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Characteristics of US-Based STEM Webcams *at a Glance*

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INTRODUCTION

STEM and STEM-education organizations (e.g., zoos, museums, and government agencies) operate thousands of publicly available live-streamed webcams, which have the potential to provide rich informal learning opportunities. To date, no research has analyzed the breadth of STEM webcams.

In this study, we developed an inventory of webcams operated by US-based STEM or STEM-education organizations.

We characterized each webcam in categories such as organization type (zoo, aquarium, etc.), webcam subject (animal, body of water, etc.), and the types of engagement features the webcam page employs (live chat with experts, data entry, ability to move the camera view, etc.), and more.

This poster is focused on webcams showing animals and presents our **preliminary analyses**. We hypothesize that webcams showing animals overrepresent charismatic, large-bodied animals.¹

This work is part of a larger study assessing motivations, use, and outcomes of webcams used by STEM organizations.



From top to bottom: Bears, penguins, and eagles, some of the most popular animals we encountered on the webcams.

Main Findings: Charismatic mammals and birds are overrepresented by animal webcams

OBJECTIVE & METHODS

Objective: Identify and characterize STEM webcams

Methods:

- Developed inclusion criteria:
 - Operated by US-based STEM organization (determined by mission statement)
 - Semi-permanently placed video camera
 - Livestream onto the internet for public viewing
 - Can access reliably at the same URL
 - Content is unscripted, uncurated, and not pre-recorded
 - Performed internet searches:
 - To find name of entity: We used the names of US-based STEM and STEM education organizations from lists of zoos, aquarium, science centers, nature centers, natural history museums, state parks, and more
 - Used Google Search with term: “[name of entity] + live stream webcam”
 - Added identified webcams to inventory if they fit inclusion criteria
 - Collected publicly available data from each webcam webpage for many categories, including:
 - Information about the cam subject matter and discipline (e.g., river and geoscience, respectively)
 - Organization type (zoo, aquarium, museum, etc.)
 - Cam location, operator HQs, contact information
 - Engagement tools (live chat, temporary cam control, etc.)
 - Information about viewership
 - Characterized each animal according to International Union for Conservation of Nature (IUCN) Red List Status as Endangered (Vulnerable, Endangered, Critically Endangered)
 - For this poster, our preliminary analyses quantify Animal webcams by
 - Categories within Animal
 - Sub-categories within Birds and Mammals
- [Future analysis will quantify subjects by order, family, genus, or species]

