

Friends of Blackfoot: Snake Activity Project

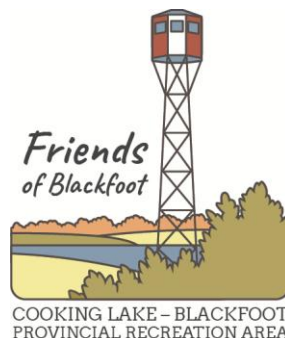
Road-kill Survey 2024



April 2025

Friends of Blackfoot Society

52365 Range Road 210
c/o Cooking Lake - Blackfoot Provincial Recreation Area
Sherwood Park AB T8G 1A6



Executive Summary

The ongoing citizen science activities of the Friends of Blackfoot Society (FoB) include a snake monitoring project that emphasizes spring and fall observations of plains garter snake (*Thamnophis radix*) in the vicinity of multiple hibernacula in a small portion of Cooking Lake moraine. We also record incidental public sightings associated with the Cooking Lake Blackfoot Provincial Recreation Area (PRA). In 2023, the program expanded to include documentation of garter snake mortality on roads adjacent to Waskehegan Staging Area of the PRA, primarily Range Road 210 from Baseline Road to Wye Road. This project continued through 2024.

In 2024, standardized surveys began on April 1 and continued through to October 28 when repeated road surveys in late October did not detect any dead or live snakes. A cumulative total of 362 snakes was recorded (358 dead, 4 live). Of these snakes, 278 (78%) dead and 3 live snakes were seen on the Range Road 210 portion of the surveys.

Temporal distribution of mortality was bimodal: the survey on May 10 (n= 38 snakes) accounted for 86% of the tallied spring mortality. This appears to reflect relatively cold spring weather through late April and early May. Local weather data correlated with spring snake activity, as reflected in mortality, peaked sharply around May 10 when daytime temperatures spiked above 20C. The fall mortality began in early September and peaked in the 3rd week of that month. Two surveys in October detected relatively high numbers of dead snakes, which also aligned with spikes in daytime temperatures approaching 20C.

These observations are consistent with the period when garter snakes migrate from hibernacula to their summer use areas in May and then move back towards their winter den sites in the fall. Spatial distribution indicates mortality is not equally distributed along the surveyed area but is clustered around three local sites in the vicinity of nearby hibernacula.

FoB continues to build on this project as an opportunity to provide snake-friendly information to public audiences and as a basis to support future collaborative mitigation to reduce the excessive road-related mortality of garter snakes throughout the Cooking Lake moraine.

Background

Plains garter snakes (*Thamnophis radix*) are relatively common in east central Alberta south of Cold Lake (Russell and Bauer 2000). Their preferred habitats contain ponds, lakes, sloughs or marshes in aspen parkland and short-grass prairie natural regions. These areas provide an abundance of preferred foods, including amphibians, small mammals, worms, invertebrates, and even small fishes. Garter snakes use hibernation as a critical overwinter survival strategy and thus require suitable winter den sites in rock piles, sink holes, mammal burrows, or among tree roots. Garter snakes also will hibernate under buildings or in cellars when suitable conditions are present to sustain their period of dormancy. Extensive migration can occur between winter and summer use areas.

All key factors for garter snake survival are abundant on the Cooking Lake Moraine and throughout the Beaverhills Biosphere. These snakes are adapted naturally to maintain successful populations on the moraine and are an essential component of local ecosystems. In particular, the rock rubble base of the moraine (glacial till) provides abundant winter den sites for hibernating snakes (Kendell 2020). An active plains garter snake hibernaculum (at least two separate den sites) at the Waskehegan Staging Area of the Cooking Lake Blackfoot Provincial Recreation Area (CLPRA) east of Ardrossan, Alberta was registered with provincial Parks, and Fish and Wildlife, databases in 2020 (Pybus 2020). Further south on Range Rd

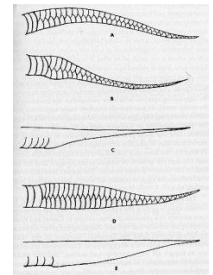
210, garter snakes are known to hibernate in rock piles on private land adjacent to RR 210. Additional verbal reports suggest other hibernacula are present throughout the general area.

As an add-on to ongoing local citizen science interest in snakes, a concerted effort began in 2023 to document vehicle-related garter snake mortality along Range Road 210 along the west boundary of the Cooking Lake Blackfoot Provincial Recreation Area (PRA) and Elk Island National Park (EINP) between Highway 16 and Wye Road (Hwy 630). Based on the lack of snake mortality in results from 2023, the survey route was truncated to exclude RR 210 north of Baseline Rd (Twp Rd 530) and south of Voyageur Estates. Snake mortality on the surveyed portion of RR 210 was known locally for many years, most often in spring and fall (approx. Apr/May, Aug/Sept). Dr Gordon Court (wildlife biologist, Fish and Wildlife) spent many hours in this area in his early years. The snakes he saw were largely red-sided garter snakes (*Thamnophis sirtalis parietalis*). Currently, snakes seen in this area are exclusively plains garter snakes (*Thamnophis radix*). However, this report simply provides this information as background and will not delve into reasons for this change in biodiversity.

Methods

Road Kill Efforts: Intermittent standardized surveys to document garter snakes were conducted by one observer throughout the summer. Total distance covered each survey was ~9 km. (7 of which were on RR 210) and generally took 60-90 min. The route was east on Baseline Road (Twp 530) from Range Road (RR) 211 to RR 210, south on RR 210 to Wye Rd (Hwy 630), deadhead north on RR 210 to Twp Rd 524 then west on 524 from RR 210 to 211 (occasionally west of 211 approximately 0.5 km). Surveys were conducted from a slow-moving vehicle (10-20 km/hr) in late afternoon/early evening during daylight. On two occasions in September, due to the sheer number of dead snakes and waning daylight, the survey route was completed the following day.

All live or dead snakes were counted and mapped with GPS. General observation of size category (small <25 cm, medium 25-50 cm, large 51-70 cm, v lge >70 cm) and, with dead snakes, gender based on reproductive conformation (male - expanded cloacal profile or direct evidence of extruded hemipenes; female – tapered cloacal region with straight-line profile & thicker tail) were recorded when apparent. Occasionally dead snakes and associated habitat pictures were taken. All observations were recorded on a paper map and also uploaded in real-time to the Alberta provincial road mortality app (511 Alberta Highway Watch, Govt of AB). Topographic descriptors were used to identify specific portions of the route to help assess potential foci of mortality. All dead snakes were disposed in the adjacent roadside ditch.



