

Biodiversity of National Parks Capstone project

Endangered Species and Foot and Mouth Disease
Studies

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Species data contained in species_info.csv

Category	Scientific Name	Common Name	Conservation Status
Mammal	Lynx rufus	Bobcat	No Intervention
Bird	Falco peregrinus	Peregrine Falcon	Species of Concern
Reptile	Trachemys scripta	Slider	No intervention

Fig. 1: An example of the kind of information contained in species_info.csv.

- species_info.csv contains information regarding National Parks species, including category, scientific name, common name, and conservation status.
- The vast majority of species (~97%) are in the “no intervention” category for conservation status. 0.27% of species are endangered, 0.18% are threatened, 0.07% are in recovery, and 2.7% are species of concern.

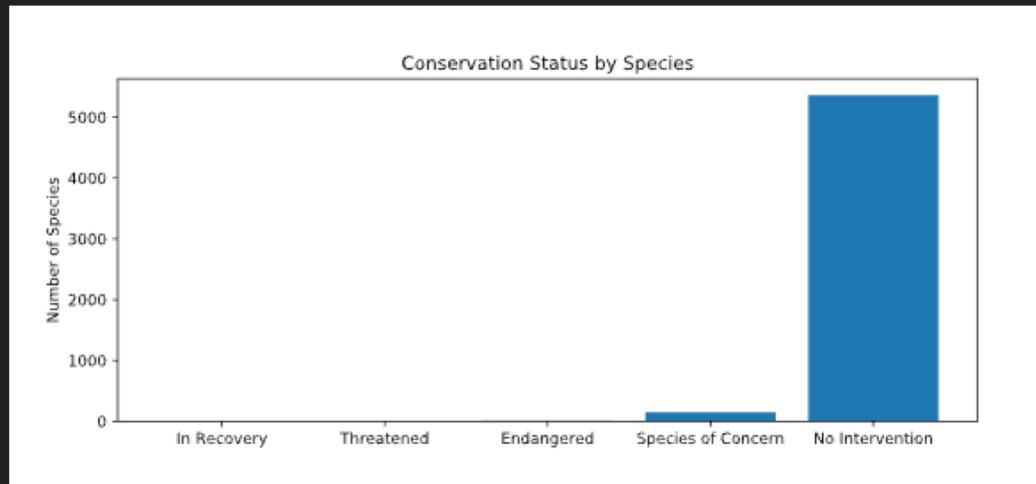


Fig. 2: A bar chart showing that the vast majority of species are in the No Intervention category for conservation.

Are some types of species more likely to be endangered?

Category	Not Protected	Protected	% Protected
Mammal	146	30	17.05%
Bird	413	75	15.37%
Reptile	73	5	6.41%

Fig 3: The three species categories that were compared on the basis of their % protected values.

Pairing	P-value	Significant?
Mammal/Bird	0.6876	No
Mammal/Reptile	0.03836	Yes

Fig 4: P-values/significance values for both pairings analyzed using a chi-squared tests. Difference between species categories on the basis of % protected was considered significant if p-value <0.05.

- By grouping species together in their respective categories and tallying the number of species in the “No Intervention” category (not protected) versus those in other categories (protected) we observe that there are differences in % Protected between certain species categories. Are these differences significant?
- To test for significance, a chi-squared test was performed. Contingency tables were created to do pairwise comparisons between different species categories.
- The difference between mammals and birds was found to be not significant. However, the difference between reptiles and mammals was found to be significant.
- This shows that certain types of species ARE more likely to be endangered than others.

A recommendation for conservationists...



As we found, certain types of species are more likely than others to be endangered. As such, it may make sense to proportionately focus conservation resources on those groups of species that are most likely to be endangered.

For example, if we find that mammals and birds are much more likely to be endangered compared to say, reptiles and vascular plants, then it makes sense to invest more effort in conservation programs that specifically target birds and mammals, rather than a more general approach that seeks to maintain the ecosystem overall (though the latter approach has its own merits as well).