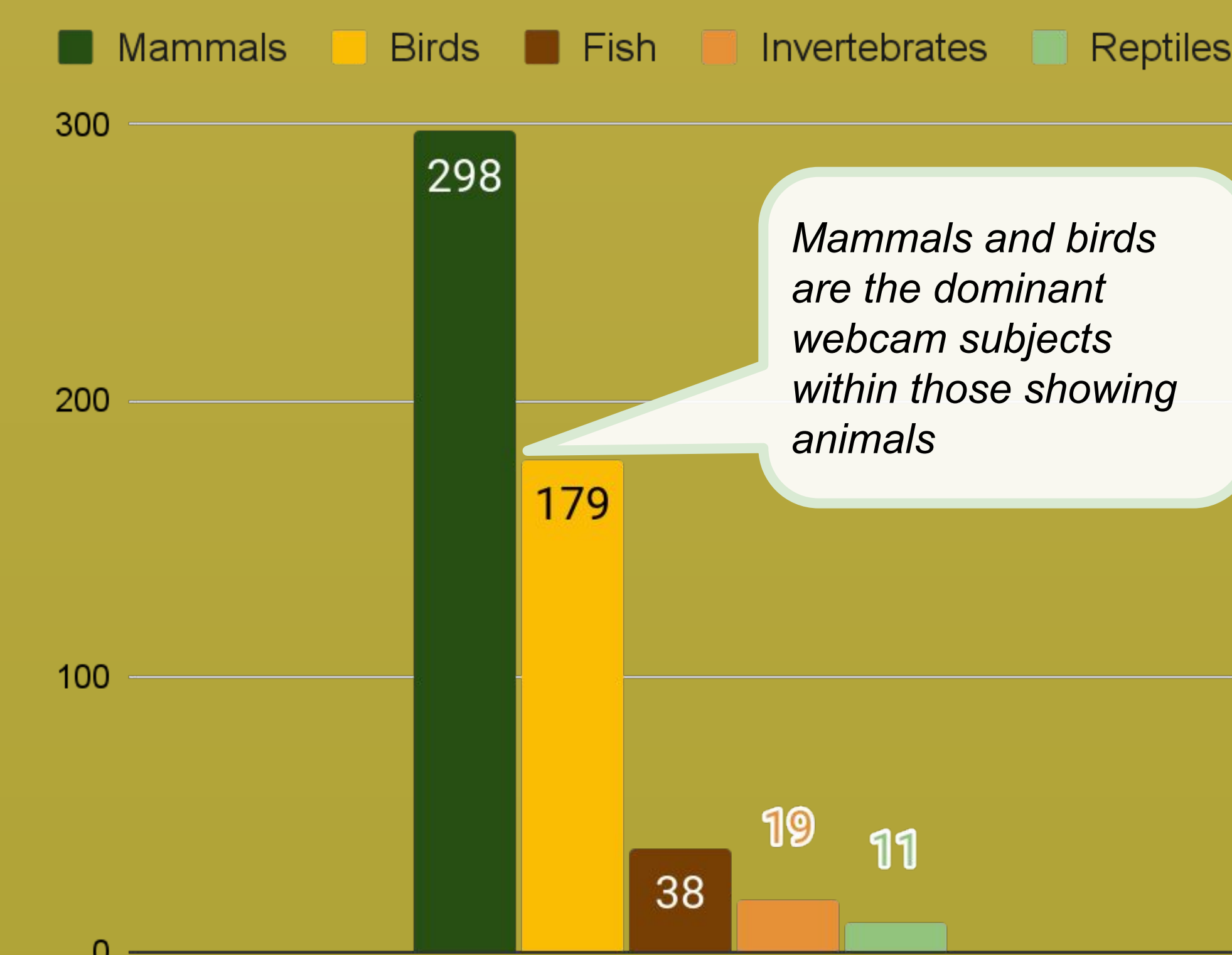


Figure 1. This graph shows the number of each of the five categories of 545 total animal webcams.

