

Anthropogenic influences on the presence and absence of canines

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Abstract

Human activity can have a significant impact on wildlife. While some species are more tolerant or indifferent to disturbances caused by humans, others can be negatively affected if they are unable to adapt. A generalist species is one that has a broad niche and can thrive in a wide variety of habitats. Some studies suggest that certain mammals are generalist species that have adapted well in urbanized environments, while avoiding contact with humans. Unfortunately, there is still a research gap in understanding the full impacts of human disturbances on wildlife and how these effects differ among species. Our project examines how canines, specifically coyotes (*Canis latrans*) and red foxes (*Vulpes vulpes*), react to human activity and how it compares to other mammals. We placed eighteen trail cameras throughout various areas in Brookhaven National Laboratory (BNL) located in New York, for thirteen trap nights at each site. A total of forty-two sites were surveyed from 06/13/23 to 07/27/23. Photos were processed with the help of Timelapse2 and EcoAssist. Based on over 38,000 images captured, we calculated the number of disturbances per deployment period at each site, as well as the average animal encounters and the types of species spotted. Our results included red fox sightings at four locations but no coyote sightings. Furthermore, red foxes were spotted in developed and undeveloped areas. Our findings could help us gain a better understanding of the behavioral patterns of certain species in relation to human activity. As a result of this summer internship, I have strengthened my field research skills and my analytical skills. This project aligns with the mission of BNL and the Department of Energy to increase conservation and ecological research.

Introduction

Background:

- Coyotes and red foxes are opportunistic feeders and generalist species that can thrive in a wide variety of habitats, including boreal forests, tropical forests, exurbs and even dense urban centers.^{1,2}
- Since 2004, there have been several confirmed coyote sightings on Long Island.³
- In a study conducted in 2015, researchers believed that red foxes were the most abundant and widespread, non-domesticated canine on Long Island.³

Problems:

- Currently, there is insufficient data on the status of these canine populations in the region
- The behavioral patterns and population dynamics of red foxes could be affected by the introduction of coyotes.
 - Some studies suggest that coexistence between these two canids might be difficult to achieve due to resource competition or direct killing of red foxes by eastern coyotes.⁴
- If the introduction of coyotes to Long Island causes the displacement or extirpation of red foxes, the population of other prey animals can be directly or indirectly affected.⁵
- There could be interactions or conflicts between coyotes and humans

Importance:

- As the population of coyotes on Long Island is predicted to increase, it is important to investigate the likelihood of coyote-human interactions and to prepare for any issues that may arise.
- The ecological diversity of Brookhaven National Lab makes it a suitable region for conducting observational studies that explore the direct and indirect effects of coyotes on other species, as well as the anthropogenic influences on wildlife.

Hypotheses:

- There will be more red fox sightings than coyote sightings
- Canines will avoid areas with high human activity.
- Canines will prefer habitats with more plant life, as opposed to more developed areas.

Methods

Study Area: Brookhaven National Laboratory

- 5,265 acres with both developed and natural landscapes.
- ArcGIS was used to determine the type of habitat at each camera site (Figure 3).

Study Period: 06/13/23 to 07/27/23

Trail Cameras and Deployment:

- A maximum of 18 motion-sensor Moultrie brand cameras were deployed for thirteen trap nights (Figure 1).
- A total of 42 different sites were surveyed (Figure 4).
- A grid containing 73 locations was used as a guide for camera placement.
- Scent tabs were used to attract animals to the camera (Figure 2).
- When mounting trail cameras to trees, we tried to place them about three feet from the ground (Figure 5).
- We tried to avoid facing the cameras east or west in order to avoid overexposure from the sun.

Photo Analysis:

- Over 38,000 images were captured during the Summer of 2023.
- All images were processed through EcoAssist and Timelapse2.
- Images were labeled according to the count of wildlife species, humans or vehicles detected.
- We calculated the total number of disturbances and animal activity per site during each deployment period.

