

A person wearing a bright yellow helmet and a high-visibility vest is crouching on a paved road. They are looking down at a tablet computer. In the foreground, a small white tag with handwritten text is placed on the asphalt. The background shows a road with a yellow line and a forest of bare trees.

Georgian Bay Biosphere's Final Report 2021

Submission to Ganawenim Meskiki

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ID: Red bellied Snake #1

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Table of Contents

<i>EXECUTIVE SUMMARY</i>	<i>i</i>
<i>INTRODUCTION</i>	<i>1</i>
2021 Activities	<i>2</i>
Report on Activities	3
Greater Killbear Area Results	3
Road Monitoring	3
Greater Killbear Area Mitigation Recommendations.....	6
Killbear Engineering Study	9
Twelve Mile Bay Road Results.....	9
Road Monitoring	10
Twelve Mile Bay Road Recommendations:.....	13

EXECUTIVE SUMMARY

Through the Maamwi Anjiakiziwin initiative, and with support from Ganawenim Meshkiki, the Georgian Bay Mnidoo Gamii Biosphere has been able to continue the building of diverse partnerships for collaborative Species at Risk protection into 2021. This year, we extended the reach of our partnerships and continue to work towards a two-eyed seeing approach for knowledge generation and co-managing priority ecosystems. Our GMI work plan focus for 2021 covered two main goals:

- 1) Identifying and addressing road mortality threats at priority locations to implement mitigation measures in Killbear Provincial Park and the Greater Region (Conservation Drive, Highway 559 between Snug Harbour Road and Killbear, and Pengally Bay Road); and
- 2) Identifying priority locations to implement road mortality mitigation measures in Moose Deer Point and the Greater Region (Twelve Mile Bay Road), and to recommend actions to increase the connectivity of habitat and reduce road mortality along the roadway.

With regards to the first goal in the Killbear region, a total of 43 road surveys were conducted by Biosphere staff on Conservation Drive. We collected a total of 241 observations of live and dead reptiles on this road. Of these observations, 92% (221 individuals) were dead on the road (DOR), mostly consisting of snakes.

With regards to the second goal in the Moose Deer Point region, a total of 35 road surveys were conducted by Biosphere staff on Twelve Mile Bay Road. We collected a total of 287 observations of live and dead reptiles on this road. Of these observations, 94% (270 individuals) were dead on the road (DOR), mostly consisting of snakes. These findings indicate that road mortality is a serious issue on both roads for all reptile species, particularly snakes.

At both locations, mapping of observations identified mortality 'hotspots' where attention should be given to reduce mortality of reptiles on these roadways. Specific recommendations are given for both sites and GBB will continue to explore implementing mitigation options with partners in 2022 and beyond.

INTRODUCTION

The Georgian Bay Biosphere (GBB) is proud of the diverse partnerships and relationships that have been built so far through the Maamwi Anjiakiziwin initiative, which has allowed us to initiate collaborative biodiversity protection, habitat connectivity, and greater resilience for species at risk (SAR) throughout eastern Georgian Bay. In 2021, we have extended the reach of these partnerships and continue to work towards a two-eyed seeing approach for knowledge generation and co-managing priority ecosystems.

With support from Ganawenim Meshkiki (GMI), our Mawaanji'lwe for Species at Risk project has helped to mitigate threats to at-risk reptiles and meet the following GMI objectives through our collaborative partnership-based approach including:

- Addressing physical threats on the landscape including road mortality of reptiles on roads, habitat fragmentation by roads, and the removal of invasive species;
- Identify priority locations along road/road segments that require mortality mitigation and implement the corresponding actions by working with stakeholders and partners to reduce this threat including reptile fencing, eco-passages, and other best management practice options; and
- Restoring connections between high quality habitat parcels through the removal of invasive species and through exploring the potential for eco-passage installation with local Townships and MTO.

This project has also:

- Been carried out on the traditional lands of the Anishinaabek peoples under the Robinson Huron Treaty and specifically Shawanaga First Nation, Wasauksing First Nation, and Moose Deer Point First Nation. These local communities are partners in this work and were welcomed to participate in their preferred capacity on this project;
- Built capacity for local Indigenous communities, municipalities and individuals to coordinate, participate, and facilitate SAR recovery initiatives that use TEK protocols, SAR monitoring, and community outreach; and
- Incorporated Indigenous knowledge associated with the target species and in survey protocols. We will continue to train new staff in reconciliation and incorporate semma offerings into our survey protocols.

This project has focused on two regions within the Biosphere Region including the Greater Killbear Park Area in the Township of Carling and Moose Deer Point Greater Region, comprised of Moose Deer Point First Nation and in the Township of Georgian Bay in the District of Muskoka. Through previous studies and habitat analyses, these two regions were identified as being areas with high habitat quality for the eastern Massasauga Rattlesnake, while simultaneously presenting as high threat areas due to road mortality and habitat fragmentation.

2021 Activities

Our GMI work plan focus for 2021 covered two main goals:

1. Identify and address threats at priority locations to implement road mortality mitigation measures in Killbear Provincial Park and the Greater Region including to:
 - Assess and compile SAR observations and habitat data in the Greater Region of Killbear Park to determine which road/road segments require mortality mitigation and ways local Township and MTO can implement these actions in future roadwork planning (including fencing and aquatic/terrestrial ecopassages);
 - Use information generated from the assessment to improve the design, implementation, and compliance with current best management practices for local road management which will be implemented by the local Township, MTO, and Park staff. These actions will directly reduce road related threats to local populations and improve habitat connectivity.
 - Create a Killbear Region SAR Working Group of all project stakeholders for active communication to discuss goals, understand stakeholder perspectives, provide understanding and education, and further update BMPs.
 - Work with Killbear Provincial Park, Carling Township, and MTO towards installing exclusion fencing and eco-passages on a) Conservation Drive, b) Highway 559, and c) within Killbear Provincial Park.