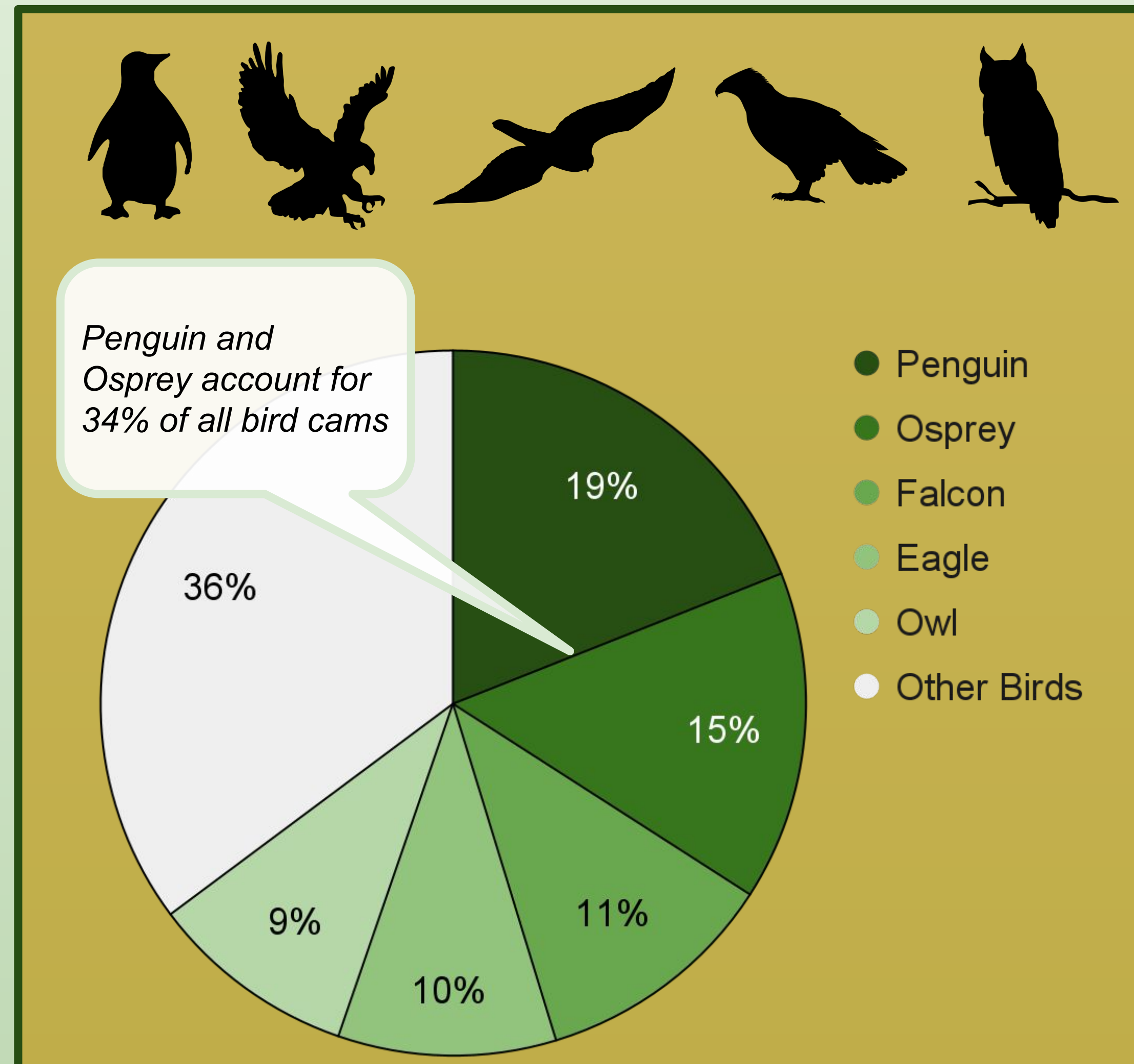


Figure 2. Here, we breakdown the bird cams by subject percentage; we highlight the percentages of the five most popular species we encountered.