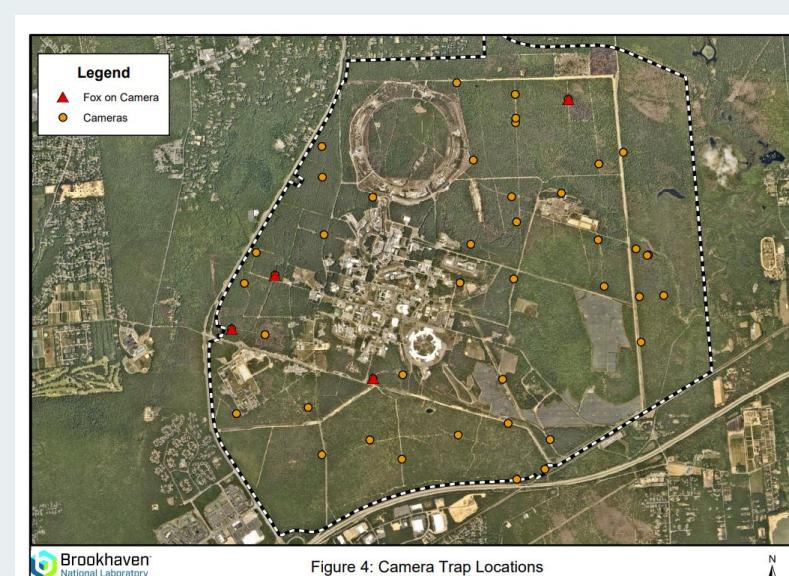
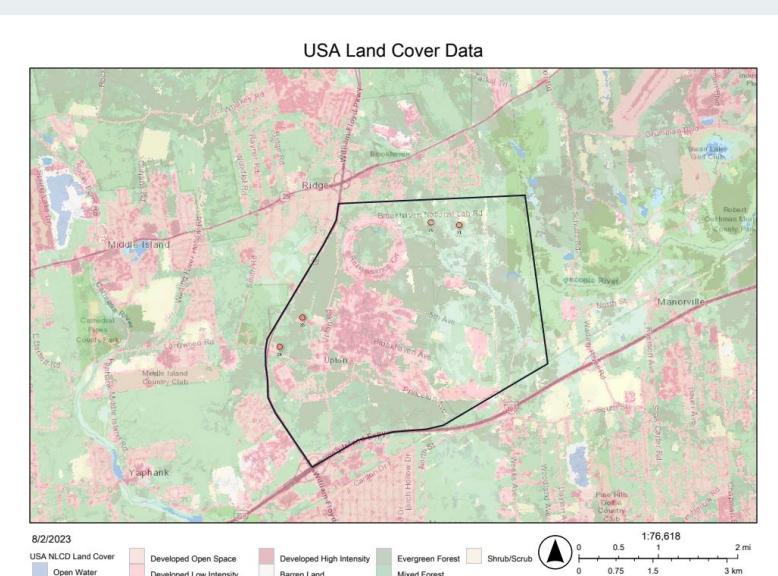
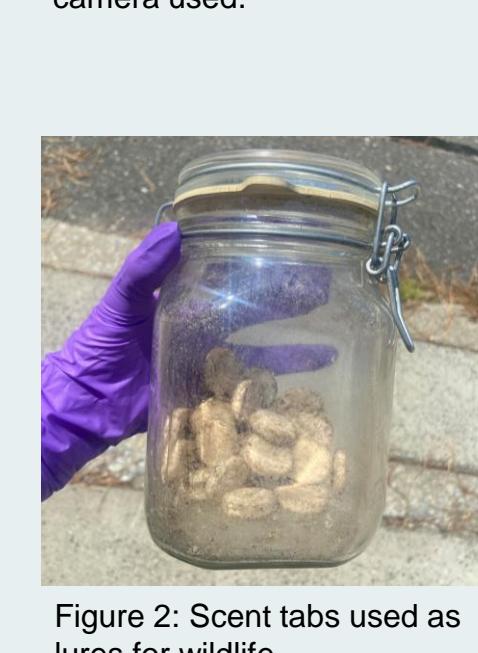
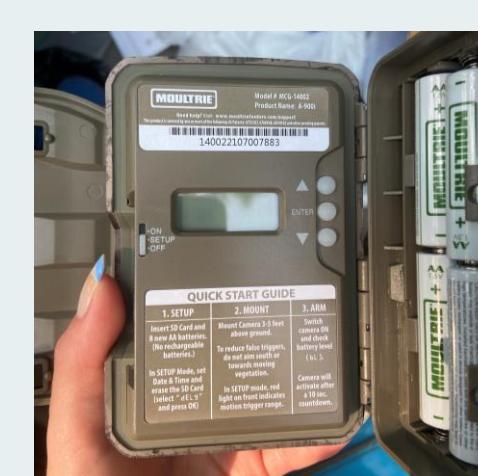