2. Identifying priority locations to implement road mortality mitigation measures in Moose Deer Point and the Greater Region, and to recommend best management practices to increase the connectivity of habitat and reduce road mortality along the roadway.

Please note that a third activity relating to habitat restoration of inland wetlands through invasive species management was included in our GMI proposal and contract. However, since the approved funding was less than requested, this activity was removed from our work plan following discussions with GMI.

Report on Activities

Greater Killbear Area Results

Killbear Provincial Park is the site of a high-profile population of Massasauga Rattlesnakes that have been the subject of research, conservation and education measures since 1992. Based on data collected from 1992 – 2006, Killbear developed an Eastern Massasauga Road Crossing Action Plan to address the issue of road mortality in the park. This report called for exclusion fencing and ecopassages in a number of areas of the park. Between 2007 and 2012, Killbear installed 4 ecopassages and approximately 3 km of snake fences on 3 different roads in the park. In 2014/2015, a research project lead by Mike Colley, a M.Sc. student from Laurentian University, highlighted the success of these mitigation efforts and identified areas where further mitigation was needed within the Park and within the Greater Region.

Unfortunately, Rattlesnake deaths on park roads and Township of Carling roads that bisect and bound the park (e.g. Pengally Bay Road, Blind Bay Road, and Conservation Drive) continue to have a serious impact on local Massasauga Rattlesnake populations.

This project provides the opportunity to conduct further monitoring and identify key areas, or 'hotspots', where road mitigation could be implemented within this Greater Killbear Area.

Road Monitoring

Please see the full report on the Greater Killbear Area in Appendix 1, which includes full methods, results, and recommendations.

Surveys were conducted along a 9.13 km stretch of road, in the Township of Carling (Figure 1). Surveys began at the intersection of Snug Harbour Road and Highway 559, and included Pengally Bay Road and Conservation Drive, ending back at the start point.

This route was chosen to better monitor the previously identified (2020) road mortality hotspot between Snug Harbour Road and the entrance to Killbear Provincial Park. It was also chosen due to the planned construction along Highway 559 in the hotspot area during 2021 and 2022, and the planned culvert replacement work along Conservation Drive in 2022.

During the 2021 field season a total of 43 road surveys were conducted by Biosphere staff. Additional data were collected on road mortality through volunteers and citizen scientists.

