

Applied Research Project



Deer Mortality on Roadways

Natural Resources Environmental Technology

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Abstract:

Deer mortality information is somewhat of a mystery in Nova Scotia, there is very little information written and produced on the subject. Our applied research is based on getting more information out there, so the public can be properly informed about how unsafe some roads are in Lunenburg County when it comes to Deer vs Car accidents. We first got in contact with Wanda Baxter (Watch for Wildlife) back in January and she has produced multiple sources but we were still faced with an issue of where these locations were. Together Andrew and I contacted Emma Vost, the large animal specialist with the Department of Natural Resources Kentville and she was able to send us the Accident Report Spreadsheet of all the Whitetail Deer collisions since 2007. We created a heat map and went out to the five worst locations, and filled in a list of questions we generated and produced three pictures from every sight. Once everything was acquired we came up with a list of recommendations and the prices that accompanied them.

Introduction:

Since 2007, there has been over 1000 White tail deer vs car accidents in just Lunenburg County alone. Between the both of us, we are looking to find the 5 worst places in Lunenburg County that result in accidents that involve White Tail Deer. Our job was to generate a list of 5 locations (See figure 1) in Lunenburg County from an excel document with the accident reports inside that were the worst and write an assessment on each one. Afterwards we would come up with a list of affordable and practical recommendations based on the location for each sight. We hope that our information and research will lead to changes within these areas and the county through better signage, fences, and other precautionary items.

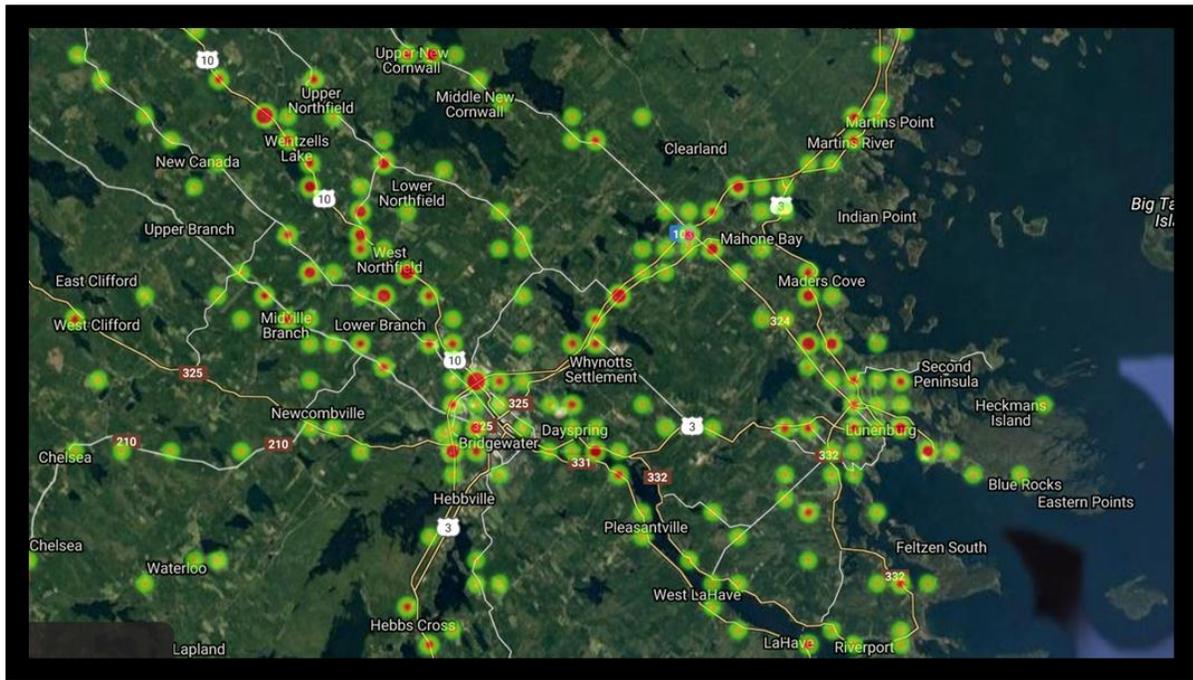


Figure.1 Heat Map of Lunenburg County Whitetail Deer Accidents

Background:

We needed to know why we need to prevent this from happening before we could start anything. State Farm estimates that 1.09 million deer-vehicle collisions occurred between July 1, 2010 and June 30, 2011 throughout North America. The average property damage of these incidents was \$3,171 (James, N. (2012, April 30)). We needed to then figure out what the best methods were for avoiding accidents and came up with a list that included: Eight ft high fencing, underpass/overpass, Signage (deer and speed), and signage with lights (Wildlife Collision Prevention Program). (See Appendix A) Through more research we found that cars slowed down when they saw the signs—speeds declined by 50 percent. And, deer mortality rates fell between 41.5 and 58.6 percent (James, N. (2012, April 30)).

