Biodiversity in National Parks

An analysis of endangered species in America’s national parks.

Presentation Overview

This presentation includes:

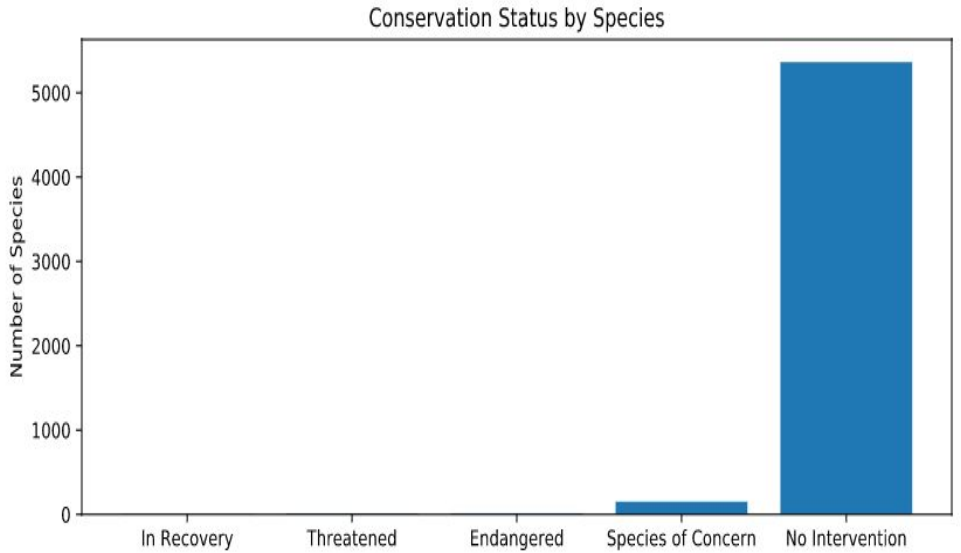
- An overview of data on species collected from national parks.
- How we used these data to:
  - Analyze the difference in protections between species.
  - Assist a national park determine the sample size needed, and the time required to attain this sample size for a study in their park.
- Recommendations for conservationists and policy makers.

Biodiversity Data

- The dataset used for this analysis includes observations on species ***within*** National Parks. Each observation includes the following information on a species'
  - Category (bird, mammal, reptile, etc.),
  - Scientific name (Bos bison, Ovis aries, Cervus elaphus, etc.),
  - Common name (Bison, Sheep, Elk), and
  - Conservation status (endangered, in recovery, threatened, species of concern, no intervention)

Biodiversity Data

- There are 5,824 observations in the dataset. Of those:
  - 96.7% (5,633) have no intervention status
  - 2.7% (161) are a species of concern
  - 0.27% (16) are endangered
  - 0.17% (10) are threatened
  - 0.069% (4) are in recovery
  - **5,541 are unique**



Are certain types of species more likely to be endangered?

- Based on observations, mammals are more protected than any other type of species, including birds and reptiles.
  - 17% of mammals are protected
  - 15% of bird species are protected
  - 6% of reptiles are protected
- However, is the difference statistically significant?
- We used a chi-square to test the following null hypotheses:
  - The difference in protection between mammals and birds is due to chance.
  - The difference in protection between mammals and reptiles is due to chance.

Chi-square Results

Hypothesis 1: The difference in protection between mammals and birds is due to chance.

- P-Value: 0.69
- **Accept** null hypothesis: Difference is ***not*** significant.

Hypothesis 2: The difference in protection between mammals and reptile is due to chance.

- P-Value: 0.038
- **Reject** null hypothesis. Difference ***is*** significant.

Therefore, the answer to our question is yes. Some types of species are more likely to be endangered. The difference between the protection of mammals vs reptiles is significant.

How do we use these results?

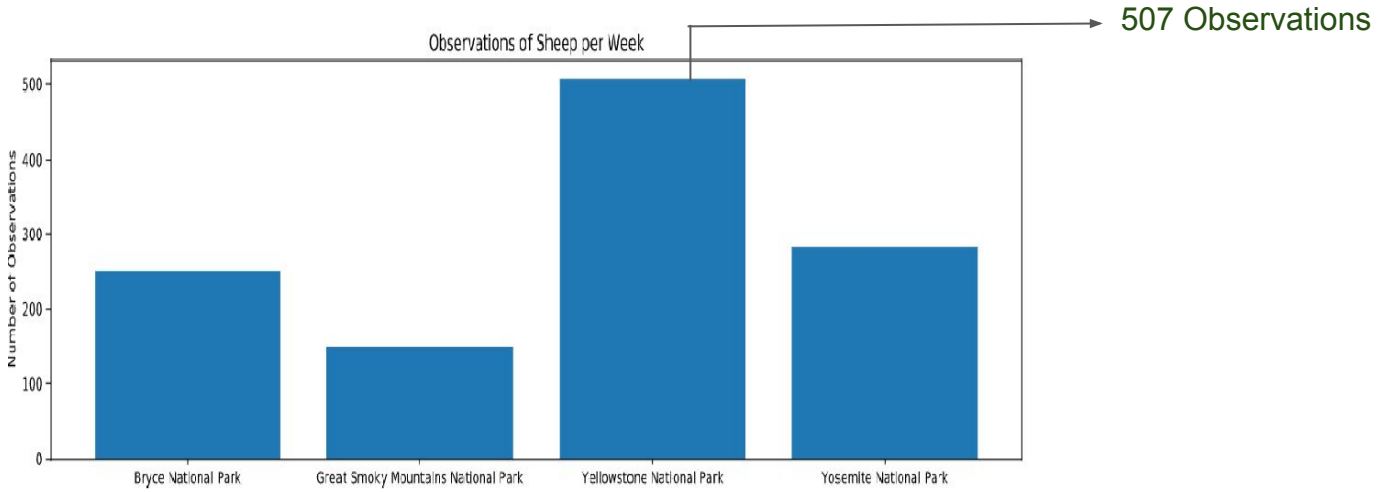
The results show that some types of species are more prone to becoming endangered than others. To help protect species:

- Park rangers should continue to collect data on species in national parks and test for significant differences between species.
- Conservationists should use these data and results to inform their conservation strategies. For example, we know mammals are more susceptible than reptiles. More resources should go toward protecting and monitoring mammals than reptiles.
- Government agencies and officials should use these results for Department decisions, including budget and other resource decisions.

What else can we do with these data?

Park Rangers at Yellowstone National Park have been running a program to reduce the rate of foot and mouth disease of sheep -- a species included in our dataset. Using this dataset, we assisted the park rangers determine how many sheep they need to observe, and how long this will take to be able to detect reductions ***of at least 5 percentage points.***

The chart below shows the observations of sheep per week:



How many sheep will they need for their study?

- The park rangers want to be able to detect at minimum a 5% difference, and want a level of significant at 90%.
- Last year rangers recorded that 15% of sheep have foot and mouth disease.
- Therefore, we need **870 sheep observations** to detect a change of 5%.

- The rangers observed 507 sheep in two weeks. They'll need observe sheep for 1.7 weeks to observe the sample size needed.

In Conclusion

These are two examples of how these data can be used. Based on our initial findings these data can be very helpful to national parks, conservationists, and federal policy makers.

We recommend that the National Park Service continue to capture these data in order to make data-driven decisions.

If you have any additional questions contact Carlann Unger.