



# *Biodiversity for the National Parks*

*Capstone Option 2*



# Species Information Analysis

- The species datasets contains **5,824** records
- The dataset contains 4 fields: **Category**, **Scientific Name**, **Common Names** & **Conservation Status**
- There are **5,541** unique species, based on unique **Scientific Names**
- There are **7.0** unique categories in the dataset
  - Mammal
  - Bird
  - Reptile
  - Amphibian
  - Fish
  - Vascular Plant
  - Nonvascular Plant
- There are **5.0** conservation status for the previous species, the NaN values have been replaced by **No Intervention**
  - No Intervention
  - Species of Concern
  - Endangered
  - Threatened
  - In Recovery



# Species Information Analysis

Table 1.0: species\_info.csv sample, first 5 rows

	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), Dom...	NaN
3	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	NaN
4	Mammal	Cervus elaphus	Wapiti Or Elk	NaN



## Endangered status, different categories of species.

Based in the analysis of the information there are **180** protected species and **5363** non protected species, the following table summarize the distribution based in each category.

*Table 2.0: Category pivot, protected species vs not protected*

	not_protected	protected	percent_protected
category			
Amphibian	73	7	0.087500
Bird	442	79	0.151631
Fish	116	11	0.086614
Mammal	176	38	0.177570
Nonvascular Plant	328	5	0.015015
Reptile	74	5	0.063291
Vascular Plant	4424	46	0.010291

Based in the information of [Table 2.0](#) it seems that Mammals are more likely to be endangered than other species

In order to validate the level of endangered against other species we will run some significance tests



## Endangered status, different categories of species.

The top 4 species at risk from the table are: *Mammals*, *Birds*, *Amphibian* and *Reptile*, we will run multiple significance test to validate the following hypothesis using the *chi-square test for independence* :

- Mammal are more likely to be endangered than species in Bird
  - The results demonstrate that different is not significant
  - *p-value: 0.445*
- Mammal are more likely to be endangered than species in Amphibian
  - The results demonstrate that different is not significant
  - *p-value: 0.084*
- Mammal are more likely to be endangered than species in Reptile
  - The results demonstrate that there is a significant difference
  - *p-value: 0.023*



# A recommendation for conservationists

*Based on the results of the significance test the hypothesis **Mammal are more likely to be endangered than species in Bird** has been accepted ( $p\text{-value} = 0.445$ )*

*Based on the results of the analysis further efforts and resources should be allocated to protect **Mammal** species as top priority.*



# Foot and mouth disease study

Our scientists know that **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. They want to be able to detect reductions of at least **5 percentage** point. For instance, if **10%** of sheep in Yellowstone have foot and mouth disease, they'd like to be able to know this, with confidence.

Based on the results of a sample calculation with a 90% significance

The **Minimum Detectable Effect** is equal to **33.33%**, this is translated in a sample size of **510 sheep**

In order to reach the desire levels of observations in each one of the parks selected:

It will take **2** weeks at **Bryce National Park** base on **250 sheep** observations per week

It will take **1** week at **Yellowstone National Park** base on **507 sheep** observations per week

