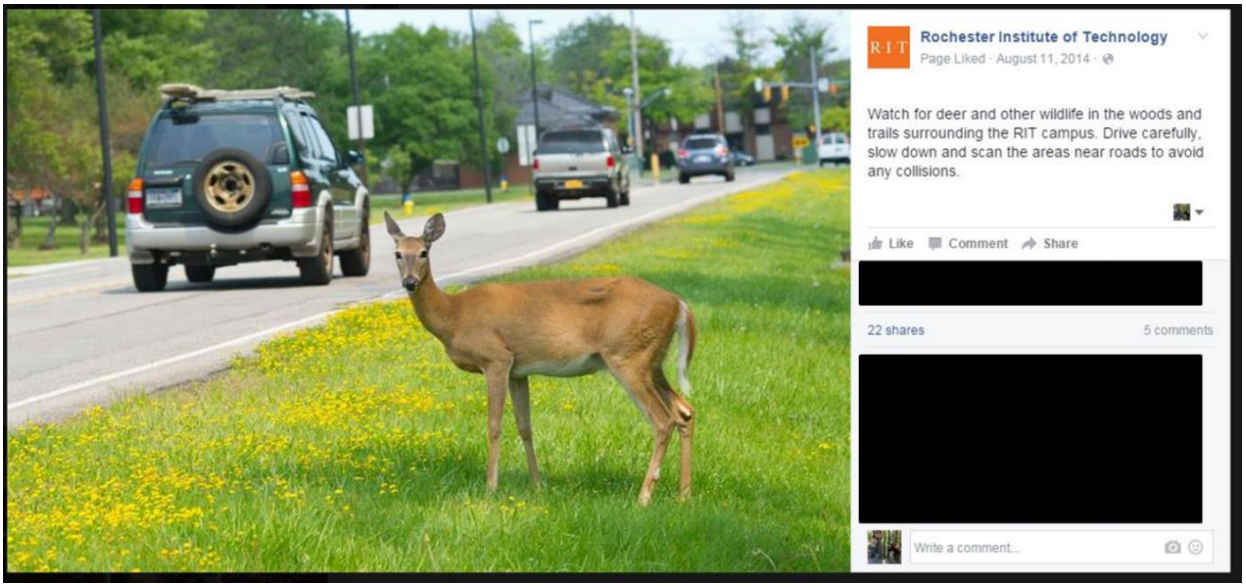

Figure 24: A RIT Facebook posting alerting the community of a deer presence on campus.

3.7 Survey Themes

At the end of the survey released during the summer, respondents had the option of adding comments and thoughts in a free response section. They were asked whether they had anything that they wanted to add. Many respondents commented on the deer on campus, with some imploring that the deer population be left alone. A few commenters suggested that the deer population be culled through bow hunting by select members of the community. Some participants pointed out that deer are part of the campus landscape and people simply need to be more alert and use common sense:

- Warning signs should be put in place. Do not get rid of the deer as RIT is the place they use as their habitat. Warn drivers better in popular areas
- If you are obeying the posted speed signs, there should be no reason to strike a deer on this campus.
- With few exceptions, I think that people should know that deer exist on campus and should be looking for them. I ENJOY seeing them. No one wants to hit a deer, but sometimes that happens. I just think we, as drivers, need to realize that the condition of our cars depends on our defensive driving skills. Slow down and don't assume the deer will stop when they see your car. They are moving for a reason - mostly from being chased or fear.
- If people just slow down and watch what's going on around them, there should be little problem. If one deer crosses, expect and prepare for another soon after.
- I am a pedestrian but I can say that the deer here aren't afraid of people. Sometimes I'll be walking to class in the morning and the most the deer would do is just look at me. We can be three feet close but it's not afraid.

A few participants recommended the use of roadside signs to alert drivers to the deer population, while others suggested that RIT erect a fence to keep the deer off the campus roads. Generally, however, the comments indicated that people saw deer frequently on campus, and their feelings ranged from ambivalence to affection for the animals.

4: Conclusions and Recommendations

4.1: Conclusions

The Rochester Institute of Technology is home to a herd of deer that are well known by members of the community. Deer can be found throughout campus, mostly in grassy and heavily wooded areas, such as the forest between C Lot and U Lot along what is now the South Loop, part of Andrew Memorial Drive (Figure 12). Having a natural herd of pleasant, friendly animals brings a certain charm to campus, but at a price. Deer are often unpredictable and are prone to darting out unexpectedly from under the tree cover into the path of a moving vehicle. This can lead to the unintended death of the animal and a damaged automobile.

Over the past seven years, there has been a marked decrease in deer strikes in and around the RIT campus boundaries, compared to the previous fourteen years. Over these two decades, the face of the RIT campus has changed greatly. New buildings have been erected, parking lots have been sacrificed, and speed bumps have been added. Specifically, the biggest change has been the conversion of wetlands in the northeast corner of the campus to establish an off-campus student housing and shopping center. In the seven years since Park Point was established, no studies had been done to examine the effects on the campus deer population, especially when it came to deer-vehicle collisions.

Upon analyzing the data obtained from Campus Safety and the Monroe County Sheriff's Office, the number of deer strikes have declined since 1993, and markedly so since 2008 (Figures 5-8). For example, between 1993 and 2000, the intersection of Jefferson Road and John Street saw twenty-one strikes. Between 2008 and 2014, however, following the completion of Park Point, this same intersection saw only three strikes. So while the locations of the highest number of deer

strikes have remained relatively constant, the overall number of strikes has dropped dramatically (Figure 8).

The reduction of strikes in the years between 2008 and 2014 may be attributed to a number of causes. The development on campus – Park Point, construction of the Gene Polisseni Arena, and various academic buildings – may have disturbed the deer, forcing them out of their natural habitat and encouraging the migration of the deer to the wetlands to the south of campus, known as the conservation wetlands. Referring to Figure 11, members of the RIT community are seeing the most deer (between 201 and 300) on the South Loop between Wiltsie Drive and Gleason Circle adjacent to U-Lot; while strike figures seem to be consistent (and low) for this area (below five strikes for each time period). Deer sightings along the external roads bordering RIT are all below fifty, with the most sightings along the South Loop and the athletic fields near the residential halls. This suggests deer are utilizing the interior of campus.

Another possibility for the drop in deer strikes from 2008-2014 was that drivers skipped reporting a deer strike to the police or campus safety, especially if the animal was not killed and there was no serious damage to the vehicle, or if they simply filed an insurance claim. During the summer survey, respondents were asked if they had struck a deer on campus, and if they reported it. This was followed up with whether respondents had forgone reporting the incident to authorities and had responded directly to their insurance companies. Survey results suggest most people still report deer collisions to police and safety personnel, and the survey totals are close to the totals reported by RIT campus safety and MCSO for 2008-2014. When contacted, local insurance companies in Rochester had no data on deer strikes and whether drivers elected to report directly to the agency, rather than through the authorities.

The addition of speed bumps and raised crosswalks in strategic places, as shown in Figure 17, along the loop around campus are forcing drivers to slow down and watch for people. This may also have a secondary effect in that drivers are now more aware of their surroundings, which may allow for better reaction times, leading to avoided collisions with deer. As shown in Figure 11, people are seeing deer on campus, but strike counts are down (Figures 5-8). While the speed bumps and raised crosswalks do not seem to have directly affected the number of on-campus strikes, it is possible that they have had a secondary effect on driver alertness.

While RIT does not have a formal deer management plan in place, the Facilities Management Service (FMS) employees apply practices through routine maintenance and appearance upkeep of the campus that may be reducing deer strikes. Employees trim back foliage and mow grasses. While the primary effect is to keep the property attractive and the vegetation away from roadways, the secondary effect is increased visibility for drivers and keeping deer further back from the road edge, which may translate into fewer deer strikes. Based on Table 5, the overall distance between the road edge and tree cover has been increasing, while strike counts have been declining (Figure 5-7).

Deer have daily and seasonal cycles in regards to their movements and behavior. They are most active at dusk and dawn, which also coincides with rush hour and a flurry of activity on campus. Referring to Figures 1, 2 and 3, it is easy to see how strikes can occur at these times, especially when deer activity occur before dawn, or after dusk. During strategic times of the year, RIT sends out e-mails through the Message Center interface and posts warnings on the RIT website informing students, employees, and faculty of increased deer activity on campus. These times coincide with rutting season, and natural migration of the deer. The daily movement of deer also coincides with the daily dark periods (pre-dawn and very early dawn, as well as post-sunset)

which may make it difficult for drivers to see deer with just headlights to guide their way. It is possible that informing the campus through social media is having an effect, but the impact of this factor needs additional study.

