



Daily Activity Patterns Among Apex Predators in the Northwest United States

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Introduction

The gray wolf [*Canis lupus*], brown bear [*Ursus arctos*], and American black bear [*Ursus americanus*], are all ecologically interesting because they are all apex predators that exist in the same spaces in the United States. Overall, they face competition among each other [1]. Past research has shown that the main driving force for these species is food availability and distribution [2][3]. Human activity has shown to affect the daily activity patterns of the American black bear and brown bear, which is important for how they interact with each other [4][5]. However, little research has been done after wolf reintroduction in many parts of the western U.S. to see if these three predators will change their daily activity patterns around each other. The goal of this project is to look at the daily activity patterns of the gray wolf, brown bear, and American black bear in the northwestern United States to see if any conclusions can be made about how these species coexist with each other.

Question

Do the activity patterns among American black bears [*Ursus americanus*], brown bears [*Ursus arctos*], and gray wolves [*Canis lupus*] differ?



Hypothesis

The American black bear and brown bear will be more active during the day while the gray wolf will be more active at night

Camera Trap Method Set-Up



- Cameras were deployed from September to October of 2019 and 2020 for 400 camera nights
- No bait or lure was used
- No white-flash camera or setting was used
- Cameras were set on 3 or 5 image bursts. No video mode, hourly or daily sampling setting was used
- First and last pictures were of a camera trapper on the day camera was deployed and received [6]



Figure 4 shows the setup of the camera traps. Each camera faced north, 50 cm from the ground and between 200m to 5km from other cameras. [8]