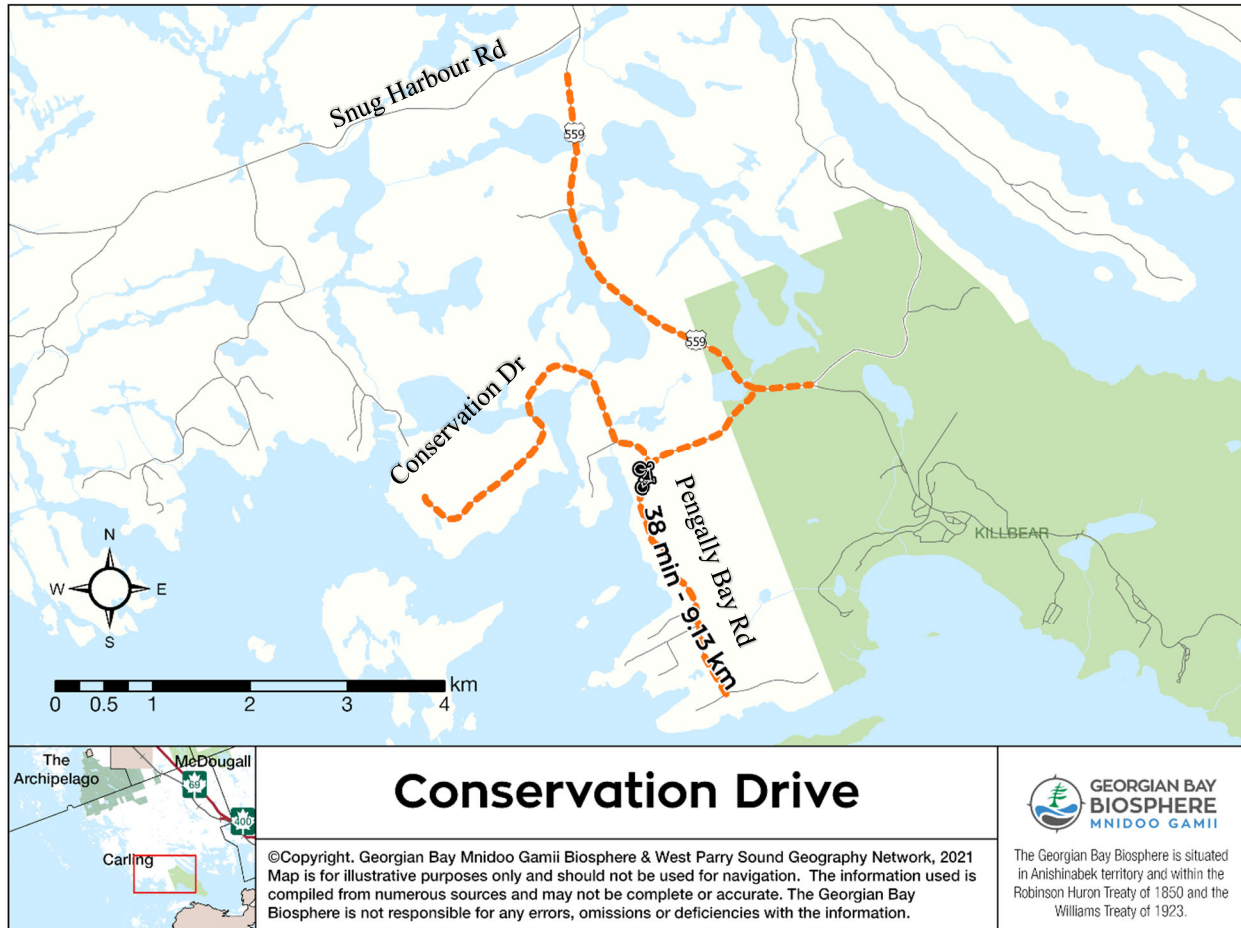


Figure 1. Map of survey area along Highway 559, Pengally Bay Road, and Conservation Drive during the 2021 field season. *Greater Killbear Area Map Series, 2022*

A total of 241 observations of live and dead reptiles on the road were collected during road mortality surveys on bike. Of these observations, 91.7% (221 individuals) were found dead on the road (DOR), mostly consisting of snakes (Figure 2).

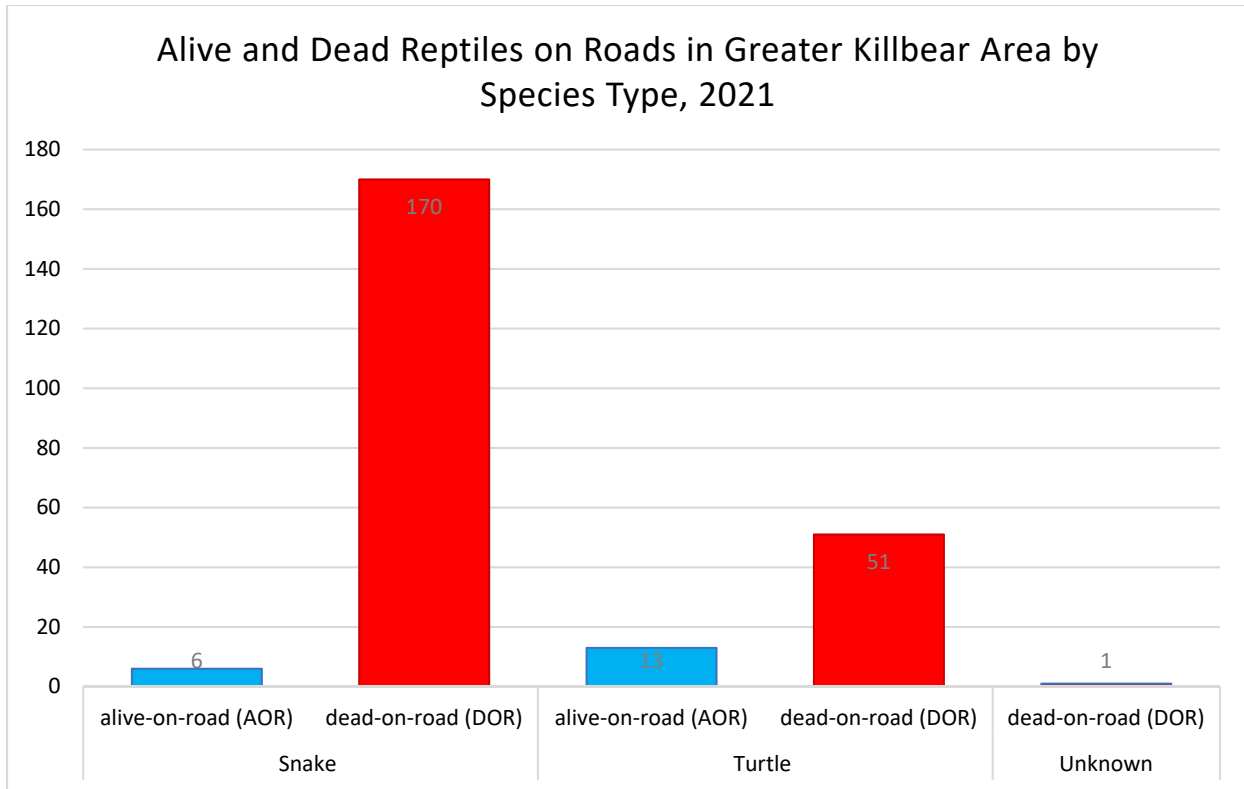


Figure 2. Total alive and dead reptiles on Highway 559, Conservation Drive, and Pengally Bay Road (Greater Killbear Area) by species family type.

Data compiled from GBB survey data and citizen science showed that observations of reptiles on the road were most concentrated on Highway 559 from Snug Harbour Road south to Killbear Provincial Park, with almost the entire stretch of road presenting as a hotspot (Figure 3). This data corroborates with data collected from 2020 to show two main hotspot areas along this section of road. The highest priority hotspot (Hotspot #1) occurs approximately 0.9 km south of Snug Harbour Road, and a second, but lower priority hotspot (Hotspot #2) occurs approximately 2.3 km south of Snug Harbour Road, near Killbear Park Mall.