4.2: Recommendations

This study should be repeated, perhaps at seven-year intervals, to re-evaluate any trends and to determine if deer strikes stay low. A community survey should be utilized to see whether "hot spots" for sightings shift over time, in addition to deer strike locations. Furthermore, participants should be asked whether RIT's measures (e-mails and social media) in reminding the community about the deer population's behaviors have had an effect in increasing individuals' awareness. Has RIT been effective in alerting drivers? Have there been any changes in traffic patterns? Are motorists traveling slower, especially along the South Loop?

The summer survey should be repeated, but with further options for responses. The Likert scales seemed to be inhospitable for some users, as some respondents commented that they had difficulty choosing only one option. If, in the forthcoming years, the Clipboard developers come up with more options for responses, the survey could be hosted on Clipboard again. If this is not the case, it is recommended that the survey be hosted on a different website that may be easier to design and use. Additionally, after downloading the data from Clipboard, there is so much raw data to work through. It is possible that the data may be easier to work with and manipulate through a different hosting website.

Additionally, due to Friday and Saturday night traffic on campus because of on-campus athletic events and student activities, it may be worth seeing whether increased traffic on these days leads to a change in on-campus deer activity. Deer exhibit daily cycles in behaviors. Hockey

games, for example, start at seven in the evening with many fans arriving to the rink an hour before the game. Would the traffic coincide with the deer's movement patterns?

It would also be worthwhile to follow up on the deer trails and see which ones are still being used and if new primary entrances have appeared due to development. The last time the deer trails were mapped and explored was in 2006, prior to the construction of Park Point. Over the past10 years, it is possible that with the destruction of wetlands to build the apartments and shopping center, many trails are now left unused or have shifted. Phil Nau, who initially mapped the trails, only did so east from Lowenthal Drive to John Street, and south from Jefferson Road to Wiltsie Drive. It would be interesting to expand this analysis to the rest of the woods and wetlands on campus. The more heavily used trails may have changed since 2006, and it would be useful to keep track of where the deer population may be migrating to.

RIT should also consider adding speed bumps on Andrews Memorial Drive between U Lot and Wiltsie. Campus Safety's traffic violations citations records indicate that drivers frequently reach the highest speeds along this stretch of road (and are ticketed as a result). Table 6 shows the number of drivers who have been caught speeding along RIT's roads. Each column shows the speed class that the motorist was traveling at, and the southern loop is the speeding hot spot.

The speeding citations may imply that due to a lack of crosswalks or speed bumps, drivers are not as attentive to their surroundings or speed. This could be a safety issue, since Figure 11 indicates that this particular section shows a high incidence of deer sightings (ranging from 201 to 300, depending on the particular segment). It is clear that deer are very active here, moving through the woods, perhaps crossing the street to get to the conservation wetlands to the south. Upon examining Figures 5- 7, there does not currently seem to be a direct correlation between the addition of speed bumps (including raised crosswalks) and deer strikes. Sections of roads that have

speed bumps or raised crosswalks already have a high rate of pedestrian traffic (for example, between the parking lots and residential halls or academic buildings) so drivers would already naturally be on alert. But this behavior modification suggests that speedbumps may be a low cost strategy to prevent deer strikes on campus.

Table 6: Data from RIT Campus Safety regarding numbers of speeding violations along RIT's roads. The period of record is 2010-2015.

Road Section	**1-9 MPH Over**	**10-15 MPH Over**	**16-20 MPH Over**	**21-25 MPH Over**	**26 or More MPH Over**
Andrews Memorial Drive	1	4	15	3	3
Perkins Rd	1	2	5	1	6
Wiltsie Dr	1	2	3	0	1
Andrews/Lomb	0	0	0	0	1
NW Andrews	0	0	0	0	1
NE Andrews/Lowenthal	0	1	2	0	1
Andrews E (Lowenthal/Wiltsie)	1	1	5	2	2
Andrews SE (Wiltsie/U Lot)	1	3	87	14	0
Andrews SW (U Lot/Institute Dr)	0	0	4	2	1
Andrews (Institute to J/T Lots)	0	0	1	0	1
Lyon Crescent	0	1	0	0	0
Total	**5**	**14**	**122**	**22**	**17**

As indicated by Figure 25, a suggested location for a speed bump would be near, or at, the location of Red Creek crossing (1), based on deer access points and sightings. Another would be a cleared gap in the woods (2), where a gas line has been laid down. FMS and utility workers use this for access, and the gap forms a habitat corridor for deer. Because of the road curve, this is another location where it may be difficult for drivers to see deer coming, especially if the driver is traveling from the east and the deer is hidden in the corridor and the road curve. The third speed bump location (3) would be where the RIT fitness trail comes out of the woods, across from the

access road to the RIT solar array. The final speed bump location would be the grassy clearing by the boneyard (4), where FMS stores trailers and large equipment. Drivers coming from the west may not see the deer and would not have advance warning that there is an animal there, since it may be blocked by vegetation and the curve in the road. The final point (5) represents a possible speed bump location, based on the 2008-2014 strike data, but it is very close to stop sign and may be redundant. Alternative methods of alerting drivers may be more cost effective (signage).

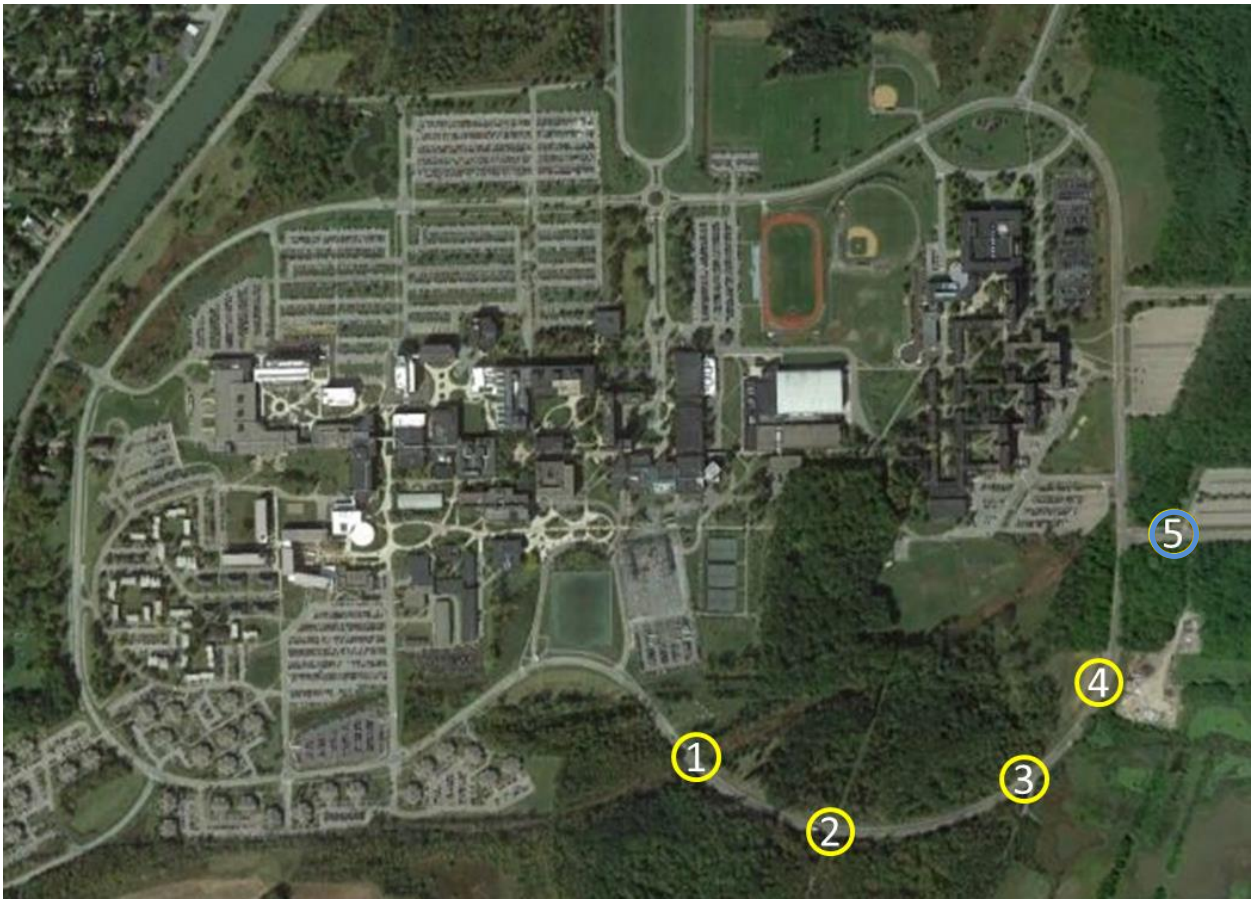

Figure 25: An aerial image of RIT with recommended locations of speed bumps circled in yellow.