Results

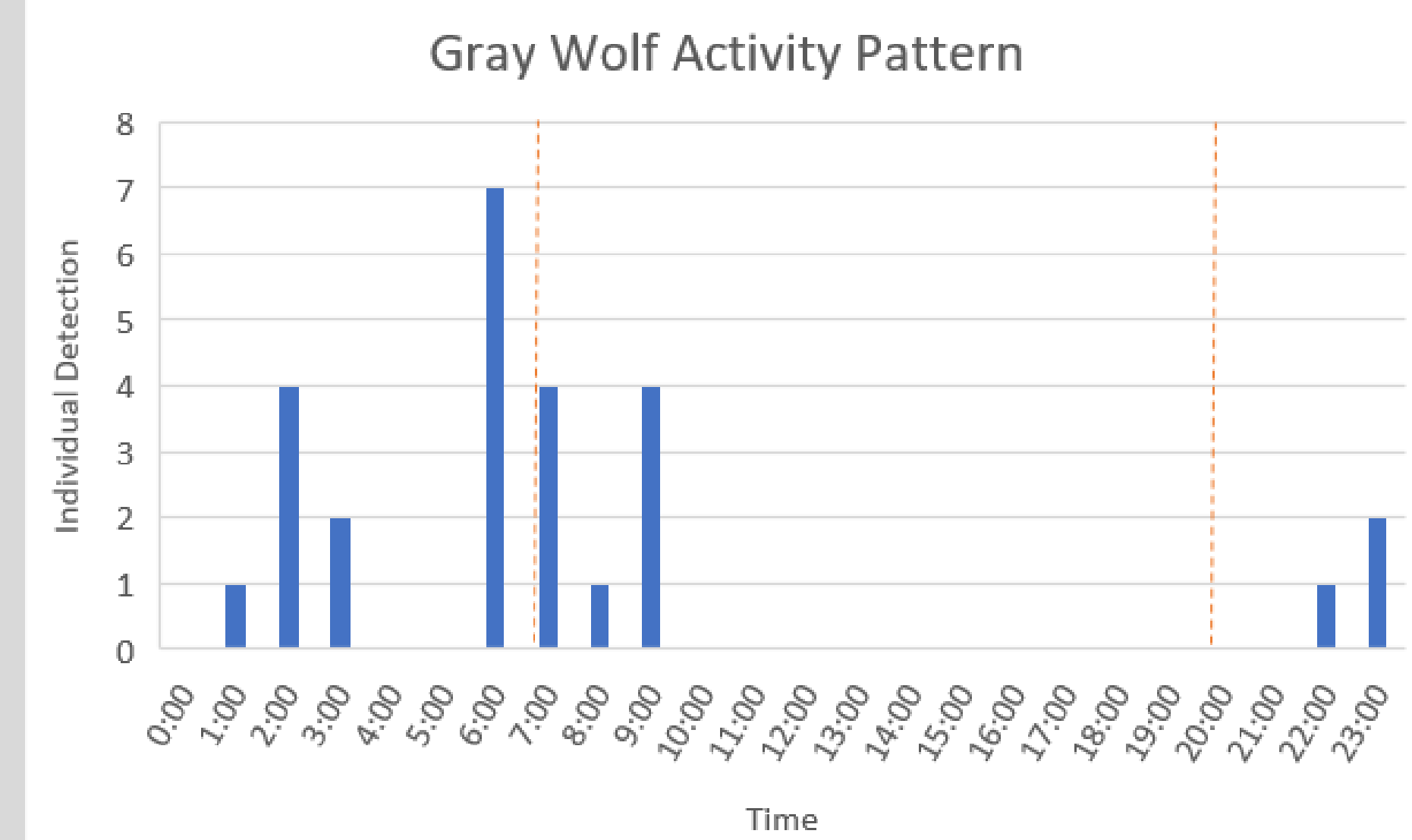


Figure 1 displays the frequency of detections of gray wolves within each hour throughout a day cycle. The orange dashed lines represent the relative time of sunrise and sunset from September and October of 2019 and 2020. There is a noticeable peak in activity right around sunrise.