Figure 3: Habitat composition at BNL according to the USA Land Cover Data layer.

Figure 4: All camera sites that were surveyed during the Summer of 2023 on imagery base-map.

Figure 5: Example of trail camera placement.

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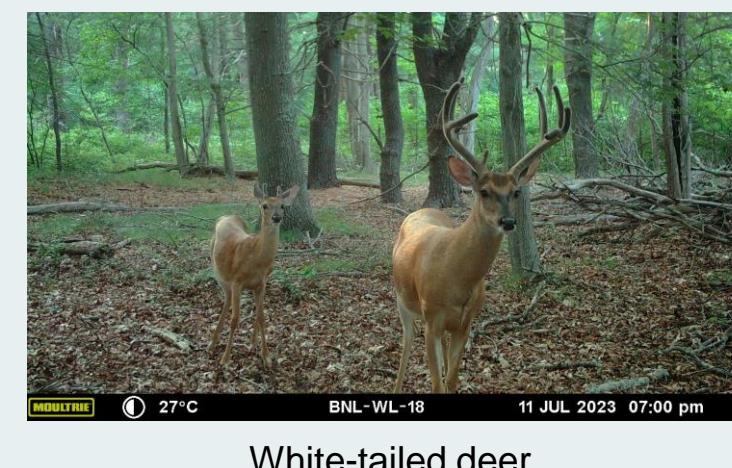
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Results

Wildlife captured:

- There were several species observed at BNL, some of which include:



White-tailed deer (*Odocoileus virginianus*)



Raccoon (*Procyon lotor*)



Wild turkey (*Meleagris gallopavo*)



Eastern gray squirrel (*Sciurus carolinensis*)



Eastern towhee (*Pipilo erythrourhynchus*)



Red fox (*Vulpes vulpes*)

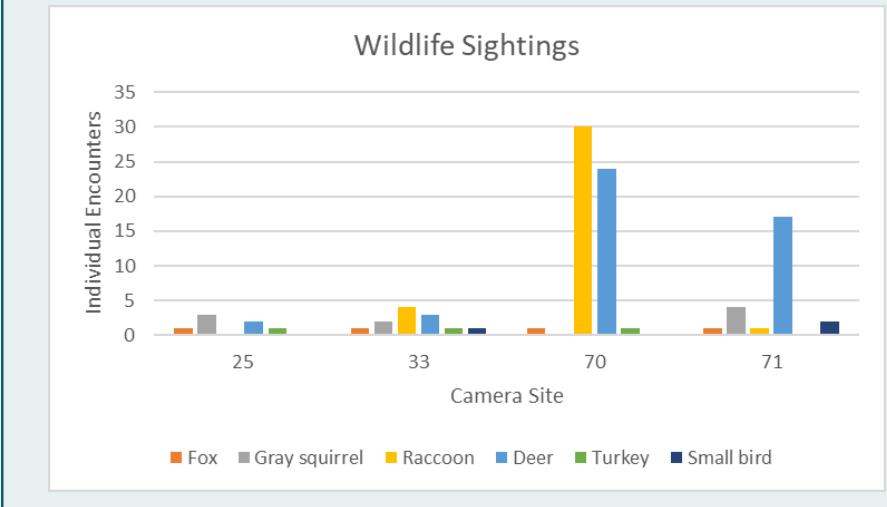


Figure 6: Individual encounters of wildlife species in the sites where red foxes were observed.

