

# TEMPORAL CHANGES IN MAMMALIAN CARNIVORE DISTRIBUTION IN THE TEXAS BLACKLAND PRAIRIES



Adam Myers, Kaitlyn Malone, Abbigal Maeng, Jessica E. Healy,  
Department of Biology, Austin College (amyers19@austincollege.edu)



## Abstract

Zoogeography is the study of where animals live and why. As the climate changes, species ranges change, and therefore it is important to consider how and why those range shifts occur. Our project focuses on the comparison of the current range, diversity, and population of mammalian carnivores in the Blackland prairie with the historical diversity, ranges, and populations of those species. We developed a historic data set (prior to 1970) of carnivore species presence in Texas by County by reviewing previous primary literature as well as tag data from Austin College's museum collection. A modern dataset, using County-level mammalian carnivore sightings from 1970 onward, was developed primarily using sightings from the citizen science database iNaturalist, supplemented by camera trapping at Austin College's Sneed Prairie restoration site in Grayson County, TX. We detected a total of 19 mammalian carnivore species across our modern and historic Blackland prairie data sets, with 5 mammalian carnivore species detected by camera trapping at Austin College's Sneed prairie, in addition to 9 other non-carnivore mammal species. Four species present in the historic dataset (*Mustela frenata*, *Canis rufus*, *Leopardus parda*, and *Panthera onca*) were not detected in our modern dataset. In addition, population estimates of larger carnivore species (such as *Puma concolor* and *Ursus americanus*) in the modern dataset were below what would be considered historical levels. These results suggest that 1) smaller or more cryptic mammalian carnivore species are likely to be overlooked by citizen science efforts like iNaturalist, which tend to overcount mesocarnivores in urban areas and undercount those in rural areas, and 2) that prairie restoration sites are in themselves inadequate to restore carnivore diversity to pre-modern levels.

## Question & Hypothesis

How have the population and diversity of carnivores changed over time in the Blackland prairie area?

## Main findings:

- 5 carnivore species (1 non-native) detected at Austin College's Sneed Prairie restoration site by camera trapping (Fig. 1, Table 1)
- Of 19 carnivore species historically present in blackland prairie region of Texas, 15 are detectable in modern times using citizen science site iNaturalist (Table 2)
- Most iNaturalist sightings of carnivores occur around urban areas (Fig. 2)

## Conclusions:

Carnivore diversity has decreased over time. Citizen science data can be useful for detecting carnivores, but is likely to be over-represented in urban areas.

## Future Directions

- Continuation of camera trapping
- Further analysis of iNaturalist dataset to estimate population sizes in rural vs. urban

## References

Baylor University Bulletin Mammals of Texas, University of Texas Press. (2016). *The Mammals of Texas* (Seventh). *iNaturalist*. iNaturalist. (n.d.). Retrieved February 13, 2022, from <https://www.inaturalist.org/>

## Acknowledgements

iNaturalist for data, Austin College Biology department for purchasing camera traps and funding for sciences summer research program



Fig. 1-- (Above, Left to right) Pictures captured at Sneed prairie: Striped skunk (*Mephitis mephitis*), Coyote (*Canis latrans*), Bobcat kittens (*Lynx rufus*), Juvenile Bobcat, Coyote.

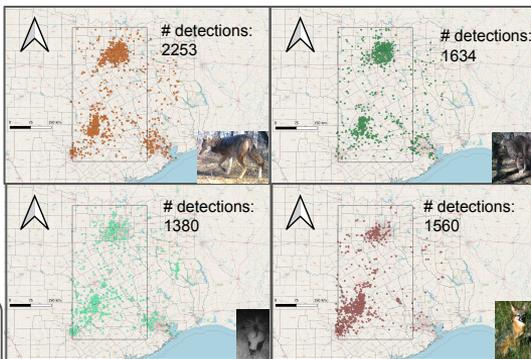


Fig. 2-- (Above) Mesocarnivores are more likely to be detected by iNaturalist users in cities than in rural areas in boxed area approximating blackland prairie region; upper left: orange dots represent modern detections of coyotes; upper right: green dots represent bobcat detections; bottom left: teal dots represent striped skunk detections; bottom right: mauve dots represent grey fox detections.

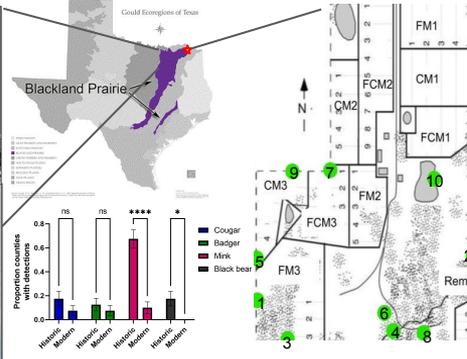


Fig. 3-- (Above) Of 40 counties in blackland prairie region, fewer had detections of carnivores in modern vs. historic dataset. RM 2-way ANOVA: Time: F (1, 156) = 43.50, P<0.0001\*\*\*\*\* Species: F (3, 156) = 13.12, P<0.0001\*\*\*\*\* County: F (156, 156) = 1.330, P=0.04\* Time x species F (3, 156) = 12.26, P<0.0001\*\*\*\*\*

Fig. 4-- (Above) Map of Sneed Prairie (Grayson County) with camera trap locations marked

Sneed Camera trapping results	
Species	Camera #
Bobcat	1, 2, 6, 7
Coyote	5, 6
Raccoon	6, 10
Striped skunk	6, 8
Domestic cat	2, 5
Cattle	2, 10
White-tailed deer	5, 6, 7, 9
Feral hog	2, 5, 6
Armadillo	3, 5, 6, 8
Opossum	1, 3, 4, 6, 8
Cotton rat	1
Woodrat	3
Cottontail rabbit	1, 2, 3, 5, 6, 7, 8

Table 1-- (Above) Camera trapping results at Sneed

Carnivore species	Historical detections (pre-1970)	Modern detections (post-1970)
<i>Bassariscus astutus</i> (Ringtail)	x	x
<i>Canis latrans</i> (Coyote)	x	x
<i>Canis lupus</i> (Red Wolf)	x	
<i>Conepatus leucocatus</i> (Hog-Nosed Skunk)	x	x
<i>Leopardus pardalis</i> (Ocelot)	x	
<i>Lontra canadensis</i> (American River Otter)	x	x
<i>Lynx rufus</i> (Bobcat)	x	x
<i>Mephitis mephitis</i> (Striped Skunk)	x	x
<i>Mustela frenata</i> (Long-tailed Weasel)	x	
<i>Neovison vison</i> (Mink)	x	x
<i>Procyon lotor</i> (Raccoon)	x	x
<i>Panthera onca</i> (Jaguar)	x	
<i>Puma concolor</i> (Mountain Lion)	x	x
<i>Spilogale gracilis</i> (Western Spotted Skunk)	x	x
<i>Spilogale putorius</i> (Eastern Spotted Skunk)	x	x
<i>Taxidea taxus</i> (American Badger)	x	x
<i>Urocyon cinereoargenteus</i> (Grey Fox)	x	x
<i>Ursus americanus</i> (Black Bear)	x	x
<i>Vulpes vulpes</i> (Red Fox)	x	x

Table 2-- (Above) Historic vs. modern detections in 40 counties of blackland prairie region