Care and attention was taken at all times in light of traffic safety and attention to oncoming or passing vehicles. This included use of 4-way flashing lights throughout the survey, avoidance of stopping on hills, vehicle displaced well over to right shoulder for any stops, and avoidance of busy times of day in terms of traffic use on RR 210 (i.e. avoid commuter times, generally conducted late afternoon/early evening).

Local education efforts to highlight and perhaps reduce the mortality included posting notices near community mailboxes and community halls, information disseminated via local social media contacts, posters at trailheads in the PRA, and selected agency social media postings. In addition, in spring and fall the County of Strathcona placed two large flashing traffic signs [Watch for... Garter Snakes] on RR



210, one at the intersection with Twp Rd 530 and one just north of Wye Road. These were active 24 hrs/day. The County also placed small sandwich signs near local community mailboxes during the same time periods. New in 2024, the County installed permanent collapsible road signs that can be opened to display an image regarding snake activity in the area. These were opened during the fall migration period. Also new in 2024, during spring and fall migration, Alberta Parks deployed sandwich boards on the Waskehegan entrance road that provided awareness of the local garter snakes to visitors entering and leaving the site.



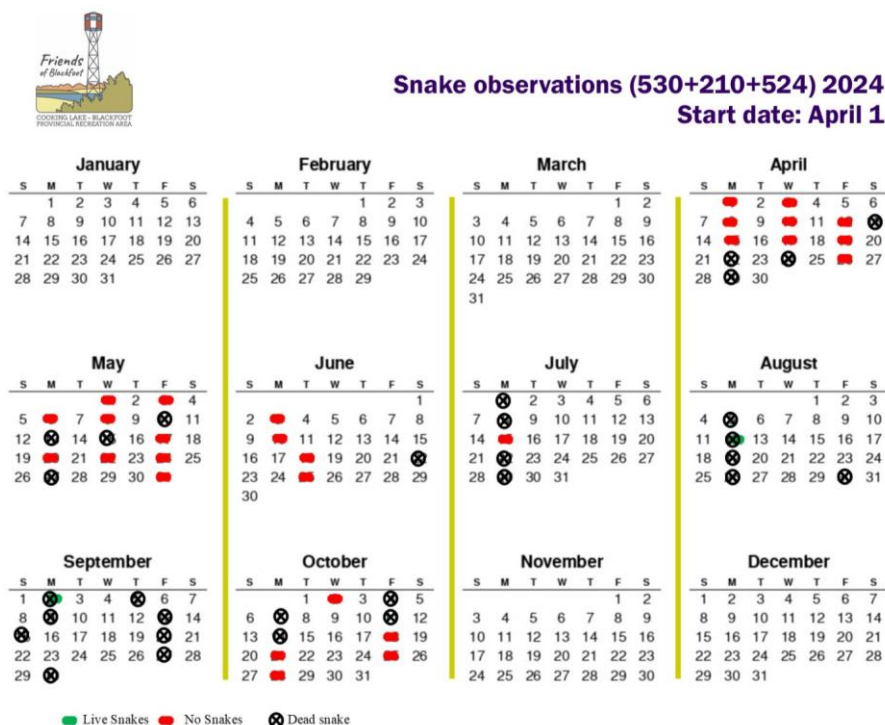
Results

Surveys - General

Snake surveys began on April 1 2024 (Figure 1). Subsequent early surveys were tri-weekly until mortality diminished in late May. Surveys in June and /July were at least weekly and some negative surveys were not recorded. From late August to late October, surveys were conducted bi-weekly, generally on Fridays (prior to a weekend) and Mondays (after a weekend). Surveys were discontinued in the fall following multiple surveys in which no dead or live snakes were seen, in conjunction with weather conditions consistent with known reduction in snake activity.

A total of 358 dead and 4 live snakes was tallied. Limited mortality was detected on Twp Rd 530 (n=72, 20%) or Twp Rd 524 (8, 2%) and the great majority occurred on RR 210 (278, 78%). The temporal pattern of mortality on each road was similar, other than on Apr 13 when 1 dead snake was found on Twp Rd 530 but no mortality was detected on RR 210. Data presented hereafter focus on RR 210.

Figure 1. Snake observation surveys, all roads, April to October 2024.



Range Road 210

A total of 281 snakes (278 dead, 3 live) was seen on 57 surveys along RR 210 between Baseline and Voyageur 1 between April 1 and October 28 2024 (Table 1, Fig 2, 3, 4). Dead snakes were seen on 27 of the 57 surveys, live snakes were seen on 2. No snakes dead or alive were seen on 30 surveys, primarily in April, May, June, and late October.

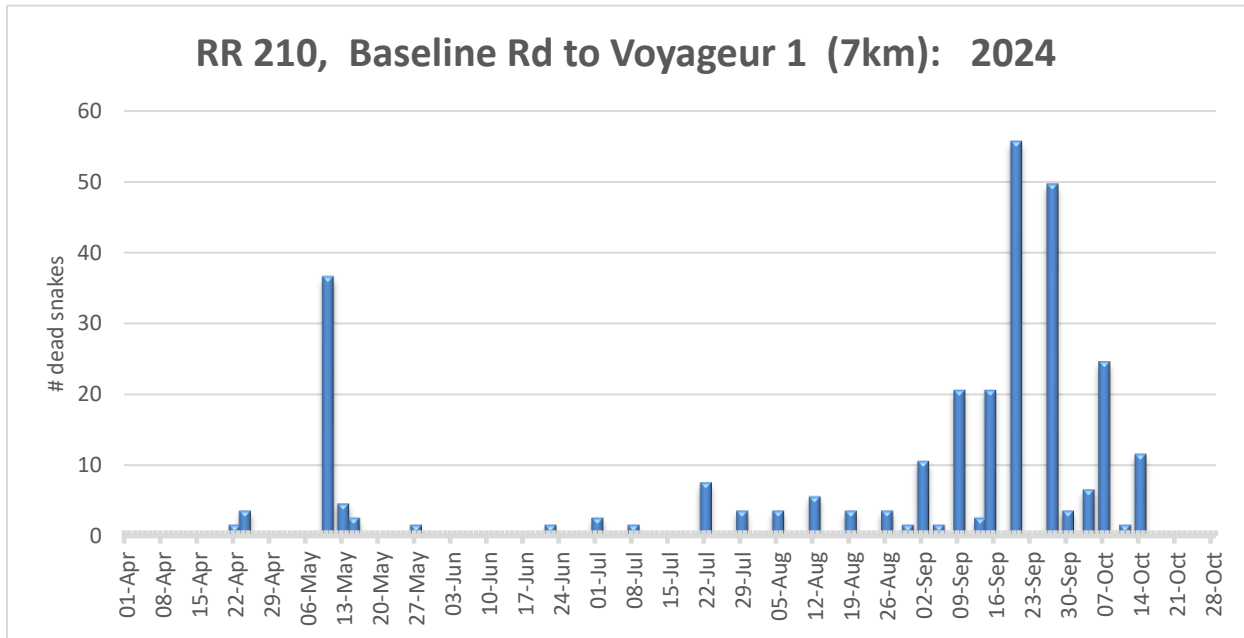
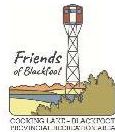


Figure 2. Dead garter snakes observed along Range Road 210, April to October 2024.

