



Biodiversity for the National Parks

Capstone Project



Species Information Collected

A review of the data collected

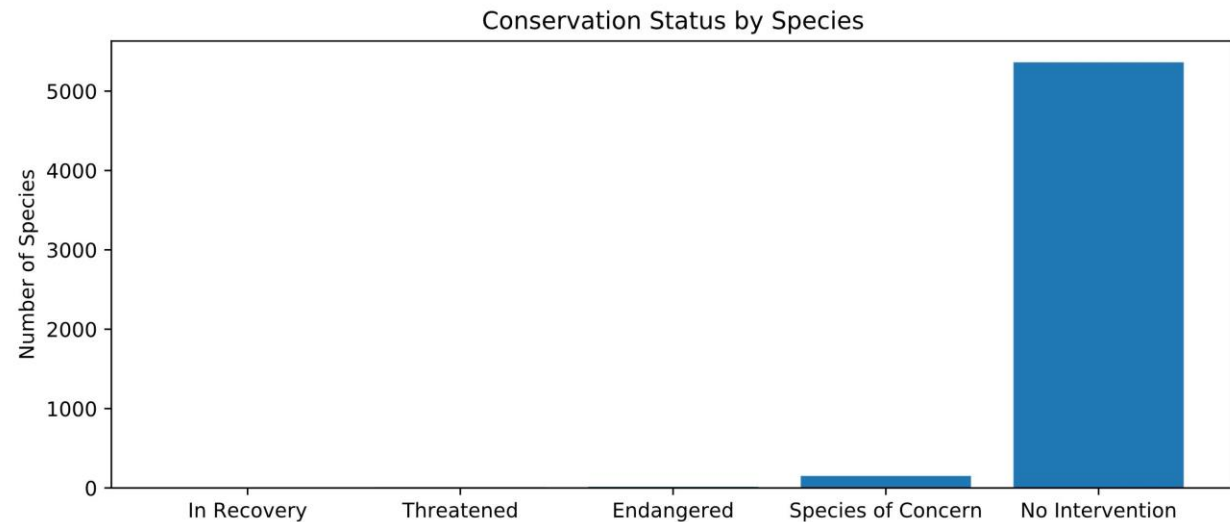
Species Information

- The data set contains 5541 unique species
- There are seven categories of animal and plant species
 - Animal Species:
 - Mammal
 - Bird
 - Reptile
 - Amphibian
 - Fish
 - Plant Species:
 - Vascular Plant
 - Nonvascular Plant
- There are five conservation statuses for these 5541 species:
 - **Species of Concern:** declining or appear to be in need of conservation
 - **Endangered:** seriously at risk of extinction
 - **Threatened:** vulnerable to endangerment in the near future
 - **In Recovery:** previously endangered but currently neither in danger of extinction throughout all or a significant portion of its range
 - **No Intervention** (recorded as 'nan' in the data set)

Conservation Status of the Species

- **5363** species require no conservationary intervention
- **Only 4** species are in recovery
- **176** species, cumulatively, are at varying levels of extinction

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



Species at Risk

	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

- Looking at the data it appears that **Mammals** are the most protected species, with **17.045%** of the species protected
- The implication is that mammals are **most at risk** for extinction
- The next protected species are **Birds** (15.37%) followed by Amphibians (8.86%)
- A chi-squared test will be done to determine if Mammals are more likely to be endangered than the other species

- The number of protected species are: **179**
- The unprotected species number: **5363**
- **3.338%** of all species are categorised as **protected**
- The highest nominal amount of species that are protected are **Birds (75 protected)** followed by Vascular Plants (46 protected) and finally Mammals (30 protected)

Significance Test

Determining if Mammals are significantly more likely to be endangered than the other species.

Setting up the experiment:

- Null Hypothesis: There is **NO** significant difference between the Mammals and other species
- P-value set at **5% (0.05)**
- The Null hypothesis will be **rejected** if the P-value < 0.05

Difference between Mammals and Birds

- P-value: **0.688 > 0.05**
- The data suggests that the difference is **not significant**
- The null hypothesis will not be rejected

Difference between Mammals and Reptiles

- P-value: **0.0384 < 0.05**
- The data suggests that the difference is **significant**
- The null hypothesis will be rejected

Recommendations for Conservationists

Species at Significant Risks

- The data suggests that Birds have the highest number of animals being actively protected
- However, by percentage, Mammals are the most protected species at 17%
- Considering Mammals and Birds are most endangered prioritising conservatory efforts to these two species would be recommended
- Allocating resources to study how human societies could be structured to minimise its impact on the ecological environments of these species
- Working with the State and Private industries to create Nature Parks and Game Reserves
- Allocate resources to preventative measures. Concentrate efforts on preventing the 176 species at risk from being further endangered.

Foot and Mouth Disease Study

Scientists have been observing sheep for foot and mouth disease at the various National Parks. 15% of sheep at Bryce National Park have foot and mouth disease. 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.

- Scientists want to be able to detect reductions of at least 5 %
- Minimum detectable effect is: **33.333%**
- Baseline Conversion Rate: **15%**
- Confidence level: **90%**
- Observations: refer to **Graph 1**
- Using the above inputs a **sample** size comprising of **870 observations** are **required**
- **Thus to observe enough sheep and determine if the program is effective, the scientists would need to spend:**
 - $870/507 = 1.7 \text{ weeks}$ or 12 days at **Yellowstone National Park**
 - $870/250 = 3.5 \text{ weeks}$ or 24 days at **Bryce National Park**

Graph 1

Detailing the number of sheep observations at the different parks

