



# An Analysis of Endangered Species for the National Park Service

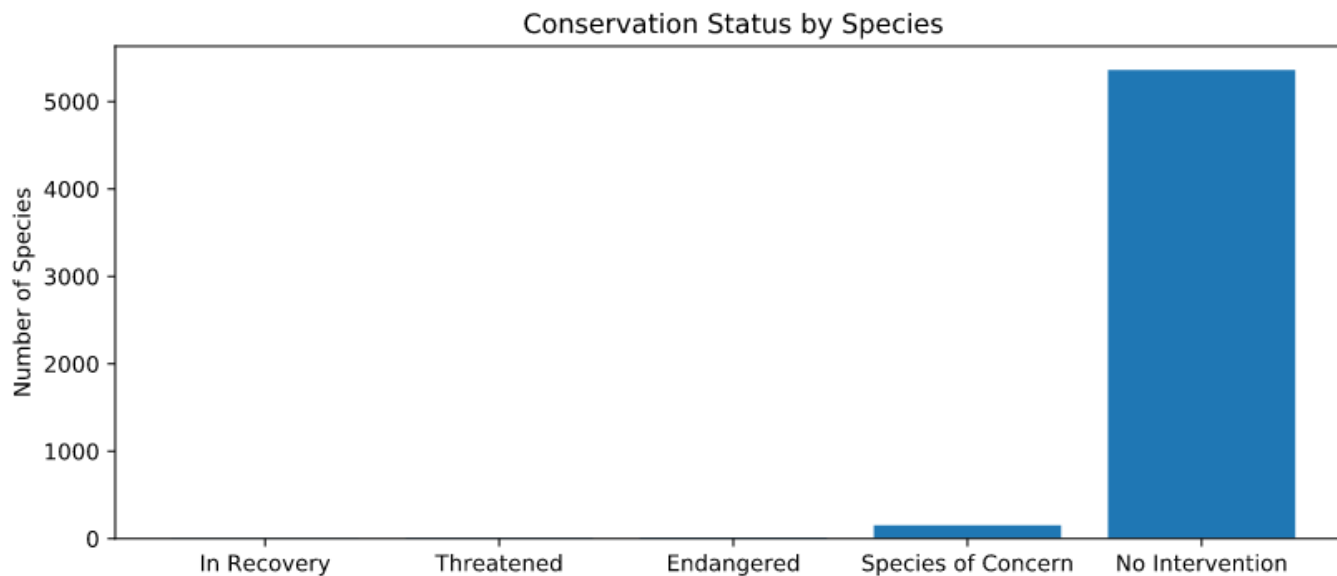
By Jack Hodges

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# Overview of Species Info

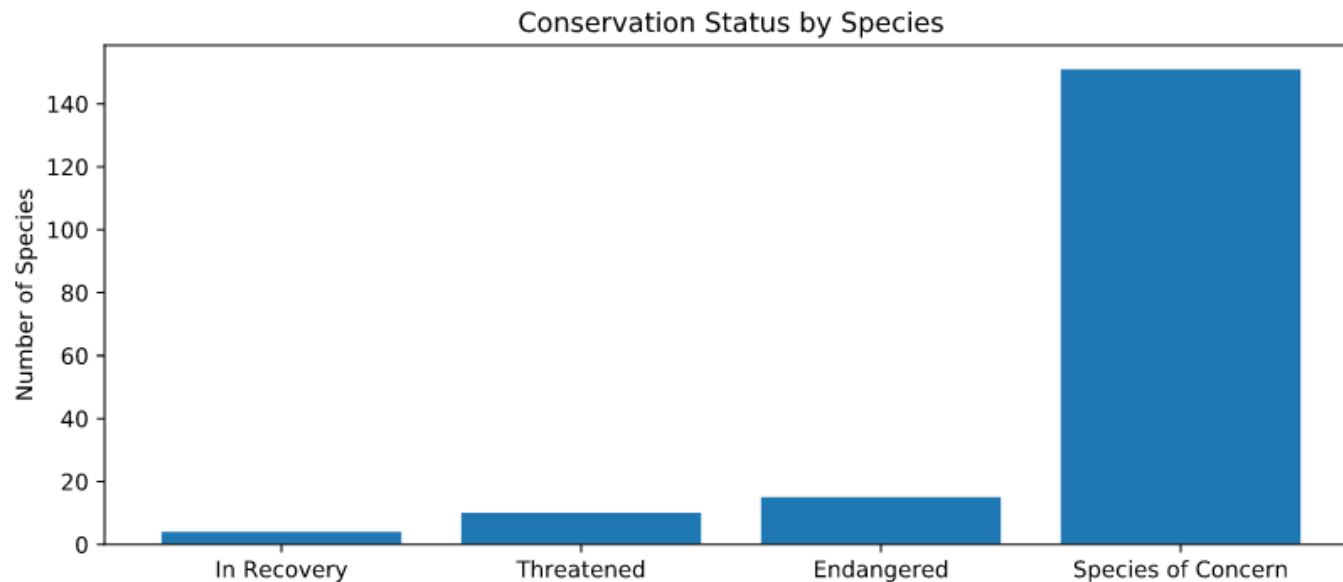
- Species\_info.csv collated data on 5541 unique species of animal and plants.
- It encompassed data from the following categories of species: Mammals, Birds, Reptiles, Amphibians, Fishes, Vascular Plants, Nonvascular Plants.
- These unique species were classified as either: Endangered, Threatened, Species of Concern, In Recovery, or No Intervention.
- These classifications were further divided into 'protected' (all species classified as 'No Intervention') and 'not protected' (all other classifications)

# Conservation Status by Species Overview



As can be seen in the chart above, the number of species that require no intervention far outweigh the number of species which are considered not protected

# Conservation Status by 'at risk' Species



When protected species are removed from the chart we get a clearer view of the status of not protected species studied.