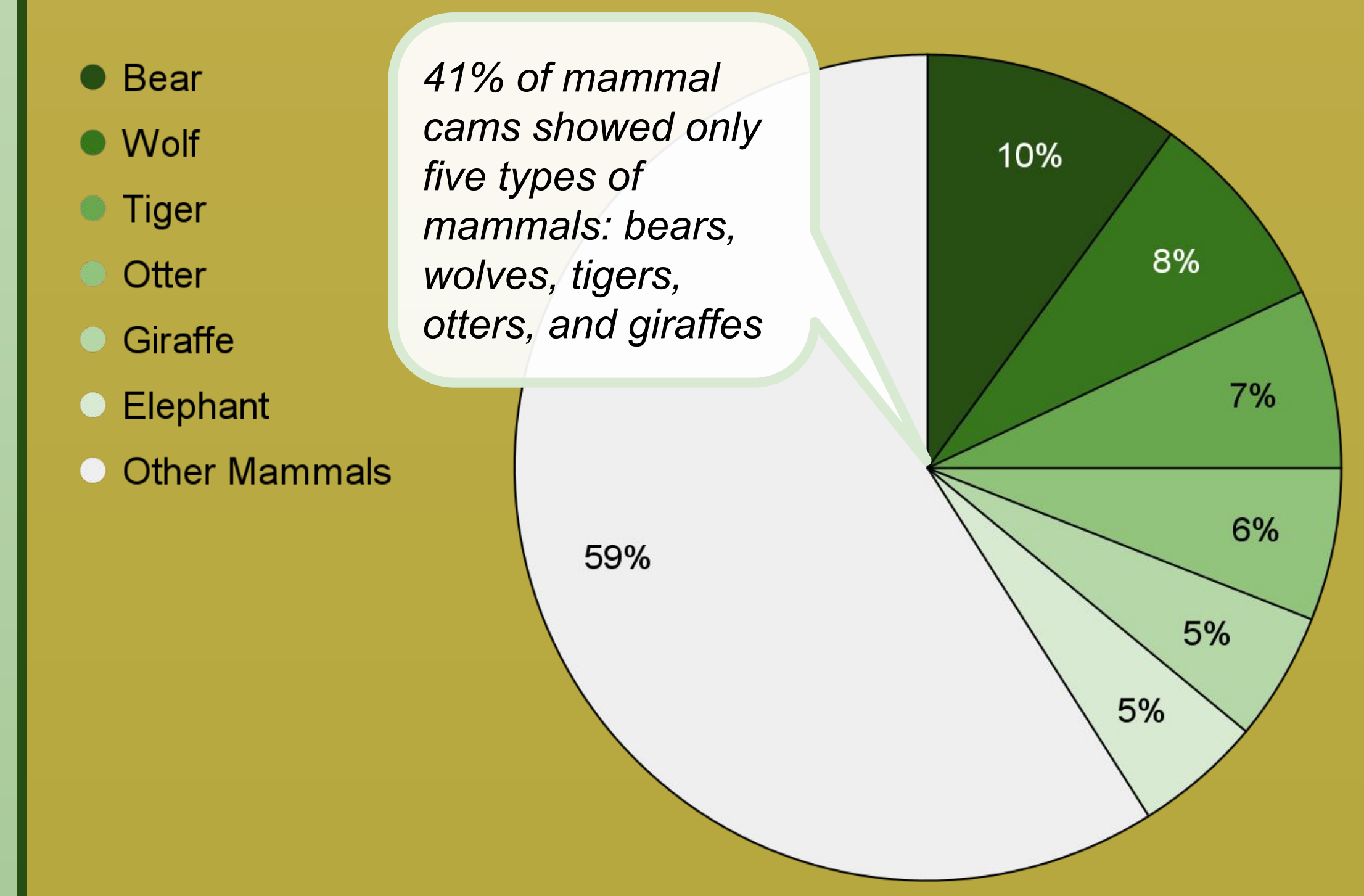
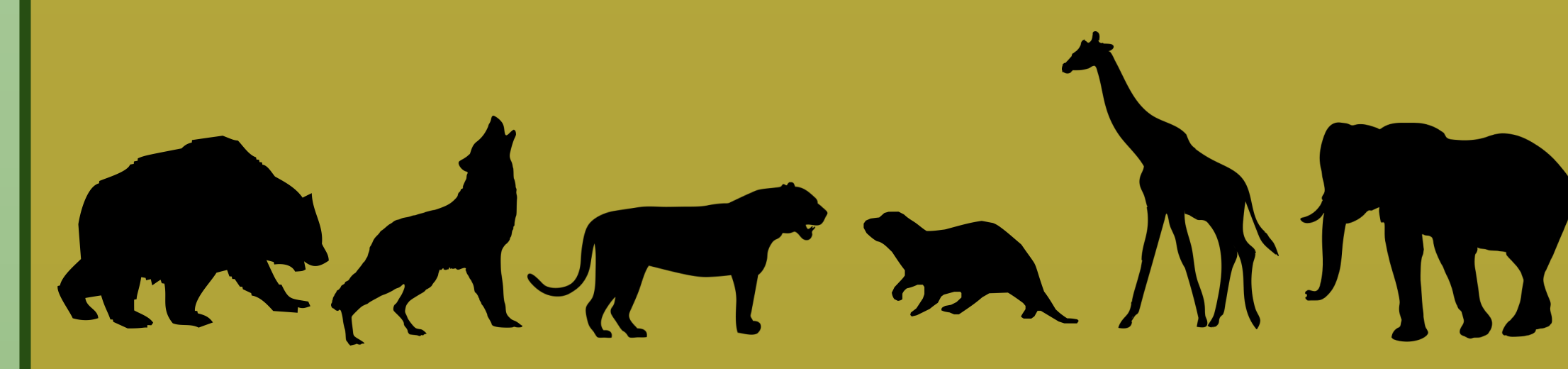


Figure 3. Similar to the graph above, here we breakdown the mammal cams by subject and highlight the percentages of the six most popular species.^{1, 2}



Acknowledgments

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RESULTS

We identified 922 total webcams that matched our inclusion criteria. 545 total cams were of Animals.

There were 298 mammal cams showing 63 types of mammals. There were 179 bird cams showing 23 types of birds. Mammals and birds were overrepresented compared with other animal categories, including reptile, fish, and invertebrates (Figure 1).^{1, 2}

This trend of overrepresentation also occurred within the categories themselves, in which only a few subjects were disproportionately represented (Figure 2 and 3). Specifically, 64% of the 179 bird cams showed only five types of birds, and 41% of the 298 total mammal cams showed only six types of mammals.

