

Mitigating the Toll of Roadkill on Taiwan's Leopard Cat Population

Yasmine Cheng

May 31, 2024

Introduction and Animal Spotlight: The Mainland Leopard Cat

Within the past nine years in Taiwan, over 46,000 animals have died as a result of roadkill. One species in particular, the mainland leopard cat, has been heavily impacted by wildlife collisions. In 2023 alone, 94% of all reported leopard cat deaths in Miaoli County, Taiwan, were the outcome of roadkill (Scanlan). This suffering predator, also known as *Prionailurus bengalensis eupitulura*, is roughly the size of a domestic house cat and is one of the 12 subspecies of leopard cats found across Asia. They are endemic to Taiwan, with other populations found natively in East Asian countries such as Korea and Manchuria (Mainland Leopard Cat).

As one of the two cat species in Taiwan, the mainland leopard cat is significant since it monitors populations of small creatures like rodents, lizards, amphibians, and birds. As such, leopard cats are argued as keystone species since they play a vital role in “effectively regulating small mammal populations and upholding ecological equilibrium” (Chen). These cats are territorial and can be found prowling around low-altitude mountain areas in both remote, rural, and developed areas. They stay out of human sight and tend to avoid areas with high human activity, choosing to hunt around forests and agricultural land (Van der Meer). The *Prionailurus bengalensis eupitulura* not only provides benefits for farmers by controlling pests in the field, but they also provide disease control from rodents as well (Animalia). Though not very big in size, this miniscule predator is a symbol of Taiwanese identity and pride, loved by many citizens across the country for its cuteness, contributing as another motivator to the protection of this species.

Threats to Leopard Cats

Despite the fact that leopard cats are quite resistant to changes in their environment and seem to adapt well to urbanization, it is estimated that less than 500 wild leopard cats exist in Taiwan, with its population continuing to decline due to habitat modifications and roadkill (Taiwan's Leopard Cat). Miaoli County, a district in Taiwan with the largest leopard cat population due to its abundance of food, reported that 17 leopard cats' lives had been cut short as a result of roadkill in 2023 alone (Scanlan). Though these numbers may seem insignificant, the deaths of several cats relative to the small total leopard cat population on the island raises concerns as more can undergo the same fate from collisions.

As nocturnal creatures, leopard cats actively hunt during dawn and dusk when light is scarce, making them prone to vehicle collisions, especially in mountain ranges. Certain sections of road in the mountains have dense fog and little to no lighting, which creates dangerous scenarios for both drivers and animals. Additionally, due to the lack of fencing and limited space, the winding paths in mountains create dangerous conditions that make accidents likely to occur, especially when drivers are not paying attention or are speeding during the night.

Alongside the threat of roadkill, leopard cats are also facing a decline in reproductive success. In remote regions, their reproductive success rate could reach up to 92% but plummets to 53%-83% in highly urbanized areas (Animalia). If more leopard cats become victims of roadkill in addition to low reproductive success rates, leopard cat populations in Taiwan will suffer from slow population recovery and further population declines.

Data Collection

In general, knowledge of the leopard cat is very limited because of their elusive behavior, and not much research has been conducted on them. In order to effectively reduce roadkill in their population, data must be collected on their distribution throughout Taiwan. The data collected could help indicate areas where leopard cat populations are most dense and sightings are most frequent so that preventative measures can be taken to reduce possible collisions from occurring.

Currently, Taiwan has been utilizing citizen science to gather information on leopard cat sightings or roadkill incidences. The Taiwan Roadkill Observation Network (TaiRON) is a government-funded citizen science project that launched in 2011 with the aim to reduce roadkill, promote environmental education, and encourage citizens to participate in scientific research. With over 14,000 active members, TaiRON's site allows everyday citizens to report sightings of roadkill, ranging from mammals, reptiles, birds, and more. Observations are collected and compiled into records that provide important information for professionals on the impacts of roads towards wildlife (Taiwan Roadkill Observation Network). As a result, the data collected from TaiRON's citizen science can provide insightful information on roadkill hotspots for leopard cats.

Another method that can be used to gather information on leopard cat populations is camera trapping, which is commonly used in wildlife conservation. Camera trapping consists of setting up cameras that will be triggered by movement from wildlife so that scientists can study a species with minimal disruptions (Kmita). The camera traps can provide useful statistics by

“[obtaining] accurate information on the distribution of many species, their abundance, activity patterns, and habitat use” (Folhadella). Camera trapping can be reliable for tracking sightings of leopard cats during hours when there are fewer people, giving valuable insights of the population throughout Taiwan.

Solutions

In order to mitigate roadkill, there are two common methods that can be used: behavioral and structural changes. The first method involves altering the behavior of drivers and their attitudes, for instance, by increasing public awareness of roadkill or enforcing slower driving speeds in roadkill hotspots. The second method utilizes structures and modifications in the road system in order to prevent animals from colliding with vehicles. After collecting data on leopard cat distributions and roadkill hotspots, these mitigation methods could be implemented to minimize wildlife collisions.

By changing driving behaviors among citizens, better driving practices can be developed to minimize collisions. Simple methods to raise awareness of the dangers of roadkill or promote healthy driving behavior include campaigns, public service announcements, and informationals. In roadkill hotspots, more signs could be implemented to warn drivers of animal crossings. The signs could also be used to remind drivers to watch their speeds and stay alert for incoming animals. Additionally, speed cameras are legalized in Taiwan and can be installed in order to enforce appropriate speeds in the roadkill hotspots. Speed cameras use advanced technologies to accurately detect driver speeds, capture license plates, and send fines to drivers that violate the

speed limit (Speed Safety Camera Enforcement). These methods can help citizens foster safe driving habits that may mitigate risks and accidents.