# Conservation Status by Species

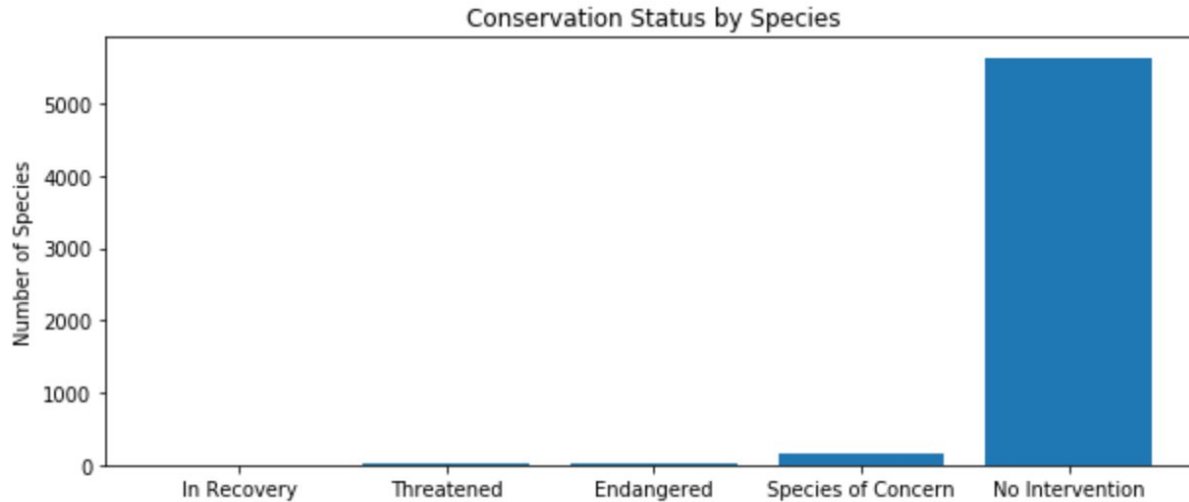


Figure 1.0: Conservation Analysis





# Observations of Sheep per Week

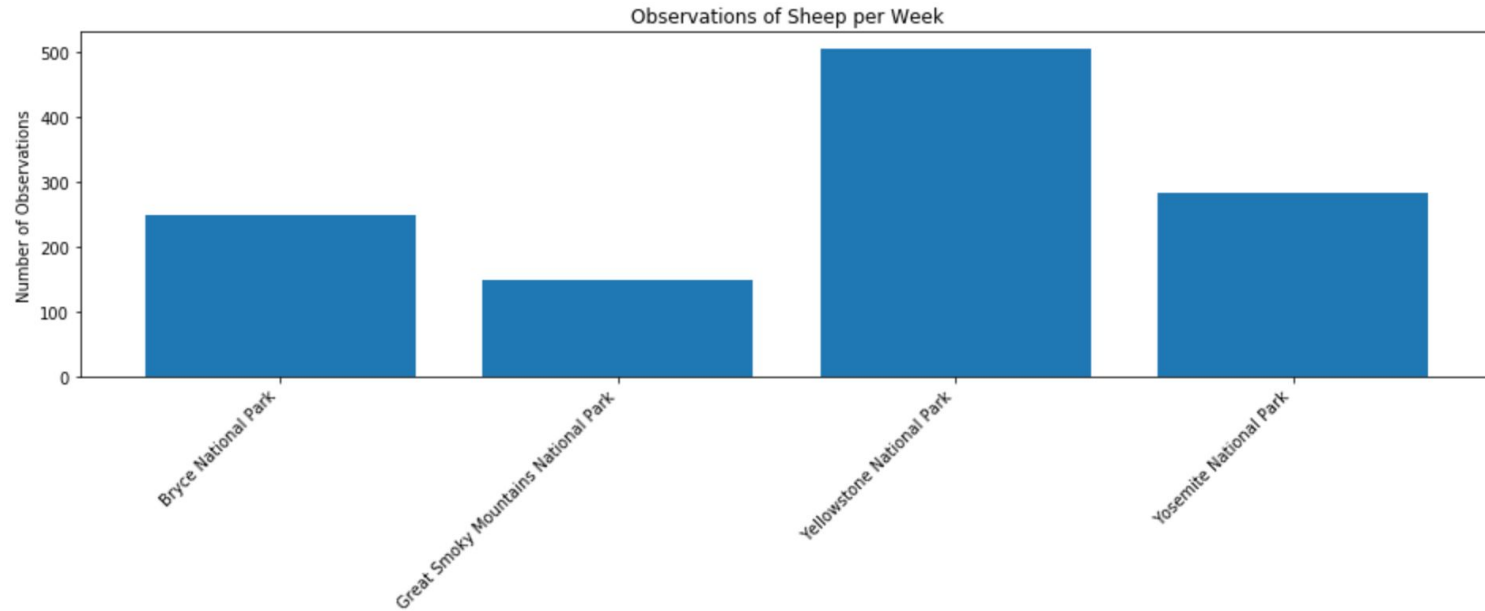


Figure 2.0: Sheep Observations