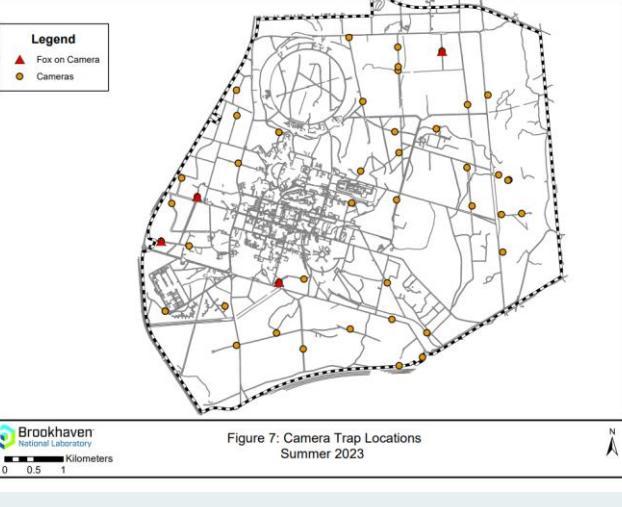


Figure 7: All camera sites that were surveyed during the Summer of 2023.

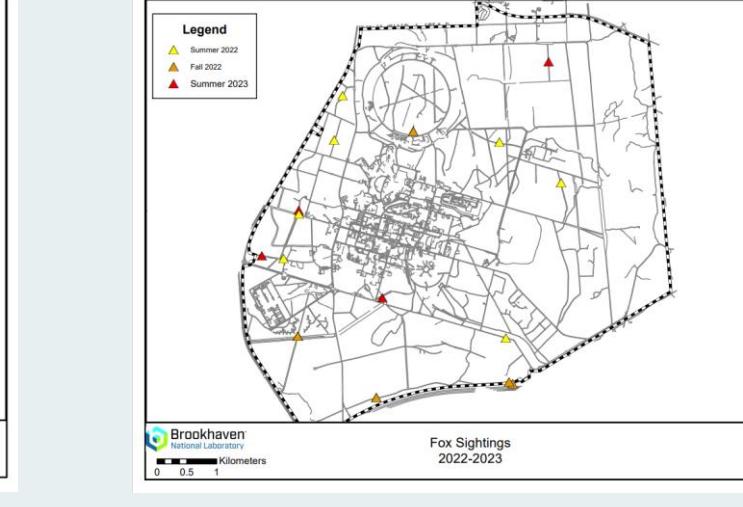


Figure 8: Camera sites where red foxes were spotted during the Summer and Fall of 2022 and Summer of 2023.