An alternative to speed bumps could be signs linked to motion detectors that flash when deer are near, or in, the roadway. The choice of location can be based on sightings data. This system uses an infrared beam to detect animal movement. When the sensors are tripped, the sign

will flash to alert drivers that an animal is in the vicinity (DeerCrash, 2006). Some states are now utilizing this technology, and some are solar powered as a cost-cutting measure (DeerCrash, 2006). Researchers tested this system in Arizona, and found that the signs were initially very reliable. They would flash every time an animal was close by. However, after a few months the signs were being set off unexpectedly, giving false alarms (DeerCrash, 2006). Overall, data showed that drivers slowed their speed when they spotted a flashing sign (DeerCrash, 2006). While the system may need improving, with careful maintenance and tune-ups, a sign that flashes could be a very innovative addition to alert drivers of deer near roadways.

Based on the recent strike numbers, it is clear that FMS and RIT are doing something right – possibly due to trimming back foliage to increase drivers' lines of sight. While this has been done primarily for other reasons, a secondary, unintended, effect may have been a reduction in deer strikes. The deer are clearly still on campus, based on Figure 11, but drivers are avoiding collisions. The deer sightings map is an excellent planning tool for further avoidance planning. FMS or an appropriate ad hoc committee should continue to periodically survey the RIT community in order to see where people see deer, and to track trends in the sightings' hot spots.

RIT should also continue to utilize the Message Center interface, as well as social media such as Facebook and Twitter, to inform members of the community about deer movements at strategic times of the year, such as in the fall and spring. However, a survey should be conducted to study the effectiveness of this type of alert system. None of the Summer Survey participants made any sort of comment regarding RIT's alert system via e-mail and social media. To this extent, it would be imprudent to assume and claim that the system is effective because deer strike counts are down. Based on the data presented here, other practices may be more effective than a periodic e-mail or social media post. Surveys should be conducted within the community to see

how beneficial these kinds of posts are, and whether the community as a whole would benefit from seeing more of these posts.

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Appendix A - Community Survey
Pattern of Deer Strikes on the RIT Campus, 1993-2014.

Increases in both the human and deer populations, coupled with habitat loss, habitat fragmentation, and decreased predation, have led to increases in deer-vehicle collisions (DVCs). The development of RIT over the past 20 years mimics urban/suburban development patterns, with documented deer-vehicle collisions. This research is interested in shifting patterns of deer movements on campus and landscape variables that might be contributing factors and in assessing RIT's efforts to reduce deer vehicle collisions on and around campus. The following survey will ask you about your recent observations of deer on campus and will be compared against official deer vehicle collision data collected by the RIT Campus Safety Office and the Monroe County Sheriff Office. The results will be used to help RIT develop conservation and management practices for the campus natural areas. This survey is part of Gina De Naples's Environmental Science Masters thesis under the supervision of Dr. Karl Korfmacher. Dr. Korfmacher may be reached at 585-475-5554 or by e-mail at kfkscl@rit.edu.

The survey is **completely voluntary** and will not ask for your name or identifying information. We anticipate the survey will take approximately 10 minutes. We do not anticipate any risks – we are simply interested in your observations and experiences with the campus deer. Any details you wish to provide about deer vehicle collisions will remain confidential (we intend to aggregate the results and link total numbers to a map as part of the data dissemination).

Continue to the Clipboard Survey? YES NO

You may leave the survey at any time.

How are you affiliated with RIT?

- Student
- Faculty (Professor, lecturer, etc)
- Employee (FMS, Public Safety, etc)
- Alumni

If you are a student, what year are you?

- 1st
- 2nd
- 3rd
- 4th
- 5th or above
- Graduate Student

Do you live on campus?

- Yes
- No

Do you commute?

- Yes
- No

Do you have a car?

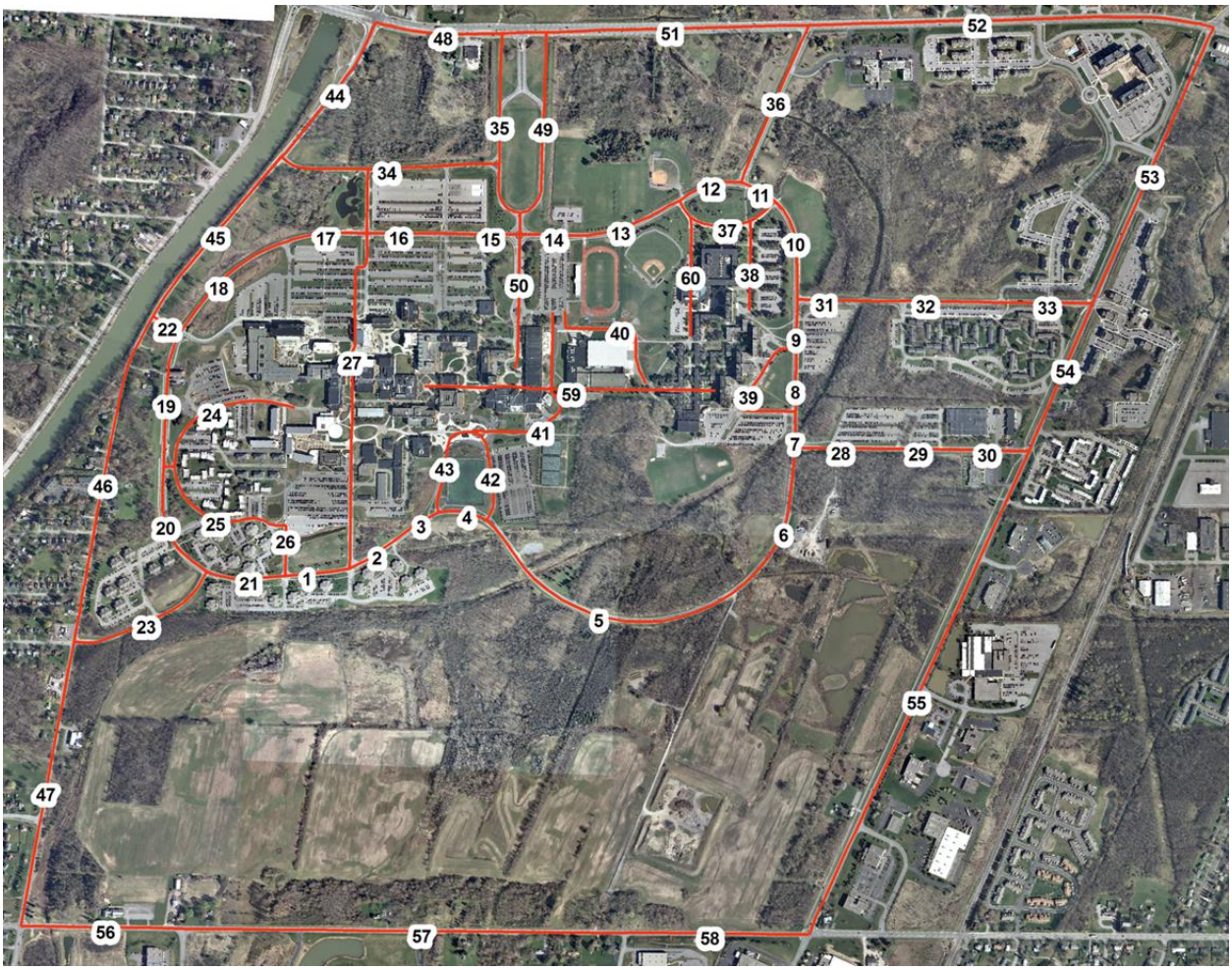
- Yes
- No

Have you seen deer on campus?

- Yes
- No

Referring to the map below, please list the top five road segments you have seen deer on or around RIT. Use the number label for each Road segment to indicate the location.

[BOX 1]
[BOX 2]
[BOX 3]
[BOX 4]
[BOX 5]



Referring to your **top 5 road segments**, please rank the most frequent times you see the deer at these locations. Make sure you list the road segments in the order that you entered them in the previous questions. ← this is a Likert scale

	Morning (4am to 11:59am)	**Afternoon (12pm to 5:59pm)**	**Evening (6pm to 9:59 pm)**	**Night (10pm to 3:59am)**
Road Segment 1				
Road Segment 2				
Road Segment 3				
Road Segment 4				
Road Segment 5				

Referring to your **top 5 road segments**, please rank the most frequent seasons you see the deer at these locations. Make sure you list the road segments in the order that you entered them in the previous questions. ← this is a Likert scale

	Spring (March to June)	**Summer (June to September)**	**Autumn (September to December)**	**Winter (December to March)**
Road Segment 1				
Road Segment 2				
Road Segment 3				
Road Segment 4				
Road Segment 5				

Have you ever struck a deer on campus?

- Yes
- No

Did you report the strike?

- Yes
- No

Please share the details about your deer strike experience, if you are comfortable doing so. Details include the time of day, season, weather conditions, location, speed you were traveling at, etc.

Please include the road segment that it occurred at, from the map below.

[ANSWER BOX]

Have you ever had a near miss with a deer on campus?

