Biodiversity for the National Parks

An data analysis for endangered animals

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Species Information

- This data set contains in total of 5541 species under seven kind of categories, including 'Mammal', 'Bird', 'Reptile', 'Amphibian', 'Fish', 'Vascular Plant', 'Nonvascular Plant'. Among all categories, majority of the species included in this data set is Vascular Plant (roughly 77%).
- For all species, there are five of conservation status documented, which are explained as following:
  - Species of Concern: declining population or appears to be in need of conservation.
  - Threatened: vulnerable to endangerment in the near future.
  - Endangered: seriously at risk of extinction.
  - In Recovery: formerly been Endangered, but currently not in danger of extinction throughout all or a significant portion of its inhabitable range.
  - No Intervention: population are under normal condition.
- For all the species included in this data set (see Appendix 1), there are in total of 180 species (around 3%) requires our attentions, in which 151 are in concern, 10 is threatened, 15 is endangered, and 4 is in recovery.

Are certain types of species more likely to be endangered?

category	Not Protected	Protected	% of Protected
Amphibian	72	7	8.9%
Bird	413	75	15.4%
Fish	115	11	8.7%
Mammal	146	30	17.0%
Nonvascular Plant	328	5	1.5%
Reptile	73	5	6.4%
Vascular Plant	4216	46	1.1%

- We tried to approach this question by first analyzing the percentage for the species under protection.
- Species that don't have intervention are marked under "Not Protected". Otherwise any concerned species are marked as protected.
- From the table on the left, we observed that Mammal and Bird are the categories that have higher percentage of species under protection.

- Thus, based on the observation, we performed hypothesis testing to explore if there is any difference between Bird and Mammal regarding the protection status. By taking the Chi-Square test, we found out that the p-value is about 0.69, which indicates that it is not significantly different between Bird and Mammal.
- Bird and Mammal have higher percentage comparing to other species. Therefore, we also performed an analysis between Reptile and Mammal. The Chi-Square test returns a p-value of 0.38, indicating that it is significantly different between Mammal and Reptile for the number of species under protection.
- In conclusion, we discovered that some species are more likely to be endangered.

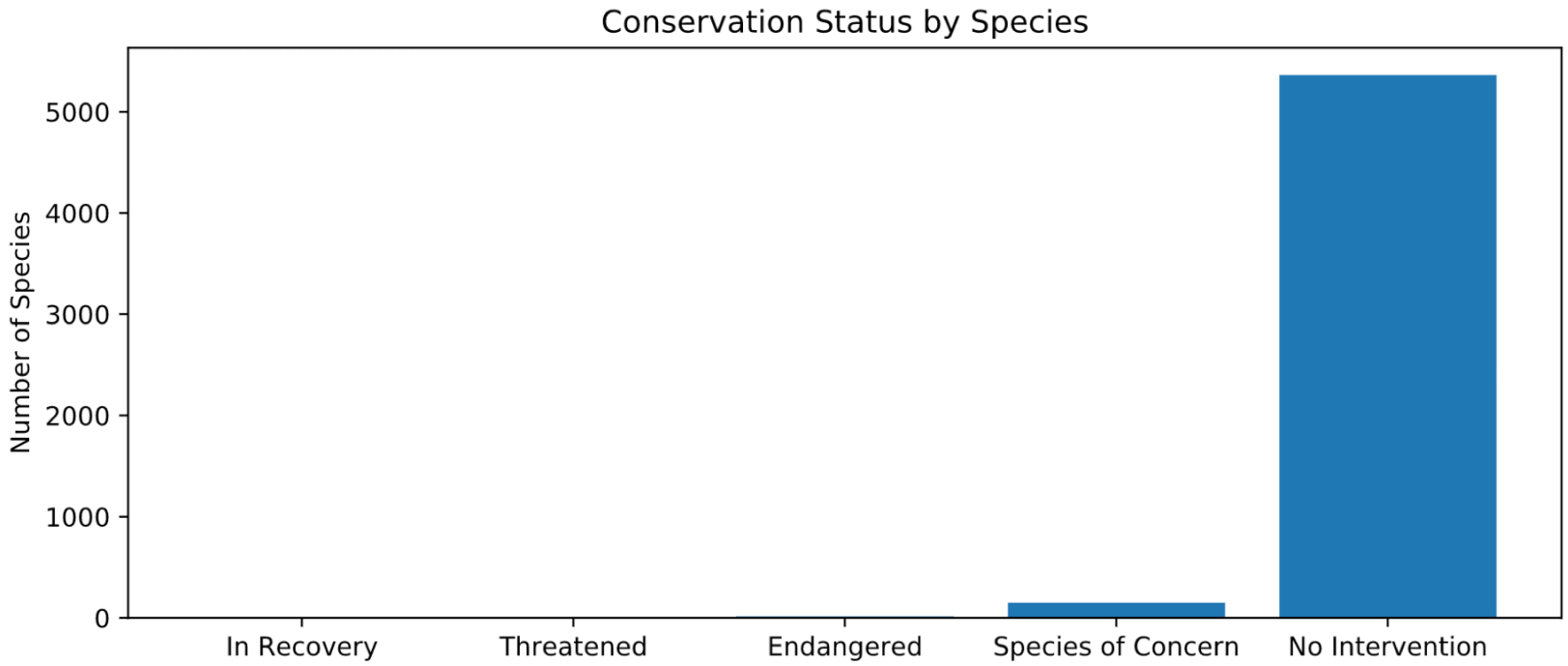
Recommendation to protect endangered species

- Based on our prior analysis, we have the following observations:
  - Bird and Mammal have a much higher percentages for the species that require protection.
  - Amphibian, Fish and Reptile have a relative high percentage as well.
  - Nonvascular Plant and Vascular Plant have relative low percentage, indicating a more stable and health conditions for those species.
- With the hypothesis analysis, we clearly showed that Bird and Mammal are in a more urgent stage to protect. We need to take good observations regarding some of the species under these two categories to ensure the species numbers are under control.
- Although the percentage of endangered plant is not high, the number of plant under protection is pretty high as well because the total number of plants is larger. Thus, we also need to take care of plants condition if possible.

Foot and Mouth Disease Study

- Park Rangers at Yellowstone National Park have been running a program to reduce the rate of foot and mouth disease at that park. The scientists want to test whether or not this program is working by detecting reductions of at least 5 percentage point.
- Using a 15% baseline rate from Bryce National Park's observation for sheep foot and mouth disease, and a expected 5% drop rate (33.3% minimum detectable effect) with a 90% confidence level, we are able to produce that the number of observations of sheep required by this test is 870.
- With our prior observation data (see Appendix 2), we know that in Bryce National Park we can observe about 250 sheep per week, while in Yellowstone National Park we can observe about 507 sheep per week. Therefore, for scientists it roughly takes about 2 weeks to observe enough sheep in Bryce National Park, and takes about one and half week to observe enough sheep in Yellowstone National Park in order to finish this test.

Appendix 1: Conservative Status by Species



Appendix 2: Observations of Sheep per Week