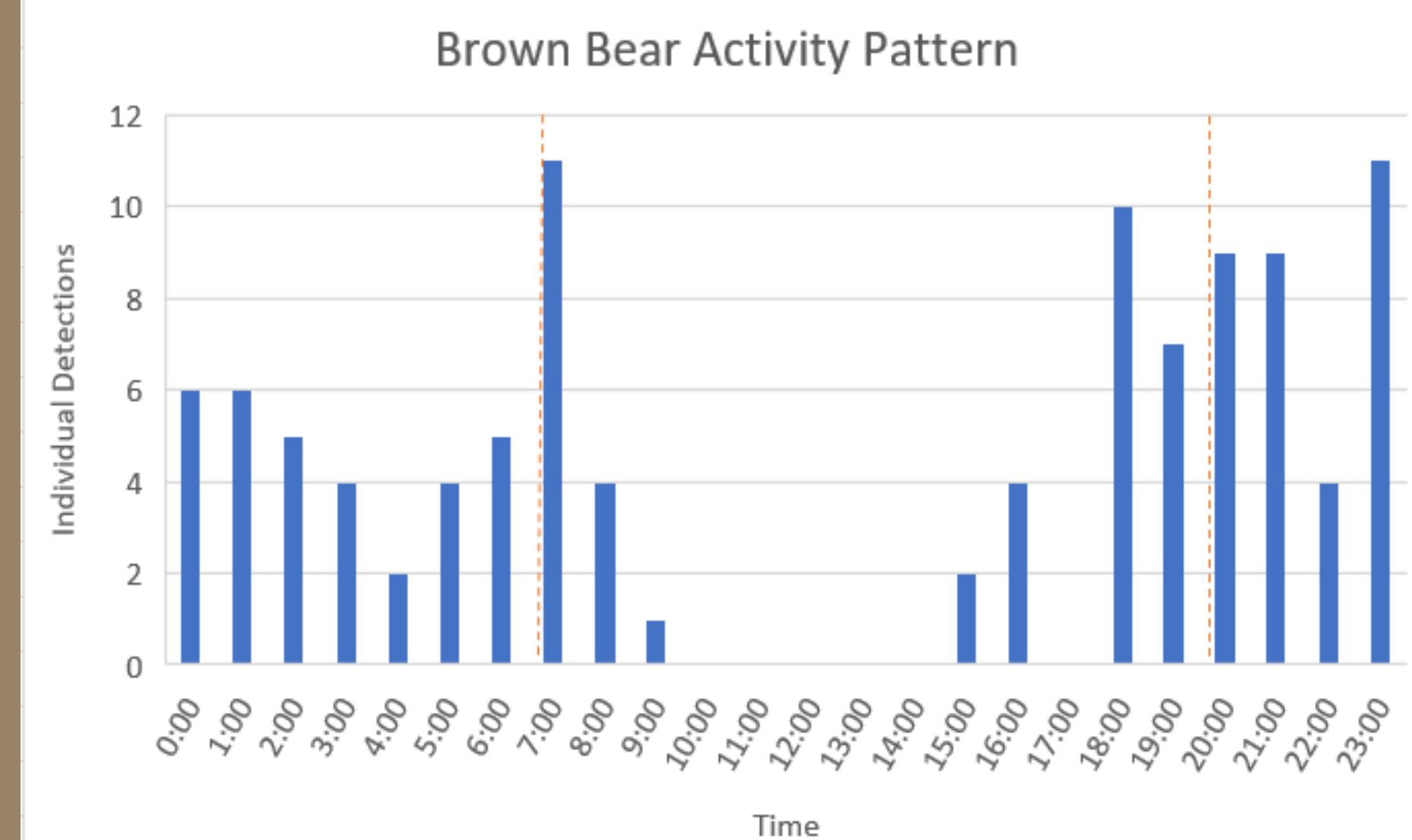


Figure 2 displays the frequency of detections of brown bears within each hour throughout a day cycle. The orange dashed lines represent the relative time of sunrise and sunset from August, September, and October of 2019 and 2020. There are noticeable peaks right after sunrise and a couple hours before and after sunset.