Additionally, a stretch of road near a large wetland area on Conservation Drive was also found to have a high concentration of reptiles on the road (Figure 3).

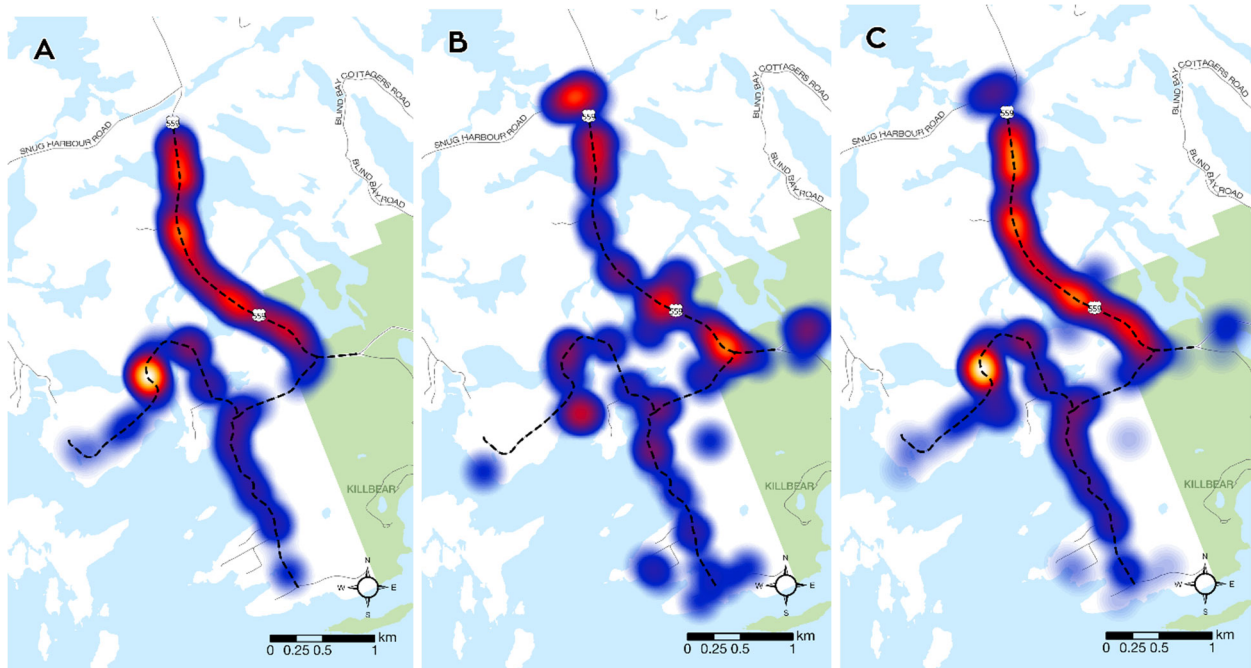


Figure 3. Relative abundance hotspot map of reptiles on road using data from a) Biosphere biologists during road mortality surveys on bikes, b) citizen science data c) both datasets combined in the Greater Killbear area in 2021 [scale 1:50,000]. Greater Killbear Area Map Series, 2022.

Greater Killbear Area Mitigation Recommendations

Hotspot mapping, habitat mapping, and species mapping allowed us to determine where recommendations for road mortality mitigation should be prioritized.

Highway 559

Observations of live and dead reptiles from surveys indicate that there are two main hotspots that could benefit from active mitigation efforts (Figure 4):

1. The highest priority hotspot (Hotspot #1) occurs approximately 0.9 km south of Snug Harbour Road; and
2. The second, but lower priority hotspot (Hotspot #2) occurs approximately 2.3 km south of Snug Harbour Road, near Killbear Park Mall.