Figure 3. Number of dead snakes on RR 210 in 2024.



Dead Snake observations (RR 210) 2024 Start date: April 1

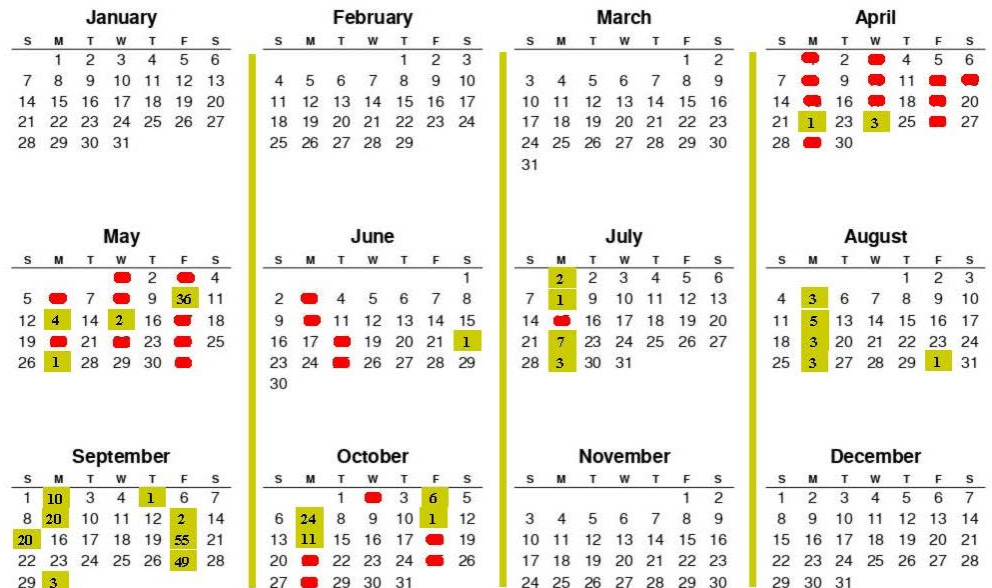


Figure 4. Mortality along RR 210 by month, 2024

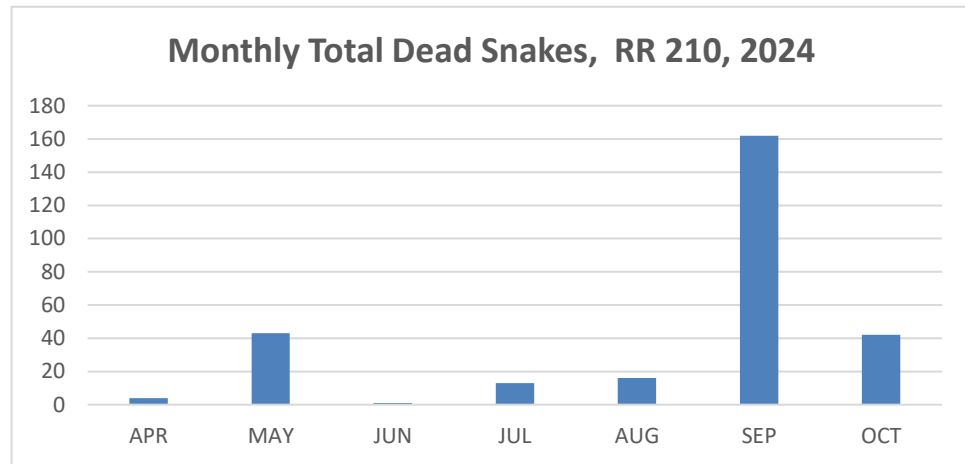


Table 1. Raw observations of garter snakes on RR 210 from Twp Rd 530 to Voyageur, 2024

Date	Snakes Y/N	Dead live	# 210	530/210	Highland	dry pond	524/210	210/Wask	Voy 1-2	Voy 2-3	Voy 3-4	Voy 4	other
01-Apr	N		0										
03-Apr	N		0										
08-Apr	N		0										
10-Apr	N		0										
12-Apr	N		0										
13-Apr	Y		0										
15-Apr	N		0										
17-Apr	N		0										
19-Apr	N		0										
22-Apr	Y	dead	1	1									
24-Apr	Y	dead	3						1	1		1	
26-Apr	N		0										
29-Apr	Y		0										
01-May	N		0										
03-May	N		0										
06-May	N		0										
08-May	N		0										
10-May	Y	dead	36		3				1	8	19	2	3
13-May	Y	dead	4			1			3				
15-May	Y	dead	2		2								
17-May	N		0										
20-May	N		0										
22-May	N		0										
24-May	N		0										
27-May	Y	dead	1							1			
31-May	N		0										
03-Jun	N		0										
10-Jun	N		0										
18-Jun	N		0										
22-Jun	Y	dead	1							1			
25-Jun	N		0										
01-Jul	Y	dead	2			1	1						
08-Jul	Y	dead	1										1
15-Jul	N		0										