Foot and Mouth Disease Study

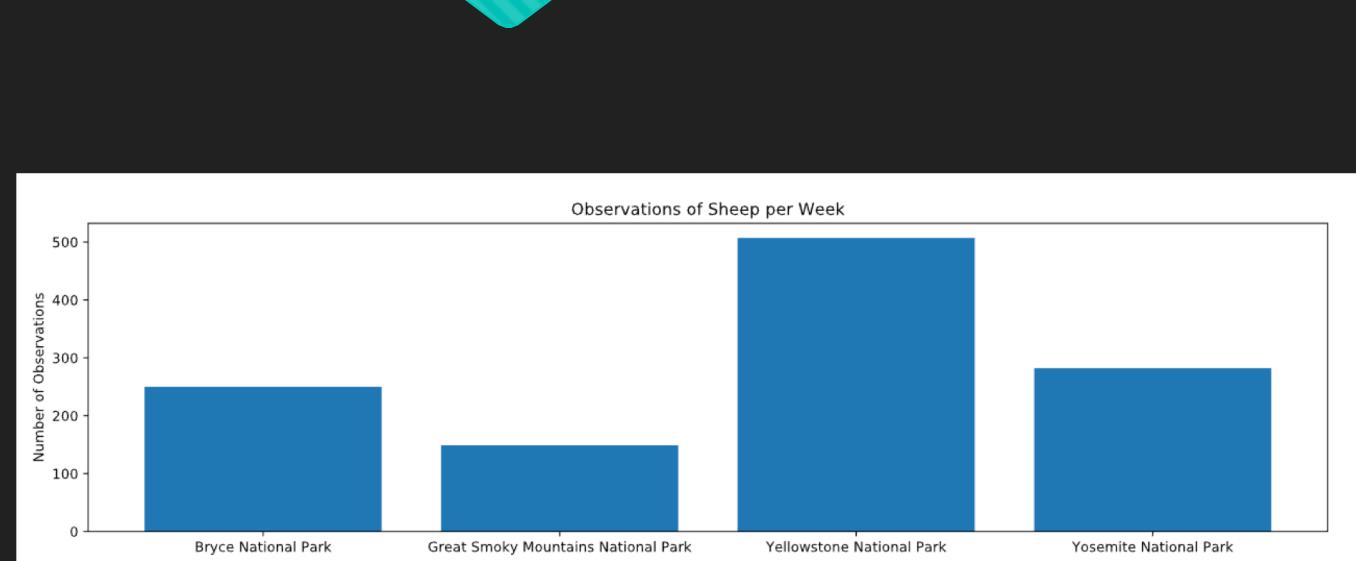


Fig 5: Most sheep observations take place at Yellowstone National Park.

- There are 4 different national parks that contain bighorn sheep. 4/5 contain *Ovis canadensis*, a species of concern. Yellowstone National Park also contains the Sierra Nevada Bighorn Sheep, an endangered subspecies.
- The majority of sheep observations take place at Yellowstone National Park, followed by Bryce National Park and Yosemite National Park, with the lowest number of observations taking place in Great Smoky Mountains National Park.

Foot and Mouth Disease Study

Baseline conversion rate:	15	%
Statistical significance:	85%	90% 95%
Minimum detectable effect:	33.3	%
Sample size:	870	

Fig. 6: Our baseline conversion rate reflects the percent of sheep at Bryce NP that had foot and mouth disease last year. We would like 90% significance. We calculated our minimum detectable effect by calculating what percentage 5% (the % reduction of the disease that we would like to be able to detect) is of our baseline. Plugging in these values gives us a sample size of 870.

- We would like to test the efficacy of a program designed to reduce the rate of foot and mouth disease in sheep.
- If we want to be able to detect reductions of foot and mouth disease by at least 5%, with 90% significance, how large of a sample size do we need?
- We set our baseline to 15%, the % of sheep at Bryce National Park that had foot and mouth disease last year. If we want to detect at least a 5% reduction in the instance of the disease, our minimum detectable effect = 33.3%. ($100*5/15$)
- Plugging these values into a sample size calculator, we find that our sample size = 870.
- Based on our observation data, it would take ~1.7 weeks to observe enough sheep in Yellowstone, and ~3.5 weeks to observe enough sheep in Bryce National Park.