In early March, Emma Vost from DNR Kentville sent us an excel spreadsheet (See Appendix B) packed full of useful information such as coordinates, dates, whether the deer was injured or dead, and a few other tips on how to approach this project. From the information Emma provided we were able to generate a map so we could visualize the worst areas in the county of Lunenburg.

Methodology:

When we first received the data on the excel spreadsheet we had to filter and sort, until we narrowed it down, to only data that we found useful for the project. The coordinates were all in the wrong order so we had to convert them to Latitude and Longitude. To figure out the worst five places in Lunenburg County we used a heat map, the heat map highlighted the areas in the County that had the most points in colours.

With the 5 locations mapped (See Appendix C), we created a field sheet. We went to each location and answered the following questions:

- What makes up the surrounding area? (Buildings, Clear cuts, etc.)
- Speed limit/If the cars are driving faster than the speed (5 minutes of watching)
- Fragmentation noted
- If there are ornamental fruit trees or food sources.
- Field recommendation (can be changed)
- Photos

Findings:

After using the heat map (Refer to Figure 1), we discovered the five worst places in Lunenburg County were:

- Highway 11 Underpass
- Maitland on the 325 – Close to Gryphon Hill Farms
- Highway 10 – Close to the Turkey Burger
- Highway 10 – Adjacent to Mckeen Road
- David Wile Road – Close to Armour Transportation Systems

Sight #1

- What is unique about the exit 11 underpass is that the recently tried to fix the problem which we inferred that it was the worst because the others still have not been fixed.
- They had put up 7-8 feet tall deer fencing along the highway stretch there.
- This area had cars going at speeds of 100-110km/hour.
- The trees are closer at this location than any other part of the highway, so deer may cross because there is less fragmentation at this location. (See Figure 2)
- No immediate food source.



Figure. 2 Shows the area at sight 1 that is less fragmented. (Google maps, 2017)

Sight #2

- At sight two there were young growth for about 100 meters. (See Figure 3.1)
- The speed limit was 80 but cars were driving by at faster speeds.
- It's a crossroad section where a fair amount of traffic comes through.
- Clear cuts in other areas leading up to this location, making this location less fragmented.
- The surrounding area is: couple of houses, church, and Sam's quickmart. (See Figure 3.2)
- No food source



Figure 3.1 The area where there is under growth for 100 meters.
Figure 3.2 Just one building from the surrounding area.

Sight #3

- There are two houses across from each other both with fairly sized yards.
- The speed limit is 80 but the cars were driving noticeably fast.
- Few clearings leading up to the spot that may cause fragmentation. (See Figure 4.1)
- We did find a potential food source in one of the yards, there seemed to have been some type of ornamental cherry tree that the deer could have been feeding on. (See Figure 4.2)
- The area is located on a long straight stretch where cars would tend to drive faster.



Figure 4.1 Shows the very openly fragmented landscape behind the burgundy house.
Figure 4.2 Shows the food source to the right of the white house.

Sight #4

- Surrounding area includes: houses, church, and cemetery. (See Figure 5.1)
- The area is all open fields, no immediate corridors. Roughly 500 meter of open fields to cross or more. (See Figure 5.2)
- 80 zone but the cars were going noticeably faster.
- This area is all open for about 1 km before and after this area.
- No immediate food source located.
- This area is so far from the woods that it acts as a deterrent because there is so much open land to cross.



Figure 5.1 Shows the cemetery on the other side of the road and all the open space behind it. Figure 5.2 Shows the 500 meters of open fields that the deer have to cross to get to the other side.