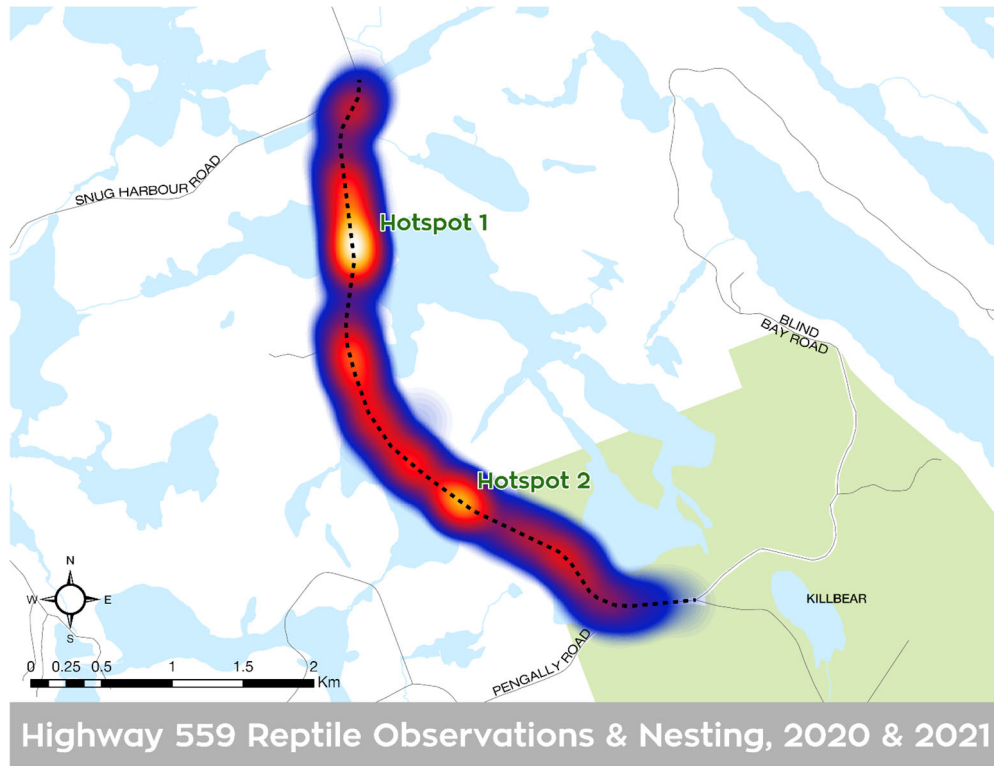


Figure 4. Relative abundance hotspot map of all nesting observations, and alive and dead-on road reptile observations on Highway 559 in 2020-2021, showing two distinct hotspots [scale 1:25,000]. Highway 559 Map Series, 2022.

Relationship building and conversations with the Township of Carling and Ministry of Transportation are on-going. A presentation was also given to individuals from the Ministry of Transportation and LEA Consulting who are working on the construction upgrades to Highway 559 in the Township of Carling (scheduled for 2023). This presentation included findings from two years of road surveys, updates to habitat mapping done in the area, our recommendations, as well as opportunities for partnership. Due to Covid-19, some of this work has been postponed on their end and construction plans have been delayed by about a year. This will allow time for partnership discussions during 2022, with potential implementation in 2023.

Conservation Drive:

Observations of live and dead reptiles indicate one main hotspot along Conservation Drive where active mitigation is needed, along with other minor areas that could benefit from passive mitigation techniques such as signage. The highest priority hotspot occurs approximately mid-way along the road (1.16 km from road entrance) at the large inlet and wetland area. Recommendations for fencing that will be suitable to prevent climbing by Foxsnakes, as well as the addition of a terrestrial culvert for reptile passage, have been provided to the Township of Carling for material sourcing and implementation. Figure 5 shows the location of this proposed fencing.

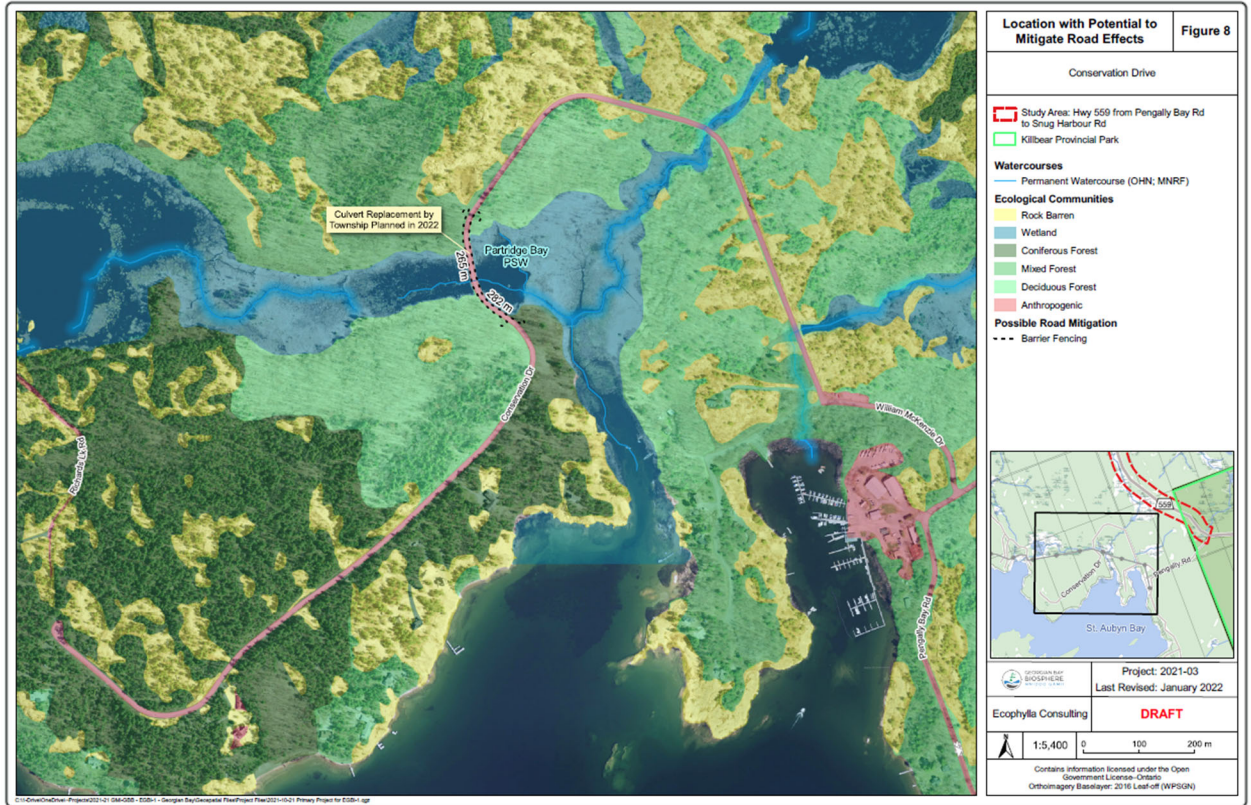


Figure 5. Map showing locations of potential wildlife fencing (black dotted line) on Conservation Drive in relation to ecological communities [scale 1:5,400]. Map produced by Ecophylla Consulting. Locations with Potential to Mitigate Road Effects Map Series, 2022.