22-Jul	Y	dead	7			2		1				1	3
29-Jul	Y	dead	3					1					2
05-Aug	Y	dead	3									1	2
12-Aug	Y	dead	5		1			1		2			1
		live	1			1							
19-Aug	Y	dead	3									2	1
26-Aug	Y	dead	3			3							
30-Aug	Y	dead	1										1
02-Sep	Y	dead	10		5	2		1	2				
		live	2							1			1
05-Sep	Y	dead	1					1					
09-Sep	Y	dead	20		3			3	8	3		1	2
13-Sep	Y	dead	2					1					1
15-Sep	Y	dead	20	1	4	4	1	3	3	2			2
20-Sep	Y	dead	55	3	3	1	8	20	4	2	2	1	14
27-Sep	Y	dead	49		2	1	2	2	7	16	2	4	13
30-Sep	Y	dead	3				1		1			1	
02-Oct	N		0										
04-Oct	Y	dead	6				1						5
07-Oct	Y	dead	24		3		1	5	5	3		1	6
11-Oct	Y	dead	1	1									1
14-Oct	Y	dead	11					1					10
18-Oct	N		0										
21 25 28	N		0										
Total			281	5	21	15	15	40	30	29	4	12	66
Date	Snakes	Dead	# 210	530/210	Highland	dry	524/	210/	Voy	Voy	Voy	Voy	other
	Y/N	live				pond	210	Wask	1-2	2-3	3-4	4	

Although snakes were detected along much of the survey course along RR 210, significant clusters of dead snakes occurred at 3 primary sites: Highlands (south of Twp Rd 530) (21 snakes, 8% of total dead snakes), Waskehegan entrance (40, 14%), and Voyageur Estates (1-2: 30, 11%; 2-3: 29, 10%; 3-4: 16, 6%) (Voy 1-4: 27%) (Table 1, 2). Most of the spring mortality occurred at these sites – 38 of 42 (90%) dead snakes seen in mid May were found at these 3 sites. Similarly, during the fall period 149 of 217 (55%) dead snakes seen between Aug 1 and Oct 17 occurred at the same sites. The remaining dead snakes were scattered as individual records along the areas between these cluster points. Note that red stars on the map indicate known garter snake hibernacula.

Table 2. Primary focal mortality clusters along RR 210, April to October 2024

Location	Overall (n=278)	Fall (n=217)
Highland	8%	10%
Waskehegan	14%	18%
Voyageur 1-2	11%	14%
Voyageur 2/3	10%	13%



Snake activity relative to weather

Mortality in spring occurred soon after minimum (= night) temperatures remained above 0°C and when maximum (=day) temperatures exceeded 20°C in May (Fig 5, 6). In fall, dead snakes were found in conjunction with warm fall days (~20°C) in late September and again in early October. Mortality did not occur when day temps were below 15°C or after night temperatures dropped below 0°C.

Figure 5. Recorded temperatures at Elk Island weather station, March to October 2024

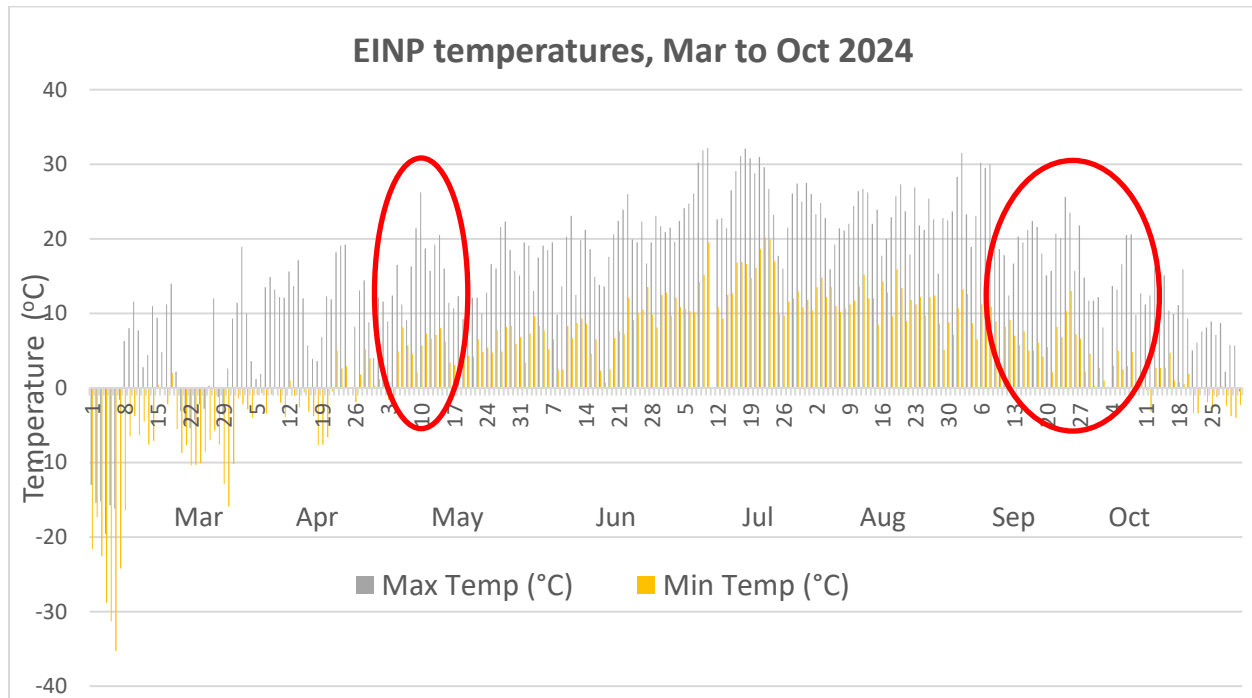
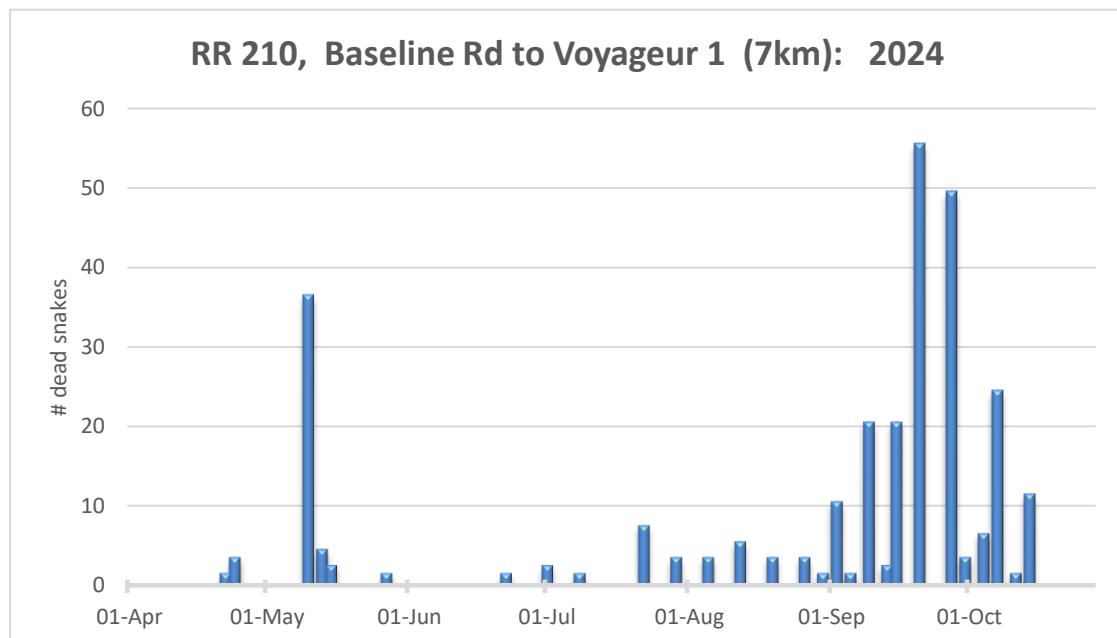