- Yes
- No

If you answered YES to the previous question, please provide a location (road segment) from the map below, season, time of day, and the type of landscape.

[ANSWER BOX]

Is there anything else you would like to add about your deer observations?
[ANSWER BOX]

Thank you for participating in this project. Results will be available in Gina De Naples's Thesis (expected publication in 2016) and by request from Dr. Korfmacher.

Message after Submission

Thank you for participating! I can't tell you how grateful I am that you are helping me with my Masters thesis.

Your responses will be extremely helpful, and once the data has been analyzed I will share the information with the campus.

If you have any further questions or concerns, please feel free to contact me at gmd1800@rit.edu, or my thesis advisor, Dr. Korfmacher, at kfkscl@rit.edu

Appendix B – Demographics Analysis Tables

Table B1 explores the general demographics of the respondents of the survey. Participants were asked how they were affiliated with RIT. A total of 883 individuals responded. 51.9% of respondents indicated that they were current students, with employees ranking second at 33.3% of respondents. 11.6% of the total respondents indicated that they were faculty members, with the remaining 3.3% at alumni status.

Table B1: A table depicting the affiliation of respondents in the Summer Survey.

RIT Affiliation	**Count**
Alumni	29
Employee (FMS, Public Safety, etc)	294
Faculty (Professor, lecturer, etc)	102
Student	458

Table B2 tabulates the responses of students, employees, and faculty who may or may not live on campus. Alumni were excluded from this dataset because it can be assumed that alumni will no longer live on campus. 51.5% of students reported that they live on campus, while 0.6% of employees reported that they live on campus.

Table B2: A table depicting whether a respondent lived on or off campus, data from the Summer Survey. Alumni are excluded from this dataset.

RIT Affiliation	**Yes**
Employee (FMS, Public Safety, etc)	2
Faculty (Professor, lecturer, etc)	0
Student	236

Table B3 shows the responses of survey participants about whether they owned a vehicle. 93% of alumni indicated that they owned a car. 99.7% of employees responded likewise. 98% of faculty members indicated in the affirmative. 70.5% of students answered that they did have a car. The data indicates as expected, that a majority of each demographic group would have a car. However, the survey did not specifically ask that alumni respond whether they had a car in college.

It is also possible that the question was not worded correctly and students assumed that they had to answer no, even though they had a car on loan from family members,

Table B3: A table depicting whether a respondent owned a vehicle, from the Summer Survey.

	Alumni	Employee (FMS, Public Safety, etc)	Faculty (Professor, lecturer, etc)	Student
Yes	27	293	100	323
No/No Answer	2	1	2	135

Table B4 tabulates the responses of participants from the survey about whether they traveled to campus using their car. The "Sometimes" option was added for some members who may occasionally take public transportation, or cycle to campus. 79% of alumni surveyed reported that they used their vehicle to commute. 96.9% of RIT employees used their vehicles to travel to campus. 94.1% of RIT faculty responded affirmatively about using their cars. 36.2% of students used their vehicles to commute. The students' responses also depended on their living situations. Those who lived in on-campus housing would, naturally, not use a car to get to campus. However, students who lived at Park Point or Province apartments would use buses provided by RIT to get to campus, since RIT Parking and Transportation does not provide parking permits to Park Point or Province residents. Those who lived farther away from campus would use their vehicles, carpool, or another means of transportation.

Table B4: A graph depicting whether a respondent commutes with a personal vehicle.

	Alumni	Employee (FMS, Public Safety, etc)	Faculty (Professor, lecturer, etc)	Student
Yes	23	285	96	166
Sometimes	3	5	1	71
No/No Answer	3	4	5	221

Figure B1 shows the frequency of manufacture years of vehicles driven by participants of the 2015 Survey. The thought is that with more updated or recent models, these versions will include enhanced safety features that may or may not help reduce the incidence of strikes, such as infrared cameras or collision detectors. The majority of cars on campus appear to have been manufactured after 2005. Automobile manufacturers are offering a night vision feature on certain models – more typically luxury models ("Safer Driving in the Dead of Night," 2006). The first of this technology was made available in 2000 with Cadillac but was discontinued due to low demand. While it's not possible to assume that all vehicles manufactured after a certain date will have collision detector features (including night vision), it is safe to assume that some automobile owners will select the option or luxury package when purchasing their vehicles.

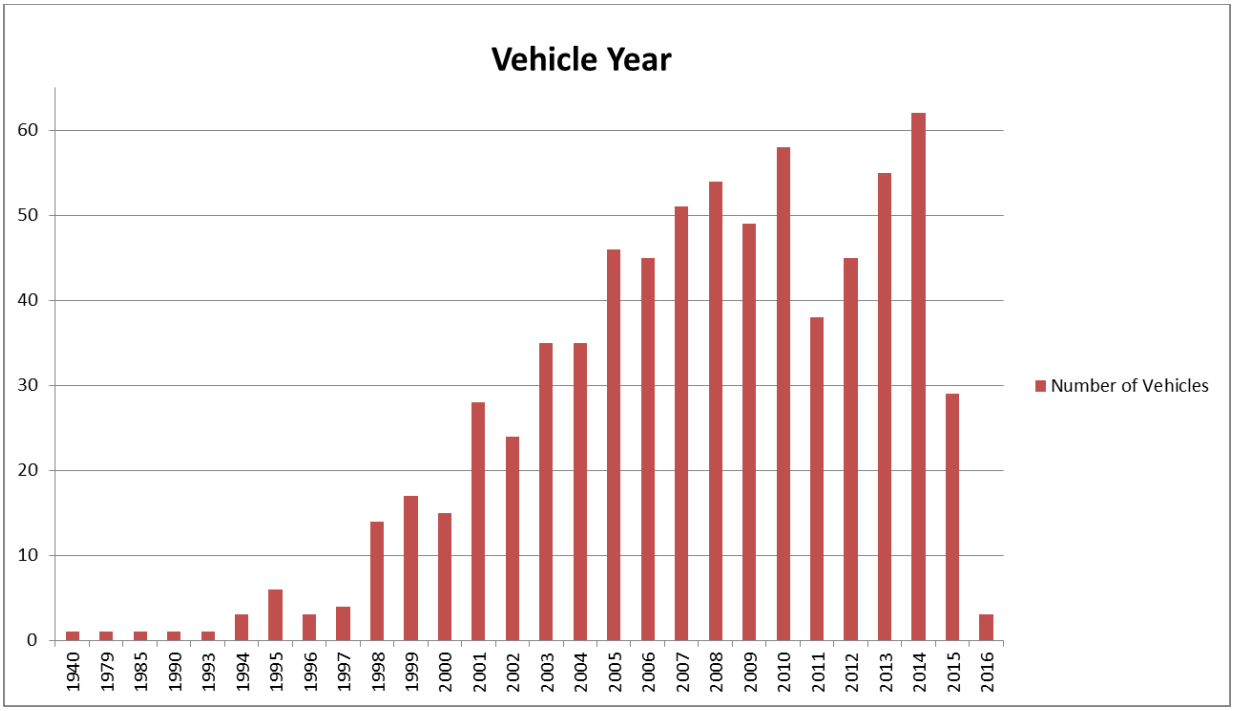


Figure B1: A graph depicting the range of manufacture years of vehicles driven by current RIT students, employees, faculty, and alumni, based on responses from the 2015 Survey.

Appendix D – Survey Free Response

- Any time I'm on campus after 8pm, I always find at least one deer near the roadways; maybe 30% of the time they run across the road. The problem seems the worst on the Northern and Western roads along campus. Rarely any sightings on the south, and only occasionally in the East.
  Bluntly speaking, just cull the deer found in the North and East, as I've witnessed/had more than an acceptable number of close calls with them. It's a hazard and it's only going to get worse in the coming years.
- I think FMS might put up some roadside warning signs in those areas with the heaviest deer traffic.
- There has been an increase in predators on campus (coyote, hawks) due to unchecked wildlife populations. I am concerned it will be getting worse before an action is taken.
- I think rit campus should add fences.
- The deer I have seen seem to be aware of cars and stay back from the road or cross quickly when they ae near the road and they see a car coming.
- RIT's deer problem is not nearly as bad as where I live. The deer issue does not bother me.
- Always around dusk is when I see them on campus all the time all year round. I saw one on campus near S lot in the mid afternoon when I stopped into work on a Saturday but those instances are rare and usually limited to when campus is very quiet. I never see them on campus in the morning.
- RIT should keep some areas deer friendly for their living space. There aren't too many deer on campus that it causes any driving problems. The number of deer is a good balance right now. This should be maintained and not decreased.
- The only other thing is I only drive section 51 in the fall and spring (not in the summer or winter).
- I see them munching on the lawns and trees more often than I see them crossing the roadways. This is true whether seeing them from my window in LBJ (which faces north) in late afternoons and when I'm driving.
- They add to the beauty of the landscape.
- "Near misses" seem more likely with small groups of deer, rather than with single deer.
- The deer are really stupid. You can stop your car and they will run into you.
- They seem to come out at night. I have seen families of deer roam around campus. Especially near the dorm areas.
- This map was very difficult to use to give you a true understanding of the location of the deer on campus-also other wild animals besides deer-why not just wildlife in general-a turkey flew into the window in the SAU one year. There are fox running around as well
- Saw three bucks together this morning! Most of the time it is female deer.
- They're rarely on the road so as long as you're paying attention they aren't problematic.
- There are many deer around Building 99 (FMS) during all seasons.
- I have seen deer walking from Bausch and Lomb building to the Eastman Quad area. It is apparent that when really hungry they eat the flowers in front of the Bausch and Lomb Building.