Sight #5

- Located right next to highway 103 at the armour transportation systems location.
- No posted speed but there was a decent amount of traffic but not at fast speeds.
- The area is mostly open and is right next to the highway on and off ramps.
- No immediate food source located.
- Near highway located approximately 1.5 km from Sight 1.
- Very fragmented, there is some green space between the ramp and the sight. (See Figure 6.1)



Figure 6.1 Shows the very small green space between the road and the ramp.
Figure 6.2 Shows the empty truck parking area that fragments the area even more.

Analyse and Recommendations:

Each sight had its own unique issue or circumstance that made it a concern. We have recommendations for each area which we made based on what is affordable for the area that the site is located on. The heat map uses the same ways of clustering data as cluster analysis would use, which means that our findings were right in the first area, because it was the only area on the list of five that was fixed which we inferred meant that this area was the worst.

The findings of sights 1-5 all show that these are prime areas where whitetail deer would be susceptible to mortality and collision. Each sight only had 1 or 2 major issues with it, which made these areas easier to fix than a sight where there were multiple issues that would need to be addressed.

The following are the recommendations for each sight:

- Sight 1: The fencing at the overpass is suspected to reduce the accidents within the area that was of most concern. Flashing signage has been used and could reduce the number of accidents as well. 0.00 (See Appendix C)
- Sight 2: Reduced Speed limits and more signage because there is none. Other options are not viable for this area because of prices. Deer crossing signage with a light that flashes when there have been more intense accidents. \$750.00
- Sight 3: Potentially the removal of the food source, along with reduced signage because of the speeds along the stretch. Potentially a deer sign with a light that's on when accidents have been more frequent in a timeframe. \$850.00
- Sight 4: This area should have reduced speed limits and the planting of corridors which would allow the white tail more time to make their way to the road rather than straight through open land where they would be more apt to run. \$250.00
- Sight 5: There area would need 7-8 ft fencing all along the highway ramp and about roughly go for about .2 of a km and on the other side of the highway as well. Speed signage and deer crossing signage is needed. \$2750.00 without fencing installation fee.

Conclusion:

The report was a study of the deer mortality rates in Lunenburg County. By studying each area and filling out the requirements, we came to conclusions on what the proper recommendations were for each area and how viable they are. Many of the recommendations were small investments that could make the difference within the area. We also have concluded that none of the areas could afford a massive costly construction underpass or overpass to help fix the issue. We believe the study was a success in our opinion, but we will continue to encourage more research to be done on this topic across Canada, as there isn't much information on the topic.

Works Cited:

Research

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Appendix A

Vegetation Management

The time of brush cutting in road rights of way can affect vegetation palatability for moose (mid-season cutting increases palatability). The composition of revegetation seed mixes can be altered to be less attractive to ungulates.

Exclusion Fencing

If erected and maintained properly, 2.4 m fencing can virtually eliminate collisions (97-99%) when both sides of the road are fenced. However, there are strong biological and ecological factors that contraindicate fencing as a blanket solution for all problem areas. Fencing impacts normal animal travel patterns, fragments habitats, and separates herds. The cost to fence both sides of a highway is between \$40,000 and \$80,000 per kilometre. Maintenance costs can also be significant.

Wildlife Warning Signs

Traditional wildlife warning signs, although frequently used and inexpensive, tend to be ignored by drivers. Studies conducted by Swedish researchers show that 60% of drivers do not even notice traditional wildlife warning signs.

Intelligent Warning Systems

Animal Detection Systems

Animal detection systems can detect large animals (e.g., deer, elk, moose, or pronghorn antelope) as they approach the road. When an animal is detected, signs are activated which warn drivers that large animals may be present on or near the road. One part of the system detects the animals as they approach the road, and the other part warns the drivers after detection has occurred.

There are two main types of animal detection systems.

Area-cover systems - These systems detect an animal within a certain area and range of a sensor, through passive infrared technology or alterations in an electromagnetic field. With infra-red technology, the area is typically cone-shaped — narrow close to the sensor and wider as the distance from the sensor increases. Infra-red systems detect animals based on body heat and motion. The electromagnetic system detects animals based on alterations in the electromagnetic field caused by the animal's entry into the field.

Break-the-beam systems - These systems detect an animal when the animal's body blocks or reduces an active infrared, laser or radar signal that is transmitted by one sensor and received by another sensor.

The reliability of animal detection systems is influenced by a range of environmental conditions, such as high winds, temperatures or humidity, and operation during day and night periods.

