BIODIVERSITY FOR THE NATIONAL PARKS SERVICE (NPS)

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SPECIES DATA PROVIDED BY NPS

For the purposes of this analysis, NPS provided a CSV file (see below).

- The CSV file contains:

  - The category of species. Species are categorized by type. Specifically, the species are identified as either Mammal, Bird, Reptile, Amphibian, Fish, Vascular Plant, and Nonvascular Plant.

  - The scientific name of species. There are 5541 individual species described in the CSV file.

  - One or more common names for the species.

  - The conservation status of the species. Specifically , whether that species is "Null" or not protected, a Species of Concern, Endangered, Threatened, or In Recovery.

	category	scientific_name	common_names	conservation_status
0	Mammal	Clethrionomys gapperi gapperi	Gapper's Red-Backed Vole	nan
1	Mammal	Bos bison	American Bison, Bison	nan
2	Mammal	Bos taurus	Aurochs, Aurochs, Domestic Cattle (Feral), Domesticated Cattle	nan
3	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	nan
4	Mammal	Cervus elaphus	Wapiti Or Elk	nan

NUMBER OF PROTECTED SPECIES

Per NPS's request, analysis focused on the conservation status of various species.

- Our analysis subdivided the data into protection categories.
  - While the vast majority of species are not protected (i.e. "No Intervention"), there are about 200 species NPS currently recognizes as protected.

Conservation Status by Species
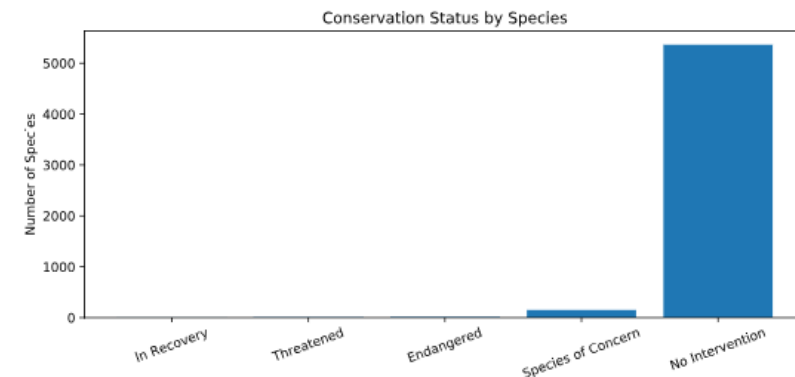
	conservation_status	scientific_name
1	In Recovery	4
4	Threatened	10
0	Endangered	15
3	Species of Concern	151
2	No Intervention	5363

PROTECTED SPECIES BY TYPE

Are certain types of species more likely to be endangered? To determine this, we calculated the percent of each category of animal that is protected (see right).

- We assumed that the variance in percentage was due to chance (null hypothesis).

- Chi-Squared testing showed that, in fact, some types species are more likely to be endangered than others. Testing showed that:

  - The difference between the percentages of protected birds and mammals is not significant (p-value greater than .05) and due to chance.

  - The difference between the percentages of protected reptiles and mammals is significant (p-value less than .05). We reject the null hypothesis – this is not due to chance!

Certain categories or types of animals (i.e. Mammal, Bird, etc) have higher ratios of protected to not-protected species.

|	category	not_protected	protected	percent_protected
0	Amphibian	72	7	0.088608
1	Bird	413	75	0.153689
2	Fish	115	11	0.087302
3	Mammal	146	30	0.170455
4	Nonvascular Plant	328	5	0.015015
5	Reptile	73	5	0.064103
6	Vascular Plant	4216	46	0.010793

RECOMMENDATION FOR CONSERVATIONISTS

Based on analysis of the NPS data, it is our recommendation that conservationists:

- Focus more conservation efforts on those types of species that are more likely to be endangered.

- Disseminate public service announcements informing visitors to the National Parks of the number of endangered species and, specifically, that certain types species are more likely to be endangered.

NPS SHEEP DATA

Analysis into NPS data regarding sheep species observed in National Parks shows that Yellowstone National Park sees the most sheep per week while Great Smoky Mountains National Park sees the least number of sheep per week.

Observations of Sheep per Week
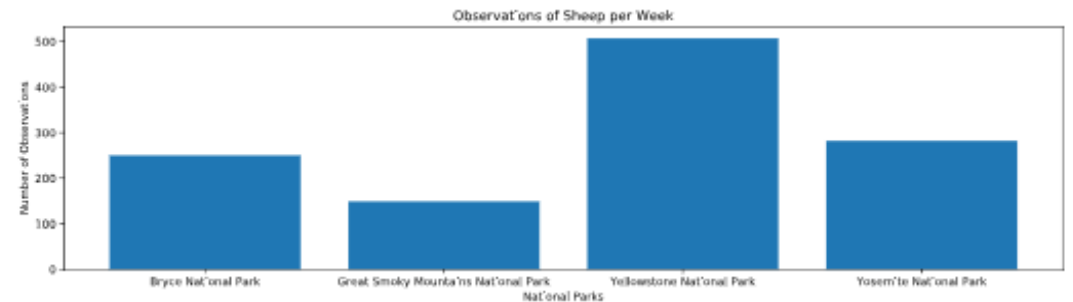
	park_name	observations
0	Bryce National Park	250
1	Great Smoky Mountains National Park	149
2	Yellowstone National Park	507
3	Yosemite National Park	282

REDUCTION OF FOOT AND MOUTH DISEASE IN SHEEP

NPS is attempting to reduce the rate of foot and mouth disease amongst sheep.

- A sample size of 870 sheep will have to be observed in order to ensure the foot and mouth percentages are significant. This is based on:
    - The observed percentage of sheep with foot and mouth disease at Bryce National Park (15%).
    - NPS desire to detect reductions of at least 5%, in order to determine if their reduction program is working.
    - The default level of significance (90%).
- NPS can determine that the reduction program is working after 870 sheep have been observed. Therefore, it make take a shorter or longer period of time, based on the how many sheep are observed per week at the park. For example:
    - Yellowstone National Park observes 507 sheep per week, it will take approximately 1.7 weeks to observe 870 sheep.
    - Bryce National Park observes 250 sheep per week, it will take approximately 3.5 weeks to observe 870 sheep.