- Love the deer on campus! We could co-exist peacefully if people would slow down, get off their phones and pay attention!
- Deer on campus seem pretty tame....
- They seem friendly!
- I've seen deer (does) in the infinity quad recently too..
- I am not aware of the time of year I see deer, I experience it pretty evenly around the year.
- There are always a lot of deer over by segments 10 & 11.
  It seems like there are more deer on campus each year.
- They let you get very close to them and do not scare easily unlike the deer in my small rural town.
- During the winter- after dark- a number of deer will feed on the athletic practice fields north of segments 12-13 and 14 and between 36 and 49.
- I see deer every season and it was very tough to select the season that I see the most.
- The coolest one is when a big buck got locked in fenced in area back of Eastman Hall. A guy who works for pt-time for Facilities happened to be walking by w/me and we heard noise in there. He had key to the door and let the deer out. Deer ran like heck thru parking lot D.
- See them year round at the locations, not just in one season. Have seen them within the bounds of academic areas during the winter as well.
  Also appear to be quite fuzzy year round, which is unusual from what I have seen of white-tail deer in other parts of NYS
- I see deer almost every day in that patch of land on East River Rd before it crosses Jefferson. They always seem to be eating, and I don't think I have ever actually seen one on the road before.
- I see a lot of deer but they generally seem to avoid the roads around campus. I've seen them on the road a couple of times, but usually just running across.
- There are a lot of deer in the woods around campus
- Warning signs should be put in place. Do not get rid of the deer as RIT is the place they use as their habitat. Warn drivers better in popular areas
- In your study, you might want to consider that time of day for sightings will probably load to the beginning and ending of the work day.
  Traffic patterns will also strongly affect locations of sighting as well as time.
  The same is true for where deer are seen--some people (like me) do not take the same route into and off of campus.
- RIT should encourage deer hunting in the area to reduce the deer population and/or work to acquire pest permits to further control the deer population.
- I have noticed more deer by segments 8, 9, 10, 11, 12 during dusk and night.
- If you are obeying the posted speed signs, there should be no reason to strike a deer on this campus.
- The most common area I've seen deer have been in the fields to the east of RIT. Especially behind Grace Watson and the fields next to Perkins road.

- I've always seen a bunch of deer on campus, but I've found for the most part they are pretty good about staying away from the roads. I've only had to break for a deer once on campus, but even so it wasn't even a close call. The deer around here are really smart!
- With few exceptions, I think that people should know that deer exist on campus and should be looking for them. I ENJOY seeing them. No one wants to hit a deer, but sometimes that happens. I just think we, as drivers, need to realize that the condition of our cars depends on our defensive driving skills. Slow down and don't assume the deer will stop when they see your car. They are moving for a reason - mostly from being chased or fear.
- I kinda estimated a lot of my answers because I barely remember anytime I see deer anymore. Also, only got a car this summer.
- I've seen newborn deer on campus as well.
- Can't answer about which seasons I have seen them. Never really paid attention to the season, just kept an eye on the deer.
- I mean, I don't see them as much of a problem, since I mostly only saw em really early in the morning when I used to go to the gym at 6, my friend would send me videos of deer a lot around park point, but that was late at night.
- It was trying to get in the Eastman building by ramming the door.
- I've seen deer on campus but mostly they're just grazing. Do not know of anyone who has actually hit a deer.
- they seem pretty "tame" compared to deer around my country neighborhood which are very skittish when they see an approaching car.
- I see deer on campus during night, but I have never heard from any friends or faculty about any stories involving hitting deer.
- They aren't afraid of humans on this campus.
- I love how many deer are on campus. Every night I walk to Park Point from building 8. I see about 10 different ones every time.
- I know there is a lot of wildlife in and around campus. I have been working here for 34 years and I used to see thousands of deer at a time. Now I'm lucky if I see 3 or 4 together.
- most of the deer that I have seen have been standing and looking around or eating. I haven't seen deer running, even during hunting season. With that being said, I have to question if part of the reason for an increase is because of speeding or distracted drivers?
- The deer on campus are usually pretty smart in that they know enough to stay out of the road most of the time when they see a car.
- MAKE MORE ILLUMINATED AREAS.
- I saw like 3 in the far woods behind the RIT ambulance/Wellness center in August last year the week before classes. This happens to be near that road (Segment 5, 6)
- Just that there are always a large amount of them on the ball fields in the triangle between your map numbers 49, 13 and 12.
- They love the woods behind Gracie's, there is a lot of deer and they are all very small deer that thankfully should not do much damage to cars as long as people pay attention.
- Don't see them as frequently as in the past. They used to come up to the building and eat from the apple trees.

- If people just slow down and watch what's going on around them, there should be little problem. If one deer crosses, expect and prepare for another soon after.
- I believe that speed could be a great factor in any strikes that happen in the back loop. I take my time knowing I often see deer there, and many times I have flashed my lights at oncoming cars that are going too fast along that stretch. I know it won't eliminate strikes but it may help if people followed the posted speed back there.
- Spend much more time on South side of campus, but see deer there almost daily, especially around southeast portion
- I love seeing them on campus..... reminds me to slow down !
- They seem to be cautious of people and vehicles.
- Those deers are assholes. They are usually standing the the way of whenever I'm walking somewhere. I do not want to spook them (especially if they have the fawns with them). Deer can be dangerous, so it can be difficult to continue until they move.
- Whenever I see a deer crossing the road, I slow down, then honk my horn a few times to scare anymore out of the bushes. I'll put on my warning lights so anyone coming up behind me knows that there is something up. I never try to go around the deer. That usually does the trick.
- Generally, I see the deer foraging in the fields around campus. There are times when I encounter deer crossing Lowenthal Rd, but I see them in advance and can avoid them.
- There are way to many, they are way to unpredictable, that makes driving on campus dangerous.
- Walking, I have accidentally stumbled into herds of deer. I was scared; they were scared; it was kind of awkward for everyone involved.
- They are usually near the "better" grass/clover or the wetter areas of campus. More speed bumps throughout campus would also help drivers slow down and could potentially help avoid deer strikes.
- I frequently have deer in my back lawn at my house, and I have hit 2 deer in my life so far (off campus), so I know this is a relevant topic.
- There appears to be a well-used deer path in that area. Usually there are a couple of deer, though I have seen as many as six cross there at one time.
- I often see fawns with older deer near River Road.
- I hope this doesn't mean we are trying to get rid of the deer
- While I do not have a car now, I had a car for 4 years.
- There can be excessive amounts of deer near segment 10 during night time and early morning. Estimated up to 15 at a time
- I rarely drive on campus in the mornings so I would not see deer during those times.
- Just saw a baby deer yesterday!
- Usually see them grazing for food, once I saw a family playing around dangerously close to the road
- There are a lot
- I love seeing the deer on campus. They are a fun addition and I look for them when I drive by the areas they are often found.

