Representation of predatory species and prey species in Rocky Mountain National Park

Abigail Schmidt

Introduction

Predatory animals were historically systematically eliminated in the western United States, largely in an effort to protect livestock. A 2015 study found that in a typical ecosystem, the predator:prey biomass ratio is equal to 0.74, on average (Fig. 4).[1] If predatory species were represented accurately by the National Park Service, we could expect to see a similar visibility score ratio when it comes to deliberate representation of animal species by the National Park Service. This project aims to understand how the National Park Service is representing animal species and determine if the representation of predator and prey species is congruent with the typical predator:prey biomass ratio as determined by Hatton et al. By analyzing the educational information and products being presented to visitors to Rocky Mountain National Park, I hope to determine if the historical attitude towards predatory species is still present in the way that the National Park Service provides information and resources to the public.

Methodology

- All data was gathered from public displays, handouts, placards, and visitor centers in Rocky Mountain National Park; Rocky Mountain National Park is managed by the National Park Service (NPS), an agency within the U.S. Dept. of the Interior. Birds, reptiles, fish, and amphibians were omitted from the data set in order to focus on mammals, as apex predators are typically large mammals in terrestrial ecosystems.
- Visitor Center: Components of visitor center displays were analyzed, and individual species were given **prominence scores** based on the type of display, number of times the animal was portrayed, and the total word count allocated to each animal.
- **Visitor Guide Handout:** Upon entering Rocky Mountain National Park, every visitor is handed a Visitor Guide and a map of the park. Both handouts have information about wildlife, including photos and information on how to view the animals. The visitor guide was analyzed for the portrayal of each species and the total word count allocated to each species. Additionally, the **Ranger Talks** advertised in the visitor guide were analyzed to determine the number minutes of per week allocated to each animal.
- **Gift Shops:** the number of specific merchandise representative of each animal was counted.

Visibility Scores:

Visibility scores were determined by multiplying the average word count of a given species, the average prominence score of a given species, and the total number of visitors centers (up to all 5) in which the animal was displayed, as the specific species featured in displays varied between visitor centers.

Figure 1. This elk display resulted in a high prominence score.

Visitor Guide

A total of 6 mammals were discussed in the visitor guide, including elk, bighorn sheep, and pika. Notably, the two predatory species listed in the visitor guide, the mountain lion and the black bear, were listed on the Safety Guide page of the Visitor Guide. Discussion of the biology of either of these animals or where to view them was not included and instead guests were educated on predator safety.

Fig. 2: The wildlife page in the Rocky Mountain National Park visitor guide.

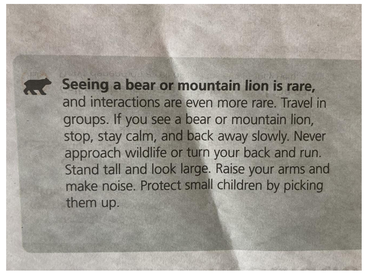
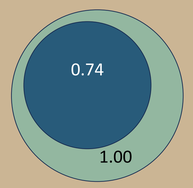


Fig. 3: Black bears and mountain lions are featured on the safety guide page of the visitor guide.

Results/Findings

Biomass vs. Visibility Score

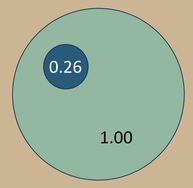
The predator:prey visibility score ratio in visitor centers was determined to be 0.26 (Fig. 5), a notable discrepancy between the expected biomass ratio and the actual visibility score of predators in any given visitor center.



Predator:Prey biomass ratio in a typical ecosystem

Prey biomass = 1.00
Predator biomass = 0.74

Fig. 4



Predator:Prey visibility score ratio in Rocky Mountain National Park

Prey visibility = 1.00
Predator visibility = 0.26

Fig. 5

Ranger Talks

The amount of time per week dedicated to educating visitors about prey species (bighorn sheep and moose) was 653.3 minutes per week, and the amount of time dedicated to predatory species (black bear and mountain lion) was 186.6 minutes per week.

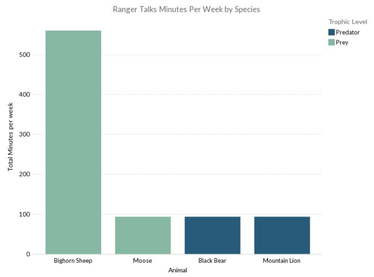


Fig. 6: Minutes per week dedicated to individual species in educational talks given by park rangers.

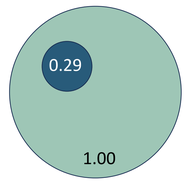


Fig. 7: Ratio of minutes/week dedicated to talking about predator species versus prey species.

Gift Shop

The most prevalent species represented in the gift shops were elk and black bear. The ratio of predator to prey merchandise was 0.6, a number significantly closer to the typical predator:prey biomass ratio.

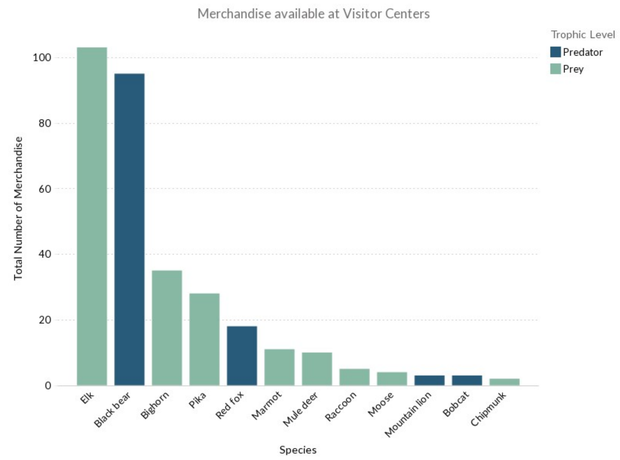


Fig. 8: The total number of different types of merchandise representative of each species across all five visitor centers.

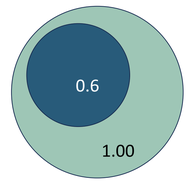


Fig. 9: Ratio of predator:prey in gift shop merchandise.

Conclusion

Is the representation of predatory species consistent with the expected predator:prey biomass ratio in a typical ecosystem?
The short answer is no: based on quantitative data, predatory animals are not allocated a proportionate word count, they are not as prominently featured in handouts given to visitors upon entry to the park, they are not as prominently displayed in visitor centers, and although the representation in gift shops was closer to the expected ratio, it was still smaller than the 0.74 predator:prey biomass ratio.

Why does it matter?
Predators are vital to ecosystems for a variety of reasons. By controlling prey populations, they prevent habitat damage due to overgrazing. Additionally, by controlling populations and preventing one prey species from out-competing the others, predators help to maintain biodiversity, which leads to a healthier and more resilient ecosystem.

The United States has a historical bias against predatory species, and by not accurately representing predatory animals, we are perpetuating that bias. **By not presenting the public with any information about why these animals are important to ecosystems, these animals receive less attention, conservation efforts for these species are harmed, and ecosystems as a whole along with them.**

Fig. 10: Merchandise in a gift shop.

Acknowledgements

National Science Foundation, EAR 1950681
University of Colorado Boulder
Cooperative Institute for Research in Environmental Studies (CIRES)
Research Experience for Community College Students (RECCS)
Daniel Morrison (data analysis)

[1]Hatton, I. A., et al. (2015). The predator-prey power law: Biomass scaling across terrestrial and aquatic biomes. *Science*, *349*(6252). https://doi.org/10.1126/science.aac6284