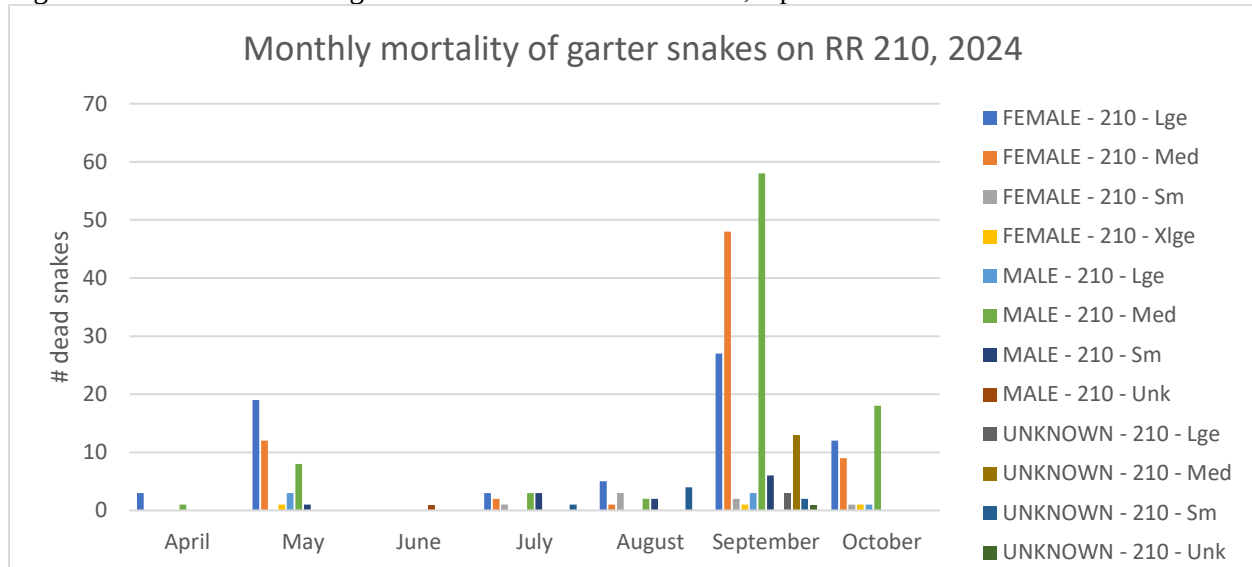
Figure 6. Bi-modal snake mortality on RR 210, April to October 2024.



Number, size, and gender of dead snakes [Pybus + Metro data, 511 Alberta Traffic Watch]

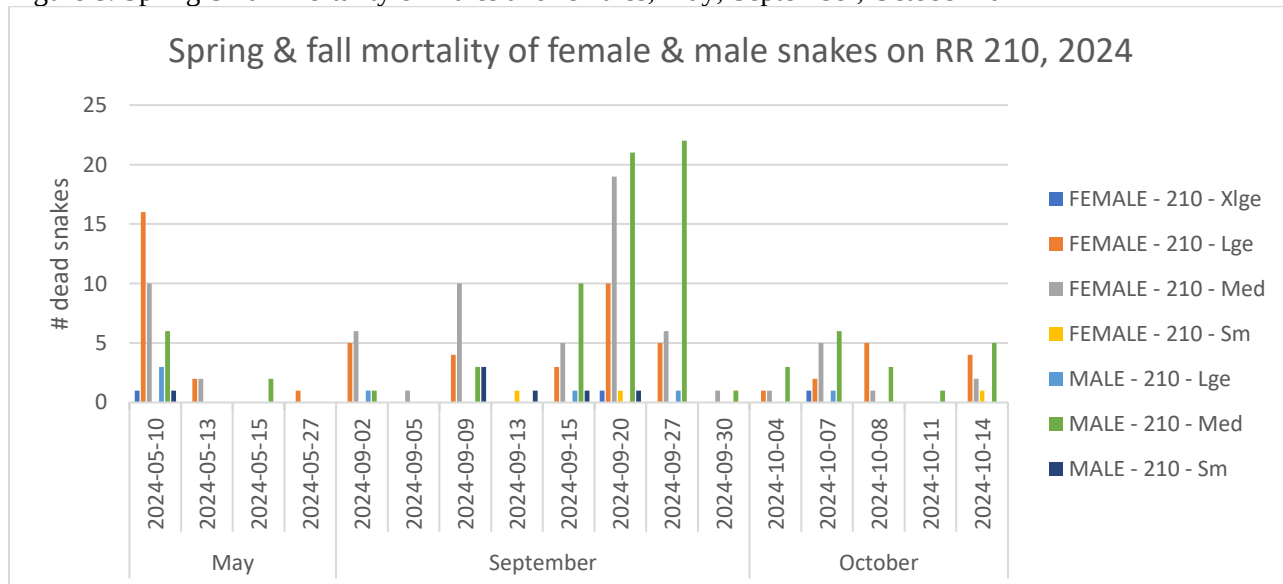
A total of 362 dead snakes was entered into the data tracking app. Coarse size category of snakes observed [small <25cm, med 25-50cm, large 51-70cm, v large >70 cm] was estimated for snakes whenever possible (Fig. 7,8).

Figure 7. Estimated size and gender of dead snakes on RR 210, April to October 2024



Looking more closely at snakes identified as males and females in the spring (May) and fall (Sep, Oct) mortality clusters... females were predominant in the mortality in spring, but males outnumbered females in the fall.