- We often see deer in the field by the pond.
- Im mostly on my bike. Ive been at RIT for almost two years, for all seasons. During winter, especially intersession, I've seen deers, sometimes in groups of 2-4 near the NTID area. Twice I saw a group of 4 deers (3 big, and one was young. Much smaller in comparison to others) when there was atleast 1-2 feet of snow, roaming in the area from Road segment 9 and near Ellingson and the Greek lawn.
  In school session Ive seen deer most often while biking the campus loop (If you're going via bus from Perkins to Gleason Circle, seen them most often on the left side of the road). On road segment 55, nearer to the somewhat dense trees+bushes to the Park Point side I've seen groups of deer just roaming around. Again very close quarters when biking on the pedestrian walk.
  IMP - The only major time I was concerned about the location of deers was two weeks ago (June 2015) when I saw a mother and her fawn (very young) crossing the quarter mile (the part between SLC and Res halls) and walking over to the SLC side of the Greek Lawn. Where they stopped and the fawn was suckling milk from her/his Momma! Very nice to watch. But alarmingly close to human contact. They were walking towards the outdoor track area via the backdoor access area for Gordon Field House.
  Im sure students would love to report immediate sightings of deer, if it would help. Thanks!
- That section of 34 from River Rd to the first turn south to go to J lot often has deer present.
- There is a lot of deer that eat on the rugby field in the morning and in the evening. A lot together have counted anywhere 10 to 15
- Most tend to keep to themselves and stand quietly by the side of the road, though they are quite close. Most of the time I see them well in advance. Never had one run out in front of me. Have had a few walk into the road when I'm farther away in the early morning hours. Have never had to make a hard stop or swerve for them.
- While I don't own a car, my roommates do and we frequently see dear at night on the loop between the turf field and dorm side in the more woods like area of campus. While none have jumped in front of our car, they do still seem to present a danger to drivers.
- Yesterday in location 49 I saw a female eating and two young babes running around like they were playing.
- I run almost every night or early morning around the campus loop. I have yet to go on a run and not run past a dear. They are out in groups ranging from 2-7. Sometimes more. I see them mostly on the east, north and south side of campus.
- I have seen several young deer (not babies but not adults either) without mothers recently. Usually they are with their mothers.
- They are lovely addition to our campus.
- On my near miss, the deer saw me coming and still decided to step out in the road, like it acknowledged my presence and said "screw it, guess I'm dying now"
- The map was not clear as to what road segments were where on the campus. Labeling with street names or building numbers would have been incredibly helpful in identifying the road segments. I most commonly see deer in the open area on whichever road segment(s)is(are) between C lot and U lot.
- People that do not live in the area often do not realize that once one deer crosses more are likely to follow.

- They belong on campus.
- They DO roam in herds!!
- Low speed, less death.
- I don't think anyone should be hitting a deer on campus if they are observant and driving the speed limit...and most deer will respond to a horn and get back out of the way. Too many students on campus drive like they are on a highway which makes a collision with them more likely whether you're a deer or not...I've had near misses with students, never a deer. Also, I am more concerned with implications of deer ticks on campus than collisions with deer. I recently heard a radio show that said a combination of mice and deer is what keeps the deer tick population up and dangerous for Lyme disease, and we have plenty of both here on campus.
- If there was hunting allowed by permit on campus (without being too close to buildings) the total deer population would decrease.
- I haven't had as many on campus deer sightings in recent years compared to 14 years ago. Now I see them for the most part grazing in the grassy playing field on the east side of campus. I also have changed my driving route from the south side of campus where I used to park in U lot to the north side on Andrews, so I do not have the opportunity to view deer along the southern section of the roadway anymore.
- Need to control population
- I think we should just give the deer the entire rugby field, it's only fair.
- They tend to stick in large herds of six or more individuals and are most often seen grazing on the grass in the fields around campus
- Generally they are in a group so people be better careful when they spot one.
- Keep seeing them more and more frequently as the years have gone by!
- I am a pedestrian but I can say that the deer here aren't afraid of people. Sometimes I'll be walking to class in the morning and the most the deer would do is just look at me. We can be three feet close but it's not afraid.
- Almost every morning all year long I see deer munching in the fields along 10,11,12,13, and 14.
- I found the question of time of day when sighted was too limited. I could only have one answer. I have seen deer several times of day at the same location.
- The ducks use the side walks and cross ways more often then deer.
- I like that there are deer on campus.
- I left #10 blank because I don't know which seasons I see them the most.
- I bike to campus and use the bike trails. I see deer on these trails all the time. Typically I see them before 8am in the morning.
- I don't remember which times of day or seasons that I've seen deer more or less often. I answered "night" for the time question, but it could have been dawn. I left the "seasons" question blank because I haven't noticed whether the amount varies from one season to the next. If you give this survey again, maybe you could consider revising the answer options for these questions. My ranking of road segments is also highly uncertain.

- its seems that the deer I've seen are aware of their surroundings and appear to look for cars before crossing. PLus they seem to be comfortable with us on foot or in cars.
- I lived in the dorms and at Perkins Green for the last 5 years on campus. I saw deer almost every day, in every season. At Perkins and Park Point, the deer frequently wander within 10ft from the apartments to eat from the trees and explore the grounds (at night from dusk to dawn). Almost every day I've seen deer at road segments 6, 10 and north of 32 in the woods. I frequently go running at night (1-3 times a week, usually between 9-11pm) in all seasons. In every season, during most runs, I will pass deer between segments 5&6. On two occasions (different years, both in the Fall), the fawns stayed close enough to the sidewalk as I ran by that I could have reached out and touched them with my hand.
- I left the season blank because I do not remember the season.
  The deer do not appear to be the least bit afraid of the cars.
- The deer are very tame and don't avoid hunans.
- I was by the University Commons Area on the road between UC and Riverknoll at night and there were about 5 or 6 deer standing in the middle of the road. I took the long way around, through parking lots to get to UC 19 and as I came back the way I came, the deer were migrating toward the outskirts of campus. They waited for me to cross in between them, I had to pass them no matter which way I went, 3 on one side of me, 2 on the other. As soon as I passed, the other two joined the group and headed towards the outer loop.
- The deer on campus are used to people being around them. They do not run from groups of people or from cars
- I'm not sure what options you may be looking into but 'thinning' the herd is not one. I would rather reduce speeds to 5 miles per hour and let the herd thin itself out by nature than have some innocent creatures killed. A car is a material object. A deer is a life - and this is the only life it will have and they were here before RIT. Already the speed and speed bumps make it slow enough such that if there is a strike it should not be fatal or injurious to the driver.
- not as many as there were when i was back at rit in 2007
- Please take care of our deer, they are very used to humans around here and I would hate to see them vanish.
- I see the deer in the fields, not on the road. I haven't had a problem, frankly, they are a nice addition to campus. it's really the geese I'm more concerned with. thank you.
- The deer don't pay attention to the cars or go anywhere near the road. Most of the time they are laying in the grass or eating.
- all the deer I see on campus are very road savvy...I have struck many deer on my way home (off campus), but never had I had an incident with the deer on campus.
- Saw by the quarter mile
- People drive way to fast coming from Province, Park Point and Perkins
- Most of the deer I've seen on campus are off the road, in a grassy field or the edge of the woods.
- I often see them in groups and near trees such as at 12, 11, and 37 area. I drive 56-58 frequently and have never seen one in that area but I see them on 55 fairly often

- I see them morning and dusk all year round segment 51 and also on the soccer fields as you leave campus. There was not a way to check multiple times and seasons on your survey.
- It is important to be aware of surroundings. I have had them run/walk out in front of my car before but I usually see them and slow down.
- I've seen fawns with an adult (female) deer at the first four listings.
- Let people hunt the Deer
- I haven't seen as many deer this past year. The map was difficult for me to make decisions as to which number I should select.
- Actually I have worked here since 1996. That year I found deer in the Ellingson Quad looking in my window multiple times one fall and winter. the population feels like it is less than those years.
- The deer that I see don't attempt to cross the road. The geese however....
- Just let people hunt the damn things.
- They seem to run away if I honk the horn
- Only ever seen doe and a couple of fawns, never a buck.
- I only frequent segments 47, 23, 21, 1, 2, 3, 4, 5, 6, 7, 28, 29, 30, 55. Of those, 5 has the most activity. I typically drive through the area around 6:45-8am and 2-4pm. Most activity that I have observed in that segment is just before true sunrise or when raining.
- I love seeing them around!
- Have increased in sightings from just the Spring to this Summer.
- I mainly see only one deer at a time near most roads that were labeled on the map, except by road labeled 10 by the field used for football/rugby. I tend to see larger groups of deer in this area.
- Very dangerous!!!
- It was difficult to determine seasons as I see deer in these locations several times a year. It does not appear to be seasonal sightings in these locations.
- They seem to stay away from the road when I see them, usually in the grass just grazing. They do not appear to be near the cars or road - more towards the woods.
- I don't think it's fair that I haven't seen a white one yet.
- I'm wondering if signs should be posted around campus to watch for deer and ducks. I've seen ducks as well.
- The deer are here year round and appear in more than the sites that I reported
- I'm always surprised at where I see them. I've seen them in the Sol quad, by the student health center, around grace watson, and a ton behind ellingson. They're very common around Park Point.
- There's too many deer on campus. Across from LBJ-Hall you can see dozens of them at any given time. They graze even in the middle of the day.
  They are very close to the roadways on campus and passing cars don't phase them.
- I typically don't drive around the back side of campus, but it isn't uncommon to see them standing at the edge of the forests near the athletic fields on the North side of campus. Especially the stretch of road running towards the Radisson.