By focusing on fencing that can mitigate for the Eastern Foxsnake, the most adept climber of eastern Georgian Bay reptiles, we can assume that this fencing will be adequate for other reptiles and amphibians in the area.

Presentations were given to Carling Township regarding the results from the 2021 field season and included a discussion on the mitigation recommendations for Conservation Drive near Killbear Provincial Park. This conversation led to the confirmation of a terrestrial eco-passage and reptile exclusion fencing being installed along the Provincially Significant Wetland and hotspot area along that road during their planned culvert replacement work in spring and fall 2022

We plan to continue monitoring this mitigation in the coming years and have applied to Habitat Stewardship Fund (HSP) through Environment and Climate Change Canada (ECCC) to assist with the monitoring and assess the effectiveness of this mitigation measure for use by Foxsnakes with the help of a Laurentian University graduate student. This will greatly inform Best Management Practices for fencing in more porous areas (i.e. areas with many driveways, intersections, or in areas of traditional hunting where access points are needed). Partnerships with the Township of Carling, Wasauksing First Nation, Shawanaga First Nation, Killbear Provincial Park, and Laurentian University have been established for this project.

Please see the full report on the Greater Killbear Park Area in Appendix 1, which includes full methods, results, and mitigation recommendations. Recommendations in this report are detailed to be site specific and include the mitigation that we have determined to be necessary, including habitat mapping which determines where mitigation, such as fencing and ecopassages, should be located.

Killbear Engineering Study

This year, we were also able to assist Ontario Parks with installing snake exclusion fencing along the recreational trail adjacent to the main park road within Killbear Provincial Park. Previously, only one side of the road had fencing as it was believed that Massasaugas were only coming from the east side. However, 3 years of data showed that snakes were also coming from the west side, which led to the installation of an additional 450 m of snake exclusion fencing on the west side this past summer, with the help of GBB staff. With fencing now installed on both sides of the road, snake movement between habitats became restricted. As such, we supported Ontario Parks with an engineering design and assessment to determine the best way to provide passage from one side of the road to the other (Appendix 2).

Ontario Parks has decided to go with a combined ecopassage solution which is a box culvert large enough to have a terrestrial path on one or both sides. The next step includes a design and costing stage, which will detail recommendations for design features such as the location of snake fencing tie-ins to the new crossing, substrate, and materials.

Twelve Mile Bay Road Results

Twelve Mile Bay Road, located in the area of Moose Deer Point First Nation and in the Township of Georgian Bay in the District of Muskoka, was identified as a priority road through the MA project based on habitat analysis, local knowledge and discussions with Moose Deer Point First Nation. The preliminary habitat analysis and follow-up ground truthing showed that wetlands along this area are ideal hibernation habitat for the Eastern Massasauga Rattlesnake. As this watershed is one of the region's largest, undisturbed, contiguous natural areas south of Parry Sound, ensuring high connectivity through a reduction in road mortality is important to the populations of species along this roadway.

This project provided the opportunity to conduct further monitoring and identify key areas, or 'hotspots', where road mitigation could be implemented on Twelve Mile Bay Road.

Road Monitoring

Please see the full report on Twelve Mile Bay Road in Appendix 2, which includes full methods, results, and mitigation recommendations.

Surveys were conducted along an 18.18 km stretch of road, in the District of Muskoka (Figure 6). Surveys began at the intersection of Twelve Mile Bay Road and Highway 400, and continued to Moose Deer Point Marina, ending back at the start point. During the 2021 field season, a total of 35 road surveys were conducted by Biosphere staff. Additional data were collected on road mortality through volunteers and citizen scientists.