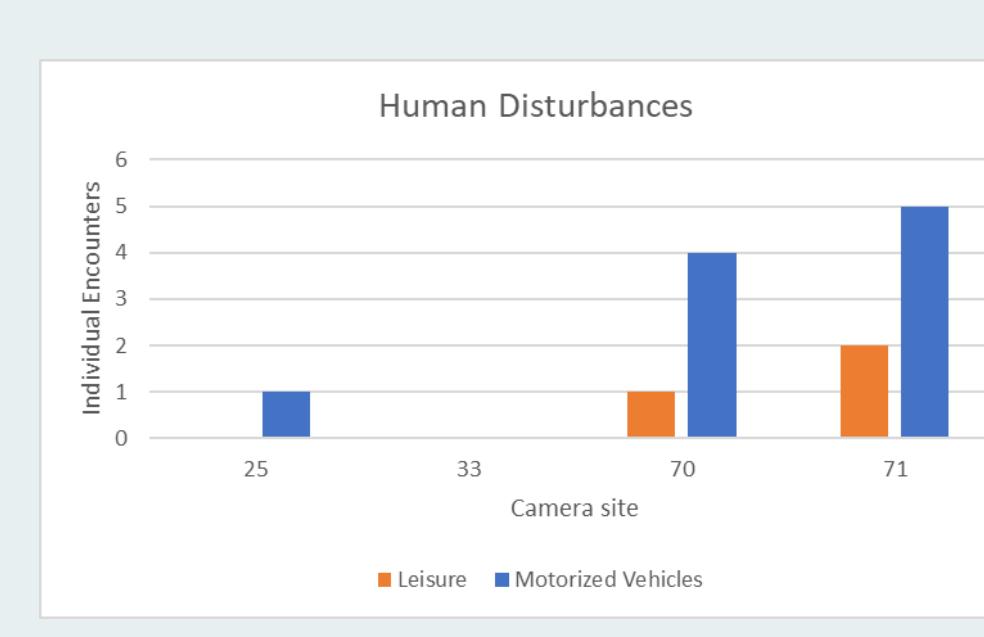


Figure 10: Individual encounters of human disturbances in the sites where red foxes were observed.

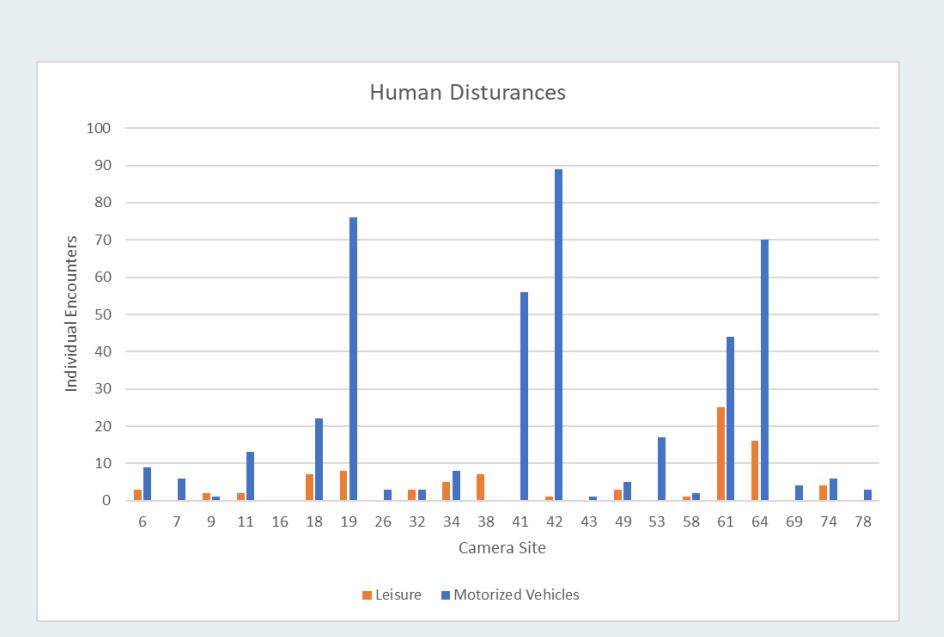


Figure 11: Individual encounters of human disturbances in the sites where red foxes were not observed.

Discussion

- Brookhaven National Laboratory has diverse habitats that are home to various species.
- There is not enough data to indicate that red foxes prefer natural habitats over developed areas.
- Figure 6 could indicate that these canines avoid human activity. However, more data would need to be collected to make any assumptions.
- Even though there are coyotes on Long Island, none were spotted by cameras at BNL.
- One of the red fox encounters showed possible signs of Sarcoptic mange
 - Highly contagious skin infection caused by a parasitic mite (*Sarcoptes scabiei*), which could indicate a possibility of spread.⁶

Future work:

- We could collect data for a longer period of time and during different seasons.
- We could place a larger quantity of cameras during a given deployment period.

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