- If I were creating the survey, I would ask which roads segments I travel on, to reduce observational bias in the results, i.e., I cannot see a deer where I am not. In addition, I would add have you seen a deer in this segment at each of the time windows, then which are the most frequent.
  Most of the deer sightings I had were when I came back at night for intramurals, however there were some when leaving at the end of the day and fewer coming in in the morning.
- The deer bring me great joy and I LOVE seeing them around campus. I see them on my drive home from Gannett after a long and grueling day. They make me happy. Whatever you do, don't get rid of the deer.
- They are less afraid of horns! They tend to keep grazing or just look up at you if you beep to get them to move away from the road.
- They mostly come out at night when it is the hardest to see them, plus the lights on the streets are too dim and the car lights do not point to the sides which makes it even harder to spot them. On the winter I have realized they get into campus a lot because since people steps on the snow the green grass shows above the surface and they gather to eat near the small bridge that connects the gym and health care center to the sau
- I don't think we should do something to keep the deer from coming on campus, its nice to see them around, the students should just take more precaution when driving too fast around the loop.
- I see them all times of the year.
- always in a group
- If RIT allowed bow hunting only, for Faculty and staff the deer would no longer look at RIT as a "safe haven". This could be done with a limit on the number of "hunters" allowed on RIT property during NYS's deer season. There could be designated areas where hunters are and are not allowed. This would be similar to what was done at Durand Eastman Park a decade ago.
- I've seen a lot near the Perkins Green laundry, last winter/spring. That region was not given a number on the map.
- They make campus unique
- I love the deer. I see them a lot out in fields but not by the road. Never even heard of someone hitting a deer on campus.
- many deers appear on all seasons after 8pm. Winter time is most frequent for dear. the more quiet or less sound, the more deer will appear around the campus. light pollution affects the deer's behavior.
- They're everywhere. Even on the highways.
- The deer herd seems to be quite large and healthy. I have seen several at a time in and around the locations I mentioned in the survey. Once I thought I saw about 10 of them in one group. When one starts running across the road, they all follow the leader. I have pretty much seen them in every season, but I am not on campus in the summer months. I don't know if they are more dangerous to motorists during mating season or not. I don't know if there is a pattern like that to identify peak times of deer sightings or accidents. Hope this helps.

- love having them on campus but realize they are all losing their natural habitat all around the area--Henrietta/pittsifrd with new developments and housing going into former fields--people need to slow down when driving in and around campus. Often they are in small groups and I see many just grazing in the fields i indicated.
- I really have seen them throughout the entire year all around the outside ring of the campus.
- They are always out in the road and I have personally seen them
  Almost cause accidents
- Most of the time I see deer it is not just one lone deer. They tend to travel in groups of 3 to 5 and wander very close to the roads. In most instances, they don't seem to be afraid of cars or mind the noises as they drive by. Its only when they walk onto the road do they suddenly become alert and dart in random directions when cars come close.
- Not shocking the deer population no hunting allowed in area and RIT is built right next to woods. Id be willingness to hunt.
- I think it is marvelous that we have residential deer on the rit campus. How many colleges can brag about that. The only reason for a deer-car strike on our campus would be for a car to be speeding far beyond the speed limits. The best solution would be to widely educate students, faculty and staff about the deer and their habits. As a hunter (elsewhere) deer move across roads typically in the early morning and dusk as they go from their feeding zones to their bedding zone. THey are also active at night occasionally. Deer do not move much during rain or snow but move just prior to a storm. They typically graze in one spot from mid-day to late afternoon. A very late commute would be the most dangerous time for a deer strike and the worst time is during the rut when females being chased and males on the chase typically lose all of their sensibilities (in late October and November). Lastly, if a deer is spoted NEXT TO THE ROAD, THE MOTORIST SHOULD SLOW WAY DOWN EVEN FURTHER THAN THE SPEED LIMIT. This is because deer are not predictable and haven't been trained by humans yet and likely won't be for a thousand years to avoid cars. I've heard many times..."yes, I saw the deer on the side of the road, but the idiot ran out in front of me at the last moment" or "I didn't know there was one behind it !" The human is the idiot. He or she should slow down when a deer is seen and always assume that the kids are not far behind the mom when crossing the road. Educate the public and there would be fewer deer hits, on regular highways too.
- Whenever I've experienced a deer sighting it's always been more than one
- The fields south of campus along east river road are frequently visited by deer and that seems to be the main source of the deer I've seen.
- Some deers are used to human contact and will not flee upon close proximity. Elder deers may be aggressive towards humans when they are with their young.
- They are most active at dawn and dusk. The bucks will become very active during the rut. Once the deer separate from their groups in the fall they will become more active as the mating season starts. The deer are also used to humans and have little fear of us compared to deer that live in rural areas. RIT needs to reduce the population of deer in order to decrease the number of car collisions.
- I see them most frequently at night so improving the lighting in the area might help reduce incidents with deer. Alternatively you could look into fencing to reduce the issue, but deer

will still attempt to reach the water source so that should be considered in the planning process.

- I like the deer. They're nice. I have never had a problem with them. As long as you aren't speeding there is no reason to hit them "accidentally". I come from an area from a lot of deer so I am used to them though.
- I've seen a decent amount of deer around campus, but never felt too worried about striking one while driving.
- Add more fence around 36 because that is the most common road to be driven on
- I was unable to complete some of the questions as I did not recognize the campus based on the provided map.
- I have observed deer congregating around the eastern side of campus, and this has seemed to be a fairly recent development.
- This year is when I've noticed that they have repopulated very quickly, however, they aren't bothering me. This has probably been their home for generations before RIT was built.
- The first time I saw deer on campus, I usually saw just one or two of them together but recently I have seen three or more at a time.
- At each sighting, multiple deer were observed
- We are smarter than deer, supposedly. We should be able to avoid them. I do not want them removed from campus. We have been crowding them out. It's a shame.
- While driving on RIT campus, hyper-vigilance is a necessity because not only is the deer population growing, but so is the college itself. More people, animals, and overall traffic on roads and sidewalks (bikers, walkers, runners, and more randomness). With the deaf community, sometimes they aren't aware of their surroundings, so not only do you have to watch out for yourself, but you also have to focus on others because unfortunately they're not paying attention to you or themselves.
- The deer appear to be quite malnourished. This is so concerning that I have considered bringing in nuts and corn to, leave in the wooded area for them. It is heartbreaking to see them starving
- I know they can be dangerous but they do for the most part seem to stay in the wooded area. I rarely see them cross streets.
- They're beautiful, this is their environment and we need to be watchful. One of the reasons why I've not hit a deer as of this time. I'm familiar with living in areas with deer and don't allow distraction until I'm well on Jefferson after leaving campus or after leaving Jefferson to drive on campus.
- I get out of work at The Commons around 9pm and there's always a lot of deer in the grass in the field right across from where M Lot meets Andrews Memorial in the winter/ spring. I always know to look for them there and they haven't come into the road at all in my experience.
- I think that the deer are pretty smart on this campus and almost always stop and look before crossing the roads.
- there are too many deer for the habitat. you should have a controlled bow hunt to handle the deer herd.

- The number of sightings in the spring and summer are much less then fall and winter months. During the "rut" they are everywhere and unpredictable. In the winter they are herded up looking for food. I"d see as many as 15 on my way in to work. This time of year no more then 5 or 6.
- the deer seem very tame and not as skittish; I personally think most of the accidents on campus have as much to do with driver's speed as they do with the deer population
- The deer do not seem afraid of people as many of them will come very close to me when on campus
- I only commute to campus in the summer. The rest of the year I live on campus, so I do not drive as much. Summer still seems to be when most of the deer are out... but that could just be because I don't drive as often throughout the year.
- I enjoy seeing them on campus. Clearly they are happy here and feel some sense of safety.
- RIT and henrietta in general has a serious deer overpopulation problem. It needs to be controlled perhaps by allowing controlled bow hunts in the area. It is ridiculous and very dangerous to the many students and commuters at RIT
- I have only rarely seen them crossing the road--mostly along Andrew's Memorial Dr. when you turn left off Wiltsie--the area that curves around toward the Poliseni Center and has grassy/wooded areas on either side.
- I see deer on campus frequently, both in the morning on the way in to work and in the afternoon on the way out; I haven't noticed if the sightings are more likely during any particular season.
- They do not seem to be afraid of cars. Also, there should be signs along the roads - specifically Wiltsie Drive (Segments 1-7) to alert drivers for the potential of deer crossings.
- Please help our deer population
- The deer seem to stay to the wood, but are use to people. This could be a problem in the future.
- I never saw the deer crossing the roads on the campus. it always on the fields or around the woods eating the grass.
- They appear very comfortable with standing by the side of the road and sleeping under the trees.
  I guess what suprised me is my near miss was not near a wooded area. The deer was coming across the road from a parking lot. B Lot.
- I usually work evenings and weekends, so my observations may be different from most responses.
- A lot of the deer are not shy about walking freely around campus and near the roads. Many that I have seen around campus are alone, not with other deer. I used to see many congregate in the back lot where freshmen park (B lot I think?).
- While I have never had a near miss with deer on campus, I have seen multiple other drivers have near misses with deer on campus.
- Deeds seem to like the grassy knolls around campus. I see them at all times during the day so answering mid afternoon which is the likeliest time I'm on campus lately is the best answer I can give
- There are a lot around and can be unsettling while driving at night