Figure 8. Spring & fall mortality of males and females, May, September, October 2024



Of 323 snakes for which size and gender was recorded, 185 (57%) were females, 138 (43%) were males (Fig 9, 10). Of the 185 females, 45% were large and 48% were medium. Most of the 138 males were medium (85%).

Figure 9. Cumulative size and gender of dead snakes, April to October 2024

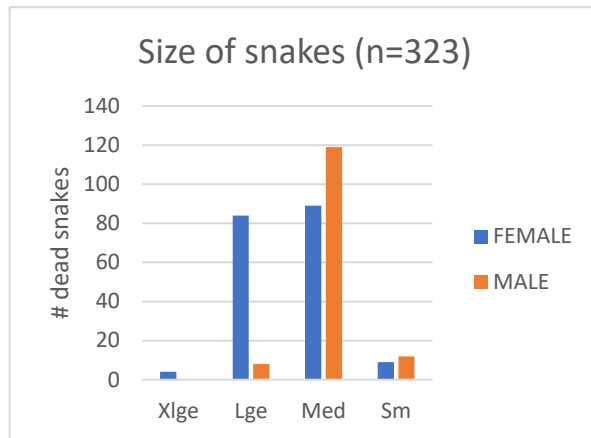
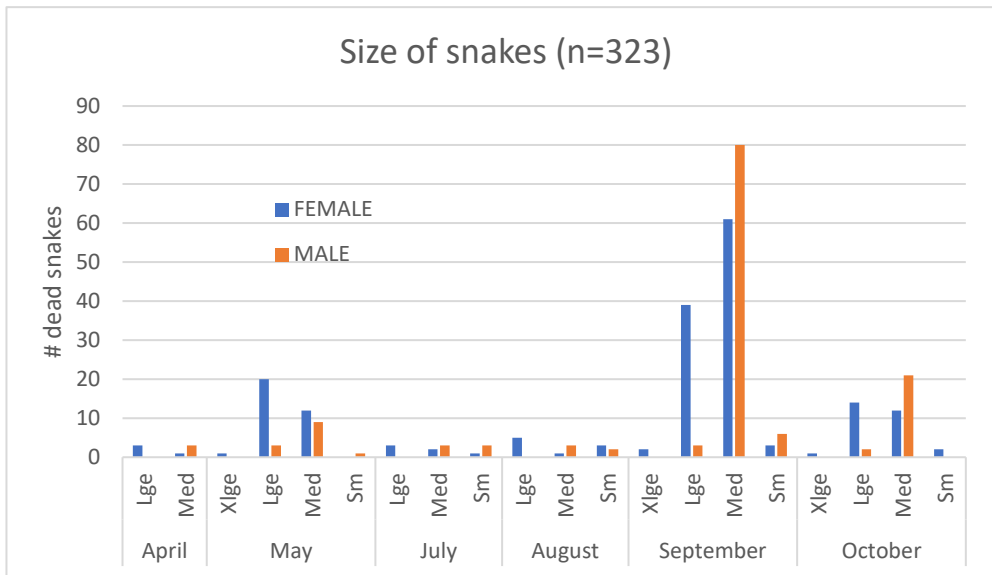


Figure 10. Size and gender of dead snakes by month, April to October 2024



Comparing Annual Temporal pattern of dead snakes: 2023 2024

Comparison to 2023: In general, mortality was slightly later in spring 2024 (~1 week) than in 2023 and was more condensed over a shorter period and peaked later in the fall 2024 (Fig. 11, 12).

Figure 11. Bi-modal snake mortality 2023

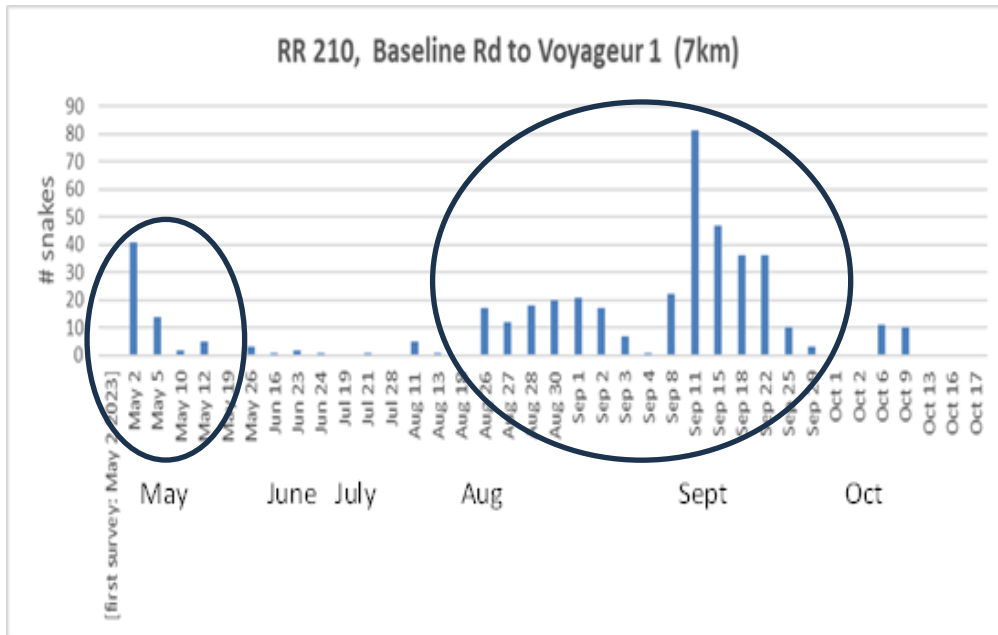
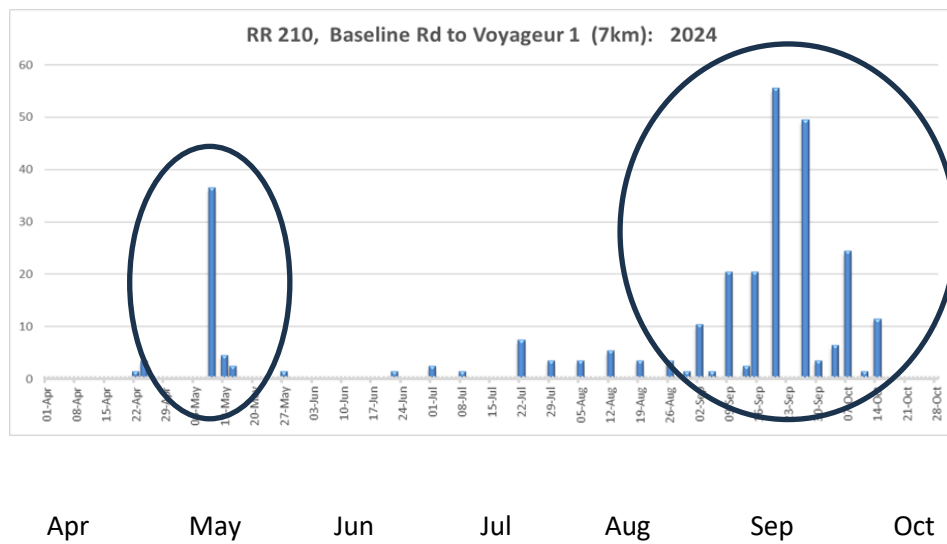