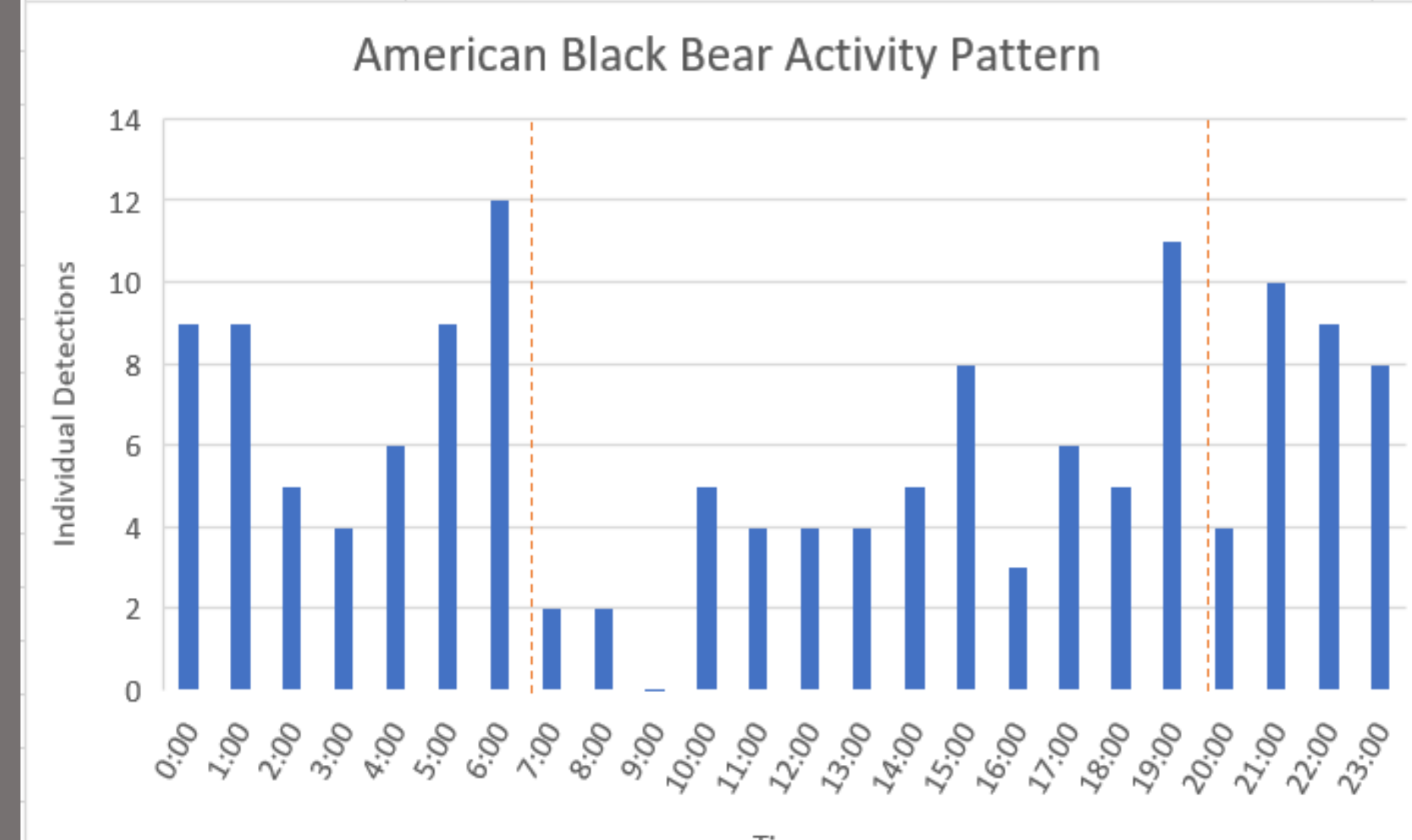


Figure 3 displays the frequency of detections of American black bears within each hour throughout a day cycle. The orange dashed lines represent the relative time of sunrise and sunset from August, September, and October of 2019 and 2020. There are noticeable peaks shortly before sunrise and sunset.

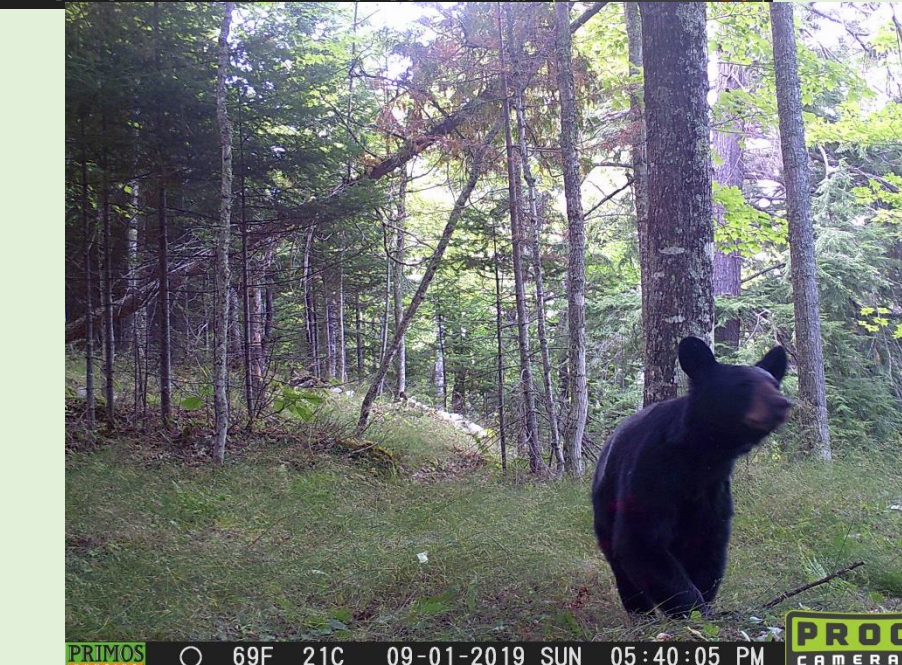


Table 1: Chi-square test results for the gray wolf, brown bear, and American black bear, showing relation to p-value of 0.05 and determined activity pattern.

Species	Common Name	Chi-Square Value	P-value	Accept/Reject Null	Activity Pattern
Species 1	Gray Wolf	62.223	<0.05	Reject Null	Crepuscular
Species 2	Brown Bear	36.577	<0.05	Reject Null	Crepuscular
Species 3	American Black Bear	10.161	<0.05	Reject Null	Nocturnal