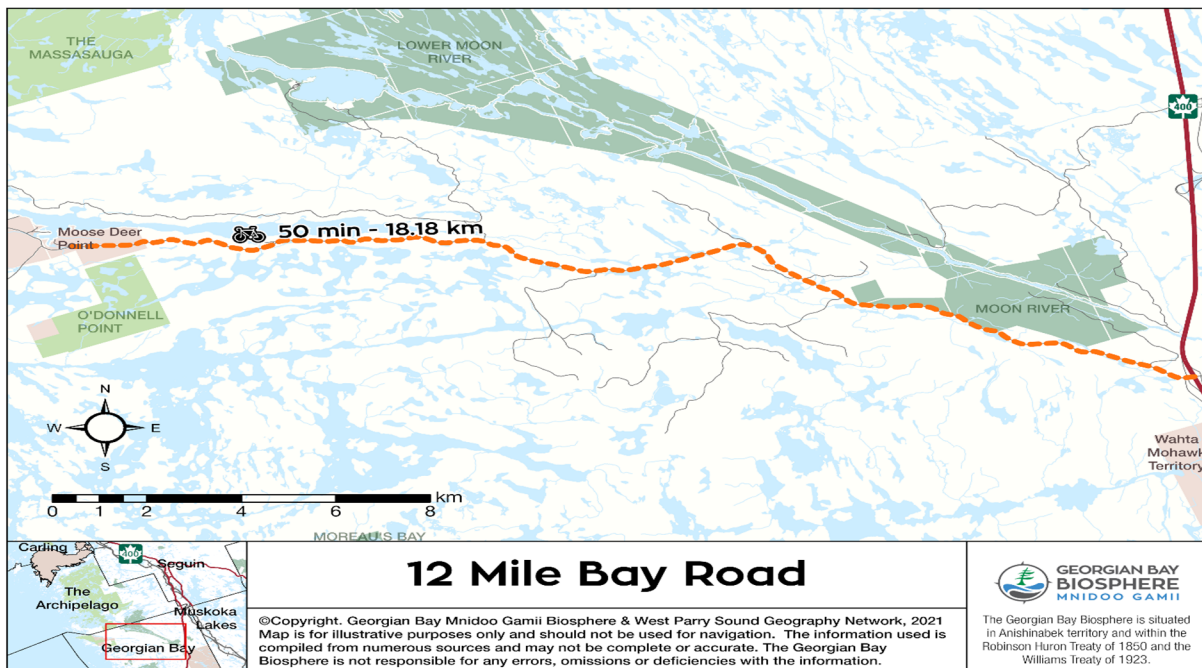


Figure 6. Map of survey area along Twelve Mile Bay Road during the 2021 field season. Twelve Mile Bay Road Map Series, 2022.

A total of 287 observations of live and dead reptiles on the road were collected during road mortality surveys on bike. Of these observations, 94.1% (270 individuals) were dead on the road (DOR), mostly consisting of snakes, and 0.7% (2 individuals) were injured on the road (Figure 7).

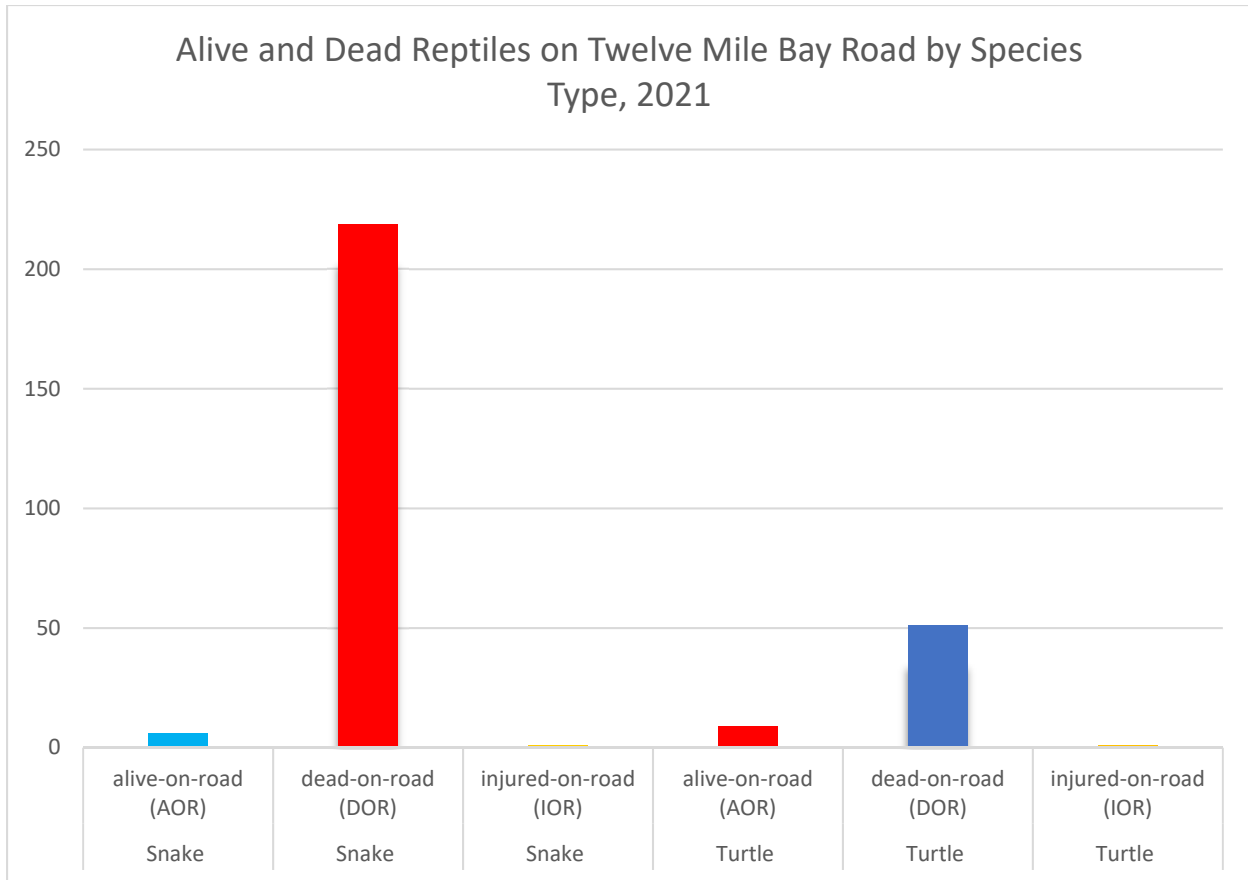


Figure 7. Total alive, dead and injured reptiles on Twelve Mile Bay Road in 2021, separated by species family type.

Both GBB survey data and citizen science data were used to generate a series of relative abundance maps to identify the locations where observations of reptiles on the road were highest (Figure 8). Data showed that almost the entire stretch of road has high occurrences of reptiles, with two major hotspot areas located on the eastern portion of road closest to Highway 400 (hotspots labelled in Figure 8,C). Hotspot #1 occurs approximately 3.3 km from Highway 400, and Hotspot #2 occurs approximately 7.3 km from Highway 400. Both of these hotspot areas feature significant wetlands adjacent to the road.