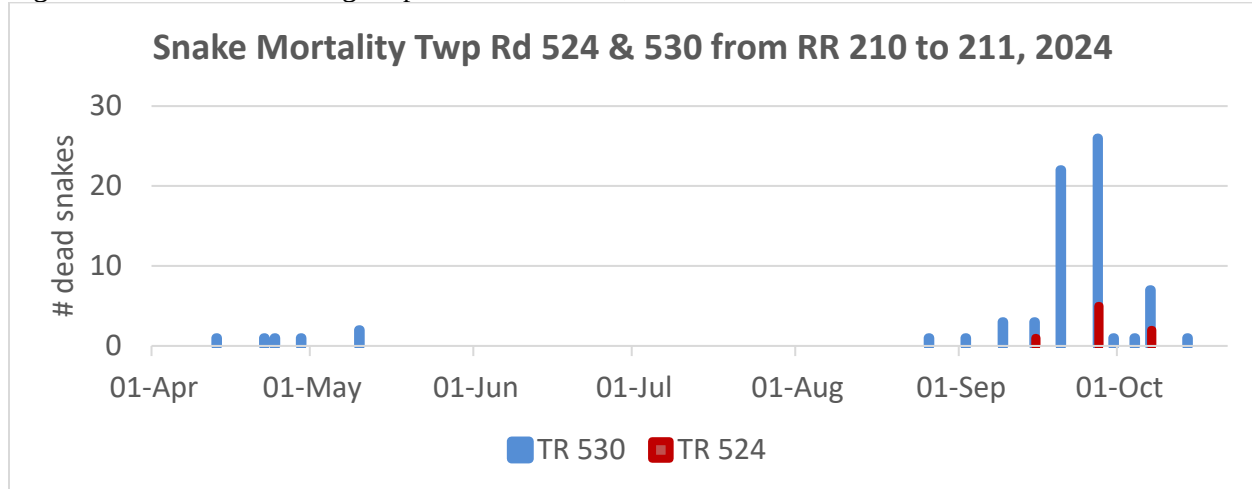
Figure 12. Bi-modal snake mortality 2024



Baseline Road (Twp Rd 530) and Twp Rd 524

Road surveys were conducted along Twp Rd 530 and Twp Rd 524 between RR 210 and RR 211 throughout the survey period in 2024 (Fig. 13). Methods were the same as those used on RR 210.

Figure 13. Dead snakes along Twp Rds 530 and 210, between RR 211 and 210.



Results on 530 and 524 reinforce the patterns seen on RR 210: increased mortality of snakes at similar periods in both the spring and fall. Foci of mortality also are apparent in the distribution of the mortality along TwpRd 530. The area east of the Quesnell entrance to west of the RR 210 intersection and in association with the area north of Highlands had consistent and relatively high mortality in both spring and fall periods.

Communications

Information regarding the mortality of snakes on local roads was posted and highlighted at the Heritage Interpretive Centre at Waskehegan staging area. During the fall, laminated posters were displayed near local community mailboxes, on public notice boards at community halls and local vendor sites, and at notice boards at the 4 staging areas within the PRA. The poster file also was provided to a few individuals to share on local social media networks. In addition, the Beaverhills Biosphere and Alberta Conservation Association (ACA) posted awareness information on their social media accounts.



Two sets of two flashing road signs from Strathcona County were placed on RR 210 at the intersections with Baseline Road and Wye Road. These were activated in spring (May 9 to June 22) and again in the fall (mid August to Oct 18)

Each sign flashed 24 hrs a day with

WATCH FOR GARTER SNAKES

Discussion

Vehicle-related mortality of garter snakes is not new – in far too many places it is an ongoing risk for native snake populations. Nor is it a new occurrence along the section of RR 210 used for the surveys reported herein. In fact, quite the opposite. The mortality has been known, and ongoing, for many years.

But this is 2025 and things are different now. The scale of human activity along this section of road has steadily increased... more visitors, more residents, more vehicles, higher speeds, extended use each day and throughout the year. What was once a quiet country road is now a well-used connector and commuter corridor between Wye Road and Highway 16. Interactions with wildlife were bound to increase also. Slow-moving animals, that soak up heat from warm dark surfaces, were bound to get in the way. Cumulative over the two years of our survey, we documented mortality of a minimum of 443 [2023] + 358 [2024] = 801 dead garter snakes, primarily on RR 210 alongside a national park and a provincial recreation area. Temporary use of flashing road signs and opening drop-down permanent road signs in spring and fall serve to increase driver awareness of the increased activity and risk to local garter snakes. And no doubt, save some snakes. But surely, we could work towards more successful mitigation to reduce the annual bi-modal slaughter of a key component of local ecosystems.

Data herein are limited by the methodology. While the standardized approach can document temporal, seasonal, and geographic patterns, it cannot be used to assess snake abundance or population estimates. The live and dead snakes counted are only the snakes seen during each survey. Scavengers and predators readily make use of roadkill wildlife. On occasion, ravens (*Corvus corax*) and crows (*Corvus brachyrhynchos*) were seen during a survey eating or flying away with dead snakes. And according to some sources, crows and ravens particularly enjoy snake liver as a treat. The number of coyote (*Canis latrans*) scats on the roadside noticeably increased in August, suggesting they too were taking advantage of the abundance of food. In addition, some motorists hit and removed an unknown number of snakes. However, these drawbacks do not detract from the veracity of the scale of the mortality and the patterns revealed in the current data.