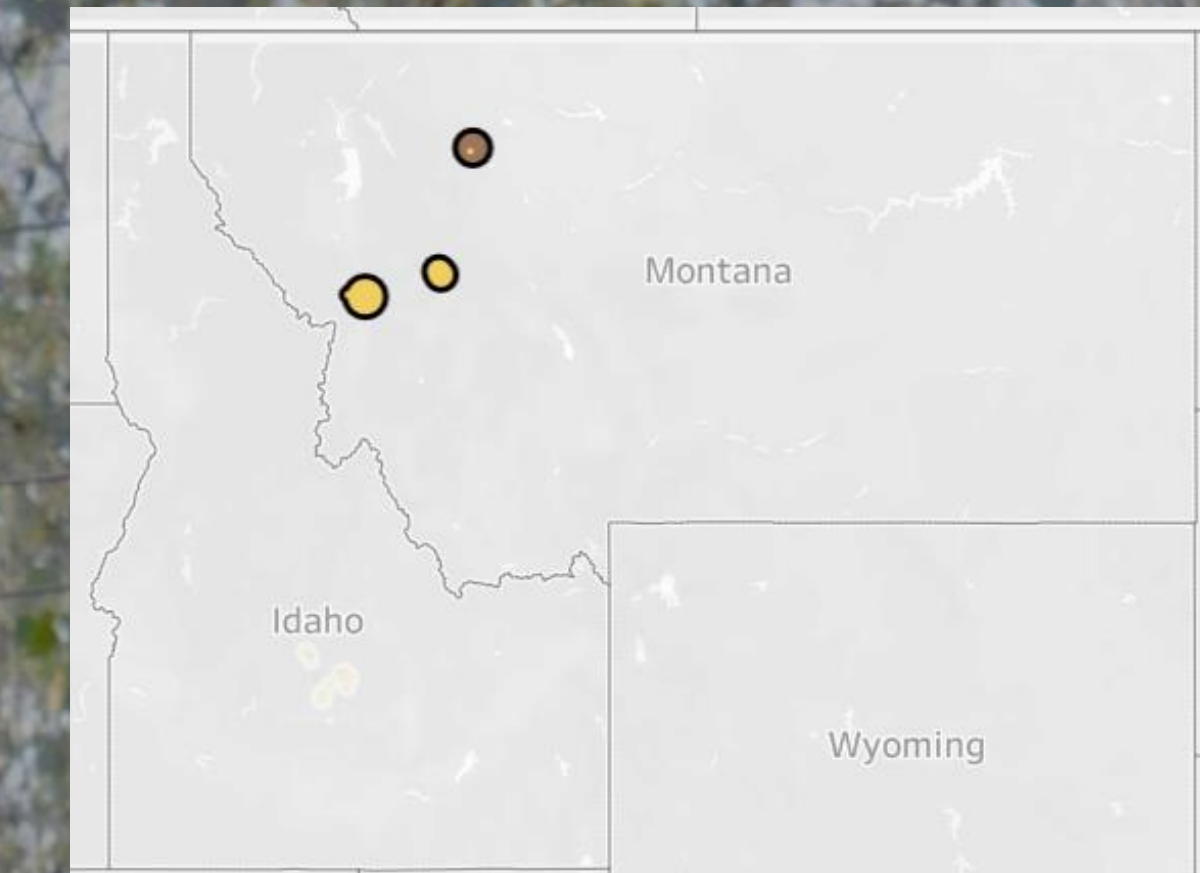


Figure 5 shows the recorded observations of the American black bear and brown bear in 2019 by Snapshot USA as colored dots



Figure 6 shows the recorded observations of the American black bear, brown bear, and gray wolf in 2020 by Snapshot USA as colored dots

Species on Map

- American Black...
- Gray Wolf
- Brown Bear

Total Observed Count

- 1
- 50
- 100
- 150
- 200
- 229

Count of Common Name 2

- 1
- 2
- 4
- 6
- 8
- 10

Common Name 2

- American Black Bear
- Brown Bear
- Gray Wolf

Discussion

These results support the second part of my hypothesis but not the first. The observed daily activity patterns show that the American black bear and brown bear follow a crepuscular activity pattern and the gray wolf follows a nocturnal activity pattern. However, these results do not tell what the cause of these daily activity patterns are. Future research could look into the cause of the activity patterns of the gray wolf, brown bear, and American black bear shown here, whether it be interactions among themselves, other species, or humans. Finally, these results can be used to mitigate human-wildlife conflict in spaces where they interact, which is especially important for the gray wolf since it is endangered under the Endangered Species Act and has only been recently reintroduced in these areas [7].

Acknowledgments:

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References

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