The durability and practicability of a system is shown by a consistent performance over time, minimal monitoring and maintenance requirements, size of the equipment (landscape aesthetics), and the road length that the sensors are able to cover.

Animal detection system systems may be vulnerable to "false negatives", which occur if an animal approaches but the system fails to detect it, and "false positives", which occur if the system reports the presence of an animal, but no animal is present.

Several animal detection systems have been evaluated for reliability. The results are written up in the 2009 report *The Comparison of Animal Detection Systems in a Test-Bed: A Quantitative*

Comparison of System Reliability and Experiences with Operation and Maintenance Final Report.

Roadside animal warning systems

These systems detect vehicles and then attempt to alert the animals through a range of audio and visual signals from stations placed in the right-of-way.

Vehicle-based driver warning systems

These systems inform drivers of the possible presence of animals in the roadside area using devices present in the vehicles equipped with such a detection system.

Reflectors

Reflectors are prisms mounted on posts along the sides of the road. As vehicle head lights strike the reflectors, beams of light are reflected at 90 degree angles to the road. This reflected light catches the animal's eye and distracts the animal from crossing the road. Installations can cost \$10,000 per kilometre. Continuing maintenance to ensure proper cleaning and alignment can cost \$500 to \$1000 per kilometre. The efficacy of reflector installations is not fully established, and there are conflicting research results. Questions requiring further study include:

- Do animals become habituated to the light?
- Do animals simply walk to the end of the installation and then cross?
- Is red the most effective colour, or would green, amber or white be better?
- What is the most effective shape? Predator eye shaped reflectors have been suggested.

BC agencies such as MoT and ICBC are not recommending the use of wildlife reflectors at this time.

A study carried out on the Berry College Campus in northwestern Georgia, USA, concluded that wildlife warning reflectors were ineffective in changing deer behavior so that deer vehicle collisions might be prevented. Evaluation of Wildlife Warning Reflectors for Altering White-Tailed Deer Behavior Along Roadways

Overpasses and Underpasses

This is one of the most effective methods to facilitate wildlife movement across roads, and can dramatically reduce the wildlife vehicle collision rate. Long term monitoring after implementation is required so that long-lived species have time to adapt to the structure.

Monitoring must document that all age classes (adults, sub-adults, juveniles, females with young) are freely using the structure before it can be said that the structure "works".

Different species have different requirements for crossing structures in terms of height, length, light and openness.

Crossing structures are expensive to build and require detailed engineering. Parks Canada has been very proactive in using these structures, especially through Banff National Park. Two 50 metre wide overpasses, and 22 underpasses have been built in Banff National Park.

As part of the ongoing research and monitoring of the crossing structures on the Trans-Canada Highway in Banff National Park, remote cameras and other techniques have recorded over 200,000 crossings involving 11 species of large animals.

The Highway Mitigation in Banff video highlights the lead researcher, Dr. Tony Clevenger, discussing the Banff Wildlife Crossings project and contains motion activated camera footage of animals using the crossing structures.

Lighting

Overhead lighting of extended sections of highway may not be practical, but it can be very helpful within city limits, where significant numbers of wildlife-vehicle collisions occur. A study in Alaska showed a reduction of collisions by 70% when lighting was improved.

Scents

The application of scents along the roadside can be used to deter animal crossings. Two types of scents exist; odours associated with predators (wolf urine) and odours associated with bad smells (rotten eggs). This method has had limited success in the United States, but there is not much scientific research completed as yet. It is thought that animals can become habituated to the scents, and it is expensive.

Highway Design

Appropriate highway design can be very effective when habitat, hydrology, ecological connectivity and population data are incorporated into the planning. Factors that be modified include road width; number of lanes; right of way, shoulder, and ditch width and depth; plus the addition of structural mitigation methods such as lighting, road surface, fencing, tunnels, and over/under passes.

Road Salt Use

Judicious and careful application of road salt only when necessary can help to control the number of animals attracted to the road to lick the salt residue. De-icing agents other than common road salt, such as calcium chloride, magnesium chloride, potassium chloride or potassium acetate can be used, but are logistically complex to implement over long stretches of highway.

Appendix B

Excel Document of Accidents in Lunenburg County

15 pages included in the hard copy

Appendix C