- i think put more road lightings will help to reduce deer collisions.
- I see frequently a baby deer in this season in the middle of Andrews Dr between 5:30-6:30 pm, and apparently he has not fear of being hit.
- The deer do not seem to care about traffic- both cars and people, as they graze beside the road or in the rugby field. They will get spooked and run occasionally, but usually the meander around and look both ways before crossing roads.
- I notice them the most on the east side in the fields on my way in or out and have never had a close call or have heard of anyone striking a deer. I talk to a lot of the people in my department and it has never come up as a problem. I can only hope that we are not planning on eliminating the deer or forcing them of campus where some hunter can kill them. I have more trouble with the bikers on campus cutting across the road and not paying attention to any of the road signs. I am surprised that more kids aren't hit. The deer for me over the years have had a calming effect on my mood when I arrive and when I leave. Thank you.
- The deer graze on the grass fields, especially when food becomes scare in the winter months. They tend to herd near the rugby field and the athletic fields on the northern part of campus. I also notice them eating on the pine trees in the winter months which are near buildings. They have to cross roads to get to the trees.
- have noticed an overall decrease in numbers. not concerned of accident due to campus speed limits. really enjoy seeing the wildlife around campus.
- I like the deer. I think that near misses are part of the deal of living with nature and driving safely.
- I have not seen any increase or decrease in deer over my 13 years at RIT.
  Playing soccer on the turf field we saw a young deer just last week.
- There were multiple deer at each of the sightings I have had - groups of 3 to 6.
- they are rarely seen alone
- When I see deer on campus, they are usually located close to the tree/creek areas and are on the short grass fields. They mainly congregate on the rugby fields.
- Deer are normally near the woods or on the field. I would highly recommend to add deer crossing signs so that commuters can keep their eyes on the deer and road.
- I think it's nice that we have so many deer on campus. I've never seen one that's been hit.
- seeing more deer on the premises than I have seen in years
- Deer on campus seem to be domesticated to the point that they know to avoid populated areas and roadways. People enjoy seeing them around and it's a treat especially for those from more urban areas.
- RIT is clearly a safe zone for deer, being this close to Rochester there are unlikely to be many hunters in the area. A contributing factor to the increase in population is most likely the rising deer populations in the neighboring counties, ironically it seems that the deer are moving closer towards the city, rather than the other way around.
- The deer use the campus as a sanctuary due to the low pressure they receive from natural predators like coyotes, and the no pressure from human hunting pressure. There is great cover for them in the campus' small sections of woods and then plenty of greens to eat from all of the sports fields.
- Need to post deer crossing warning signs near the most prominent areas they tend to cross.

- They are nice. People need to be more vigilant when driving.
- I've seem them often outside of campus, on Clay road. They're also very often in herds. I don't think I've ever seen only ONE deer.
- They usually move pretty slowly on campus, so unless you're blind, I don't think hitting them is ever an issue.
- My data might be a tad biased since I usually only commute during early orming or late at night.
- When driving around segments 4 - 6 if you slow down they will look and kind of walk away. Within the last two weeks driving into work early 615ish am down road segment 33-31 a woman jogged right by a doe and the doe continued to eat and did not move, flinch, anything.
- While the majority of my deer sightings occur in segments 10,11,12 and 36 I have never had a close call with deer in those areas and they seem more calm in those areas versus the deer in sections 3 through 7.
- The deer herd should be culled through an organized hunt on campus. The deer herd would be healthier and benefit from an annual hunt/cull.
- The deer do seem to be closer to the road then I have ever seen before. There was a deer I saw once facing me at an intersection on campus and as I got closer to the intersection it did not run away as I expected it to, it just looked up for a second and continued grazing.
- I mainly see deer in the distance (not near roadway). If the deer do come near the roadway, they do not run into the street, but slowly amble through so I have not been in danger of hitting one. But I do know that accidents have happened to others; just not to me (yet).
- Deer are awesome!
- I always enjoy watching them. Too bad we are invading their space.
- thanks for asking about this. 20 years ago when I started here at RIT, I never saw a deer on campus. Now they wander about in herds!!
- I don't see a lot of deer migration on campus across roadways and I rarely see them near the roads.
- I observe deer only during times of coming to and leaving from campus on roads I normally use for these purposes.
  You might consider how much damage deer cause to campus property, (flowers, etc.) and to small and emerging forest seedling trees.
- It's a pleasure to see them on campus. I don't like seeing them killed out on Jefferson Road though near campus - I've seen that a few times.
- When I see deer on campus, they are usually in larger groups (at least 5 of them together). Rarely do I see 2 or fewer.
- I have seen deer in the indicated areas throughout the year, regardless of the time of day. I also have seen a large group of deer use the crosswalk that is located near location 20 on the campus map. In this instance, I drove over the crosswalk, saw the group of deer and stopped to avoid hitting one potentially, and witnessed them walk up to the crosswalk, wait a few seconds, and then all go over it at once.
- The map was hard to read. Not sure I picked the correct location. Needed to have a compass to know the proper direction.

- It seems like deer are here year round equally visible in all seasons. A safe driving speed and proper attention is all that is needed to avoid collisions or near misses.
- I think that near the time of Graduation, (Late May and Early June), the deer are giving birth, and there is much more activity of fawns, dashing out on the roadways, and Doe's getting struck, and then the Fawns, wander around the area where the Mom dies, until they are also struck and killed. Loenthal Road and The Loop Road area.
- Yes,please. I have mentioned this before. Leaving campus by Minnett Drive, on the right of that road there is a lot of marsh growth that gets to be over 6 feet high. Just beyond that, there is a deer path that takes deer from behind the growth, just across Minnett Drive and I think this is a hazard. A solution might be to add some fencing from the end of the growth, just about 10 feet of fencing form there out toward the road. If the deer went around the fence, and I realize that's wishful thinking, then the drivers could see them coming whereas they can't when they dart out from behind the marsh growth.
- Please do not do anything to remove them from the campus. I love having them around. It is one of the reasons why I love working at RIT -- surrounded by nature including our deer. They are lovely to have around.
- I enjoy the sight of deers grazing in the field, but I understand how devastating deer and car collision can be.
- The correct thing to do, is to be paying attention while driving, and slow down when you see deer on either side of the road. Students should know that.
- If you're trying to get a deer population census, the survey is flawed because it will reflect deer sightings on heavily traveled routes near more-or-less open grasslands where deer are visible, at peak commuting hours. Many people will report seeing the same deer.
  For much of the year, commuting hours correspond to dawn and dusk, when deer are most active, which will also skew the survey.
  Low speed limits on the RIT campus and relatively good mowing practices by FMS make collisions unlikely in my opinion. More likely, you'll get collisions on E. River and Jefferson roads where speeds are higher and drivers' sight lines aren't as good.
  Based on my experiences on campus, first helping my wife feed/manage a feral cat colony, and then in the community garden - coming in on weekday evenings and weekend mornings/afternoons in addition to regular commuter hours, and also occasionally biking in along the Red Creek trail, I can tell you that the deer on campus lodge/hide in the woodlands and swamps around the campus edge during the day and then travel inwards towards the ponds and less-well mown areas at the edge of the campus at dawn and dusk. Very typical deer behavior.
  In winter, they will get quite bold. I have seen them migrate inwards the Bausch & Lomb building along the line of pine trees next to the E lot. Last winter, when they were obviously starving, some started feeding in broad daylight in the middle of the sunken oval in the middle of Lomb drive. I have also seen droppings and tracks as far into the center of campus as the gardens around the Gannet building.
  I'm guessing that there are multiple small herds on campus - one to the NW, one to the south, although I haven't seen that many fawns this summer. Either they're still hidden, or unfavorable weather and/or coyotes have thinned their ranks. Go coyotes!
- The segments I identified correlate with the path I drive each morning and afternoon. I see the deer in early AM and sometimes in the afternoon.

- I feel that off late I have found a lot of deer drifting towards the campus from the thick forests, Particulary behind the Max Lowenthal Hall (Saunders College of Business) I always find a couple or two deer on the move at around 8-9 pm during the summers.
- I love them and once I tweeted about them being my friends
- Deer do not like mature forests without undergrowth. They prefer edge habitats, and this is where most sighting occur on campus.
- there are soooo many deer and I had never heard of anyone hitting them until this survey
- My times of seeing deer is limited to the times that I am driving on campus; either arriving to work or leaving work. The frequency of sightings is influenced by the times that I am out and aware of seeing deer not necessarily when they are out.
- I see most deer on Wiltis Drive near bone yard and Parking lot B. If a motorist observes one deer crossing in front of then,assume that there will be more to follow.
- i always see them when out running at night around 9-10PM near the boneyard