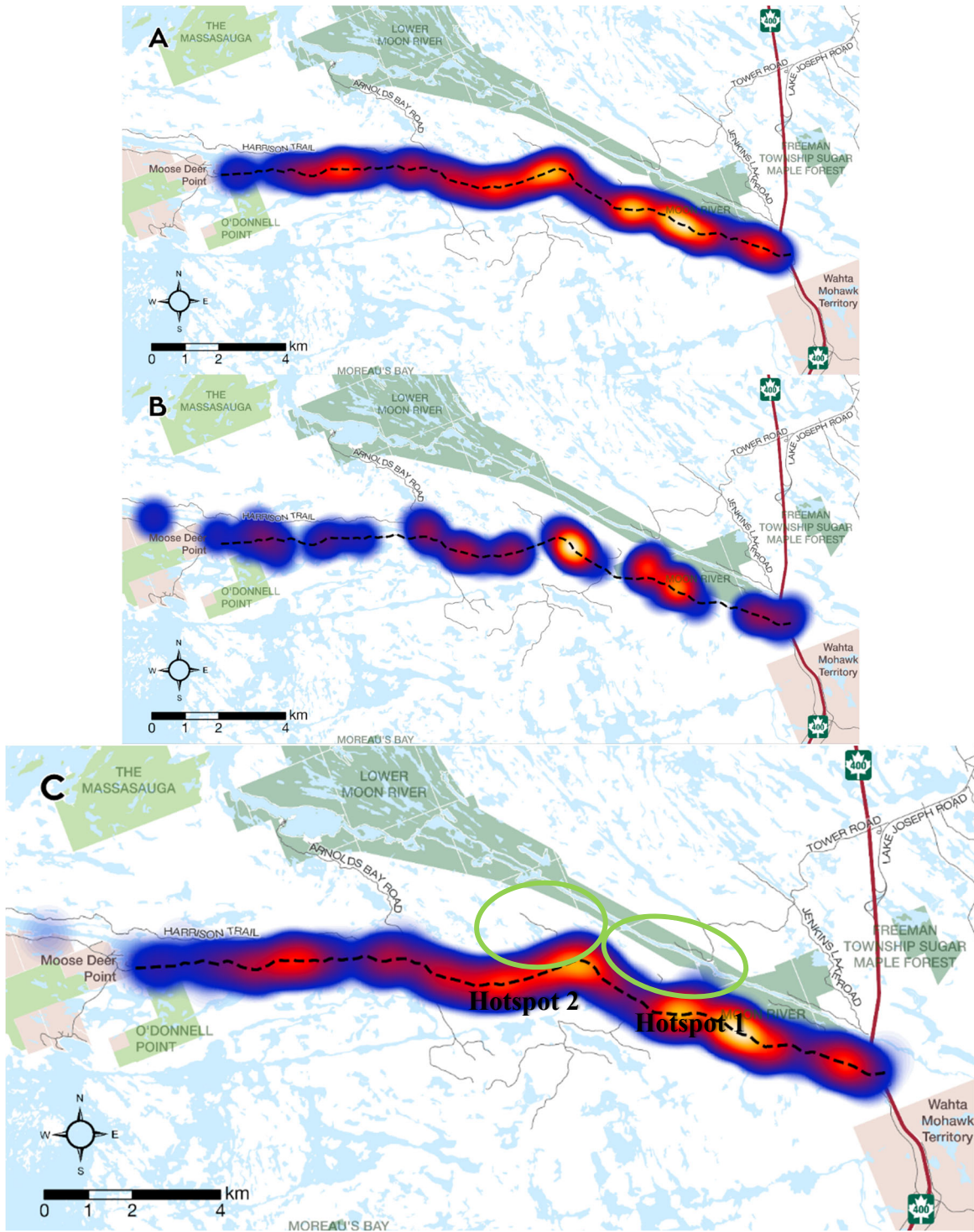


Figure 8. Relative abundance hotspot map of reptiles on road using data from a) Biosphere biologists during road mortality surveys on bikes, b) citizen science data c) both datasets combined on Twelve Mile Bay Road in 2021 [scale 1:100,000]. Twelve Mile Bay Road Map Series, 2022.

Twelve Mile Bay Road Recommendations:

Observations of live and dead reptiles, as well as predated nests from surveys indicate that almost the entire stretch of Twelve Mile Bay Road is hazardous for reptiles. However, our analysis identified two main hotspots (Figure 8, C) where active mitigation efforts, such as exclusion fencing and ecopassages, are needed and would be most effective, along with other minor areas that could benefit from passive mitigation techniques such as signage and reduced speed limits. This report will be shared with both Moose Deer Point First Nation as well as the District of Muskoka Public Works Department to determine if the road will be undergoing upgrades in the near future, and if there are opportunities for partnership and road mitigation to be implemented.

Several other best management practices can be found in our final report for this roadway. These include time periods that are best to conduct roadwork and include options by which the Georgian Bay Biosphere can partner and help to mitigate any effects of roadwork, including training on species at risk and best management practices.

Please see the full report on Twelve Mile Bay Road in Appendix 3, which includes full methods, results, and mitigation recommendations.

Thank You Miigwech

The Georgian Bay Mnidoo Gamii Biosphere (GBB) is an inclusive and dynamic organization that builds capacity for regional sustainability in eastern Georgian Bay.

The GBB is a non-profit registered Canadian charity governed by a Board of Directors.

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