Furthermore, structural changes, such as fencing, could be incorporated into road systems. A meta-analysis that used data from 50 studies concluded that fencing could reduce roadkill by 54% (Rytwinski). In order to prevent habitat fragmentation, wildlife corridors and underpasses can be built so animals are able to move where they wish without being hit. These corridors act as a safe passageway for animals to travel without having to cross roads, and they can avoid potentially dangerous environments (Rytwinski). Lastly, quality lights should be installed in areas on the road with little to no lighting. Proper lighting is essential for safety and visibility; if drivers are behind the wheel when leopard cats or other animals are active, having good lighting can lead to increased driving attention and faster reaction time to prevent collisions.

Adding on, extra steps can be taken to aid in the conservation of leopard cats. Given that many leopard cats like to hunt near or around agricultural areas in search of rodents, farmlands can be altered to welcome leopard cats into a safe space. For instance, a farming practice called agroforestry can be implemented on more farms; agroforestry is a method that involves integrating trees and shrubs into crops, which in turn can provide countless benefits, such as natural habitats and corridors for passing wildlife on farmland (Lee). On top of that, farming communities could set aside some unused or abandoned areas of their field for wildlife conservation, providing extra space for the leopard cats to rest or hunt with little stress (Van Der Meer).

Overall, utilizing roadkill mitigation methods can not only benefit leopard cat populations but other species, too. These animals are not just limited to mammals, but include amphibians and reptiles as well. Changing and improving road systems so that there are fewer risks for both drivers and animals while educating citizens about healthy driving habits can reduce the possibility of hazardous scenarios from occurring and create a safer environment. By altering uses of farmland and pairing them with roadkill mitigation techniques, the protection of the beloved feline species can be achieved through multiple levels of effort. Leopard cat populations in Taiwan can be protected and make a recovery over the detrimental impacts of roadkill with time, cooperation, and commitment by Taiwanese citizens for a better ecosystem in the island's future.

Works Cited

- Animalia. (n.d.). *Leopard cat*. Retrieved May 23, 2024, from <https://animalia.bio/leopard-cat?letter=g>
- Chen, X., Tian, T., Pan, H., Jin, Y., Zhang, X., Long, Q., Tang, L., Yang, B., & Zhang, L. (2023). The minimal impact of anthropogenic disturbances on the spatial activities of leopard cats in Xinlong, China. *Animals*, 13(21), 3328. <https://doi.org/10.3390/ani13213328>
- Folhadella, A. (2020, October 28). *Behind the Camera: A look at camera trap impacts - Amazon Conservation Association*. Amazon Conservation Association. <https://www.amazonconservation.org/camera-trap-impacts/>
- Kmita, A. (2023, February 9). *5 uses of camera traps - Wildlife Drones*. Wildlife Drones. <https://wildlifedrones.net/5-uses-of-camera-traps/#:~:text=Camera%20traps%20are%20fr,requently%20used,in%20a%20minimally%20invasive%20way.>
- Lee C. (n.d.). *Beauty on the Prowl—Taiwan's Leopard Cats*. 台灣光華雜誌 Taiwan Panorama | 國際化,雙語編排,文化整合,全球華人的雜誌. <https://www.taiwan-panorama.com/Articles/Details?Guid=93103322-7e34-4d79-8b40-4a9bce9593f8&langId=3&CatId=7>
- Mainland Leopard Cat (Prionailurus bengalensis)*. (n.d.). iNaturalist. <https://www.inaturalist.org/taxa/922738-Prionailurus-bengalensis>
- Rytwinski, T., Soanes, K., Jaeger, J., Fahrig, L., Scott Findlay, C., Houlahan, J., Van der Ree, R., & A Van der Grift, E. (2016, November 21). *How Effective Is Road Mitigation at Reducing Road-Kill? A Meta-Analysis*. National Center for Biotechnology Information.

Retrieved May 23, 2024, from

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5117745/#:~:text=Many%20measures%20are%20designed%20to,detection%20systems%2C%20and%20roadway%20lighting.>

Scanlan, S. (2024, January 15). *2 roadkill incidents of leopard cats in Miaoli in 2 weeks*. Taiwan News. Retrieved May 23, 2024, from <https://www.taiwannews.com.tw/news/5078569>

Speed Safety Camera Enforcement | NHTSA. (n.d.). NHTSA.

<https://www.nhtsa.gov/book/countermeasures-that-work/speeding-and-speed-management/countermeasures/enforcement/speed-safety-camera-enforcement#:~:text=Automatic%20plate%20recognition%20and%20time,a%20citation%20may%20be%20issued.>

Taiwan Roadkill Observation Network. (n.d.). <https://roadkill.tw/>

Taiwan's Leopard Cat. (n.d.). TaiwanPlus.

<https://www.taiwanplus.com/news/taiwan-news/animals/230126007/taiwans-leopard-cat>

Van der Meer, Dullemont, H., Wang, C.-H., Zhang, J.-W., Lin, J.-L., Jai-Chyi Pei, K., & Lai, Y.-C. (2023, January 8). *Fine-Scaled selection of resting and hunting habitat by leopard cats (*Prionailurus bengalensis*) in a rural Human-Dominated landscape in Taiwan*.

National Center for Biotechnology Information. Retrieved May 23, 2024, from

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9854813/>