# Summary of Conservation Status

- The large majority of species studied were protected (5363)
- Of species that are considered not protected (180), very few of these are 'in recovery' (4), current conservation strategies may not be effective.
- General conservation strategies may not be an effective tool as <5% of all species studied are 'at risk', conservation should be targeted at these specific species.

# Investigation of Endangered Species

Category	Not Protected	Protected	Percentage Protected (%)
Amphibian	72	7	8.86
Bird	413	75	15.4
Fish	115	11	8.73
Mammal	146	30	17.0
Nonvascular Plant	328	5	1.50
Reptile	73	5	6.41
Vascular Plant	4216	46	1.08

From the above table it can be seen that protection status is not equal across the categories, 17.0% of mammals are not protected where as only 1.08% of vascular plants are in the same classification.

# Investigation of Endangered Species

- While there is clear variation between the categories of species, it was not clear if there was a statistically significant difference in protection status.
- Some initial testing was conducted using a Chi Squared Test between mammals and birds, a p-value of 0.688 was obtained, so the null hypothesis could not be rejected.
- A further investigation found a p-value of 0.0384 when comparing mammals and reptiles, in this instance the null hypothesis that the variation of these two groups was a result of chance could be rejected.
- There is a significant difference in the protection status of certain , but not all, categories of species which can not be explained by chance alone.

# Summary of Investigation of Endangered Species

- From this initial statistical analysis we can see that the protection status of species categories is not equal.
- Targeted strategies for conservation, as discussed earlier, should be targeted at specific categories, in addition, a strategy which is suitable for one category may not be suitable for all as the differences between these categories can not be explained by chance alone.
- Mammals are the most at danger with 17.0% of all species not protected.
- Vascular plants are at the least risk with only 1.08% of all species no protected.



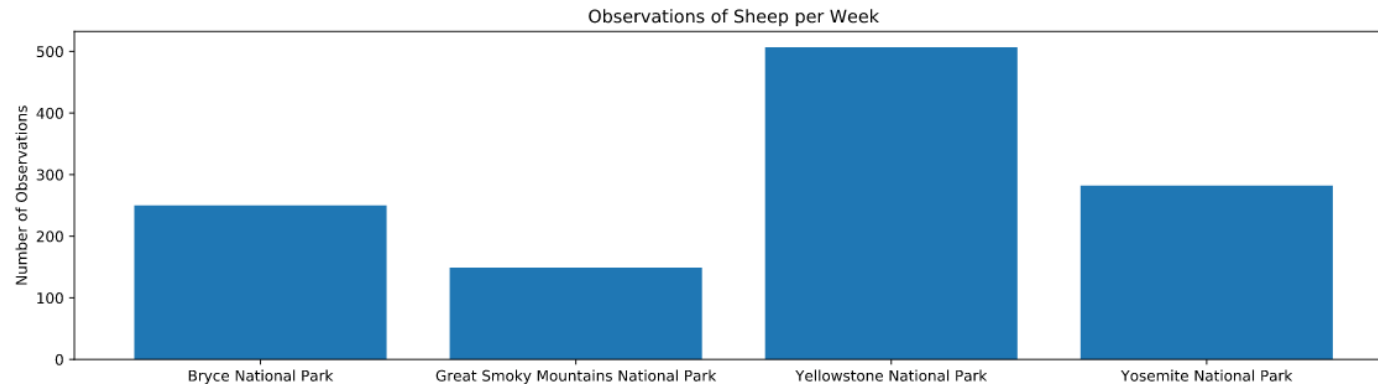
# Sample size determination for F&M Disease

- Observation data was collected at numerous parks.
- Concern has been raised about the spread of 'Foot and Mouth' Disease among sheep within the national parks.
- A program has been undertaken to try and reduce the spread of this disease, last year 15% of sheep at Bryce National Park were recorded as having F&M Disease.

# Sample size determination for F&M Disease

- The scientists hope to detect a reduction of 5% in F&M cases from their previous measurement of 15%.
- With a confidence interval of 90% the scientists would need to sample 870 sheep in ensure their results are significant.

# Sample size determination for F&M Disease



With the sample size determined to be 870, the decision left to make is which park shall be used to collect this data. The above bar graph shows the observations of sheep per week at a number of parks, the park with the largest number of observations is 'Yellowstone National Park'. It would take 1.72 weeks to collect the necessary data here, compared to the 3.48 weeks it would take at the original site of testing, 'Bryce National Park'