Of the 545 total animal cams, 51 (10%) subjects are categorized as Endangered on the IUCN Red List (Figure 4).¹

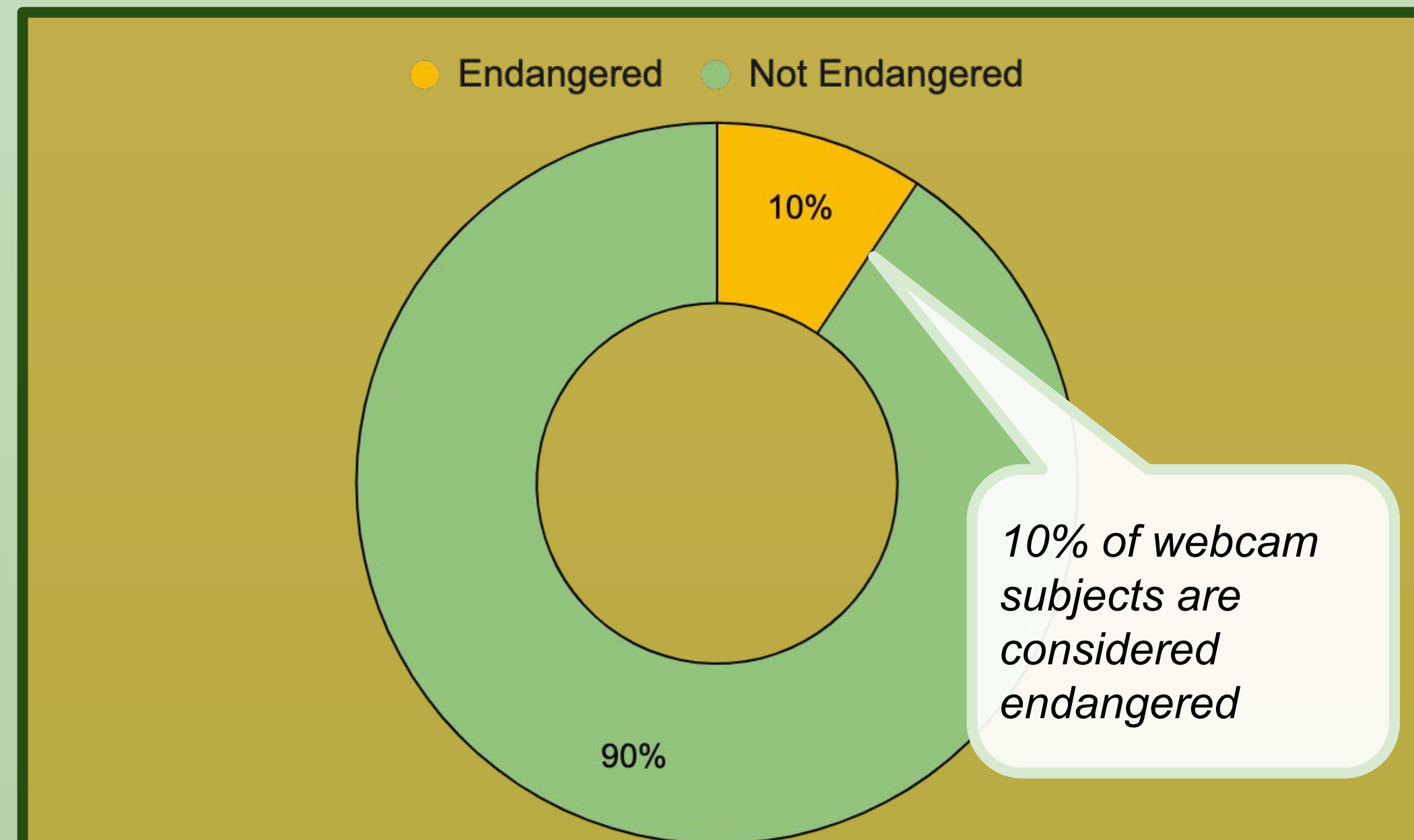


Figure 4. This donut graph illustrates the percentage of cams that are dedicated to animal types ranging from vulnerable to critically endangered as indicated by the IUCN Red List of threatened species.

CONCLUSION

Many of the animals overrepresented in webcams are considered to be charismatic or large bodied. Our findings amplify the overrepresentation of some animals seen in zoos and children’s books.

We speculate that the overrepresentation of certain types of animal webcams may be attributed to a plethora of factors, possibly including animal popularity in zoos, funding incentives, viewer interest, and ease of cam installation and maintenance. Regardless of its cause, it presents an interesting implication for the informal STEM learning these webcams facilitate: viewers are more likely to be exposed to animals they are already familiar with than they are to learn about those that are unfamiliar. Further, our preliminary results suggest that life sciences topics dominate STEM webcams, leaving potential for other visually engaging fields such as robotics, astronomy, or marine ecology to participate. Given the potential for spreading awareness that STEM webcams have, we encourage practitioners to consider the goals of their STEM endeavors.