The bi-modal pattern of mortality in both years (2023, 2024) reinforce the general patterns in the natural history of garter snakes, with particular focus on increased activity associated with spring and fall migrations away from and going towards known wintering sites. Spring mortality seems somewhat driven by local temperatures. No mortality was detected during April when night temperatures dipped on occasion below freezing (0C). Even as the spring weather warmed, mortality seems to occur only when day temperatures reach or exceed 20C. Quite noticeable in 2024, the spring mortality was delayed and then spiked over just a few days of warm temperatures. This suggests the snakes were perhaps held back in the vicinity of a hibernaculum and then once conditions were amenable, they quickly moved to their preferred summer use areas and did not tarry on or near the road. In contrast, fall migration both years was more protracted through August to October, but again seemed more prominent when daytime temperatures were above 20C. Once day maxima reached only 15C, no further mortality was seen. Concentrated spring and extended fall migration periods are also seen in many migratory birds.

A relatively large number of garter snake hibernacula are documented on the Cooking Lake moraine (Kendell 2020), some of which occur adjacent to this strip of deadly road (Pybus, 2020, Friends of Blackfoot 2021, 2022, 2023; S Fyfe pers comm). The three primary clusters of mortality along RR 210 are in the vicinity of the known hibernacula immediately west of the road. Protected native forests atop morainal rock rubble in the protected parks on the west side of RR 210 may offer particularly suitable winter use areas for garter snakes. In addition, two of the three hibernacula are in gravel fill under

buildings or in large boulder piles. The abundance of small lakes and sloughs with adjacent wetlands and grassy uplands in the moraine landscape, all relatively undisturbed with human activity provide optimal summer habitat for garter snakes. Summer use areas with abundant ponds and sloughs are scattered throughout residential areas and fields east of RR 210.

The consistent cluster of mortality along Twp Rd 530 between Quesnell and RR 210 suggests perhaps an undocumented hibernaculum in this area. Efforts could be directed towards locating a winter den site in the adjacent treed area. Alternatively, perhaps these snakes are moving to and from the hibernaculum associated with the Highlands area on RR 210 south of Twp Rd 530.

The population size or local abundance of garter snakes cannot be addressed with road-related mortality data. Similarly, it is not known how mortality data may reflect the true demographics of the local population. Medium and large snakes may be over-represented in the mortality data for a number of reasons. These animals are easier to detect during a survey from a moving vehicle, even tho moving slowly. Small dead snakes are more difficult to see, may be ‘flattened’ beyond recognition, or may be easier to remove by scavengers. Regardless, the high number of medium and large females and males dead on the road, suggests potential for a serious negative effect on the reproductive capacity for the local population.

Communication and collaboration are key to success in any project of the scale of road-related wildlife mortality, even if limited to a relatively small area like the Cooking Lake moraine. Our hope is that documenting the amount and patterns of mortality on one small portion of one busy road can be used to launch a higher profile, broader awareness, and increased concern for both snakes and snake mortality that will lead to effective actions to reduce the extent of the mortality. The umbrella effect of the Beaverhills Biosphere connecting various agencies, stakeholders, residents, and concerned citizens would seem to be a good fit for generating a closer look and perhaps a new approach to reducing traffic-related wildlife mortality in general, and specifically that of garter snakes. However, efforts of 2023 to gather such a working group stalled and did not produce significant results. Perhaps this can be re-visited in coming months/years?

The seasonal timely deployment of flashing traffic signs by the County of Strathcona is a good first step on this path. They were perhaps the single best communication tool that registered with the public, as reflected in reported conversations among school children at Uncas, local residents at Antler Lake and Deville/N Cooking halls, folks gathered around kitchen tables, and comments provided in local social media posts. The signs and posters displayed at local sites where people gather or spend time also raised the profile of the issue among users of the PRA and folks who drove the road, dropped in at local businesses, collected their mail, or visited other sites where the posters were hung or information was read on web pages and social media.

Overall highlights:

- Spring activity aligns with spring temperatures greater than 20C and appear to reflect the activity of snakes moving away from their winter dens.
- Survey route was truncated to 7 km along RR 210 as no dead snakes were seen north of Baseline (TWP Rd 530) or south Voyageur Estates.
- Surveys along Baseline and Twp Rd 524 between RR 210 and 211 serve as additional mortality data, and reflect similar patterns of seasonal snake activity.

- Results are an absolute minimum # of dead snakes. There was evidence of ravens, crows, and probably coyotes removing dead snakes. Similarly some people apparently removed individual snakes after inadvertently running them over.
- These data provide systematic evidence of the scale of mortality rather than the specific number of dead snakes nor abundance of local garter snake populations.
- The preponderance of relatively large snakes in the mortality suggests this could have a significant effect on the reproductive capacity of local populations.
- Such survey data can
 - highlight the mortality
 - identify cluster points or mortality hotspots
 - identify key time periods of significant mortality
 - inform future mitigations
 - raise awareness of garter snakes and the ecological services they provide in the Beaverhills Biosphere

Recommendations:

- continue standardized observations in coming years.

Start in early April

Document negative surveys consistently

Consistently include sections of Twp rds 530 and 524 between RR 210 and 211

- try (again) to attain vehicle use data for RR 210 from the County.

- promote further communication and collaboration locally and throughout the Biosphere regarding

- the value of garter snakes to local ecosystems

- the excessive mortality on roads adjacent to hibernacula

- local interest in reducing seasonal snake mortality

Acknowledgements

This ad hoc project is fuelled by the efforts of a few FoB members and interested local residents. The efforts and signage from the County of Strathcona and Alberta Parks staff also are acknowledged. The shared interest by a wide range of residents and visitors to the area also helps fuel further efforts to protect and conserve native garter snakes.

Prepared by Margo Pybus, on behalf of Friends of Blackfoot Society

Associated Literature

Friends of Blackfoot Society. 2021. Snake activity report, 2021. 19pp. Available from the Friends.

Friends of Blackfoot Society. 2022. Snake activity report, 2022. 17pp. Available from the Friends.

Friends of Blackfoot Society. 2023. Snake activity report; Road mortality survey 2023. 12pp. Available from the Friends.

Kendell, K. 2020. Garter snake (*Thamnophis* spp.) surveys at historical den sites in Alberta 2017-2019. Data Report, Alberta Conservation Association, Sherwood Park, Alberta. 17pp + App.

Pybus, M.J. 2020. Snakes at Waskehegan. Internal Fish and Wildlife report, Fish and Wildlife Information Management System (FWMIS), Edmonton.

Russell, A.P., and A.M. Bauer. 2000. The amphibians and reptiles of Alberta. University of Calgary Press, Calgary, AB. 279 pp.

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Working towards this:



NOT this:

