Observing the Biodiversity of our National Parks Part I

Greetings!

This presentation will observe the many great species in our National Parks.

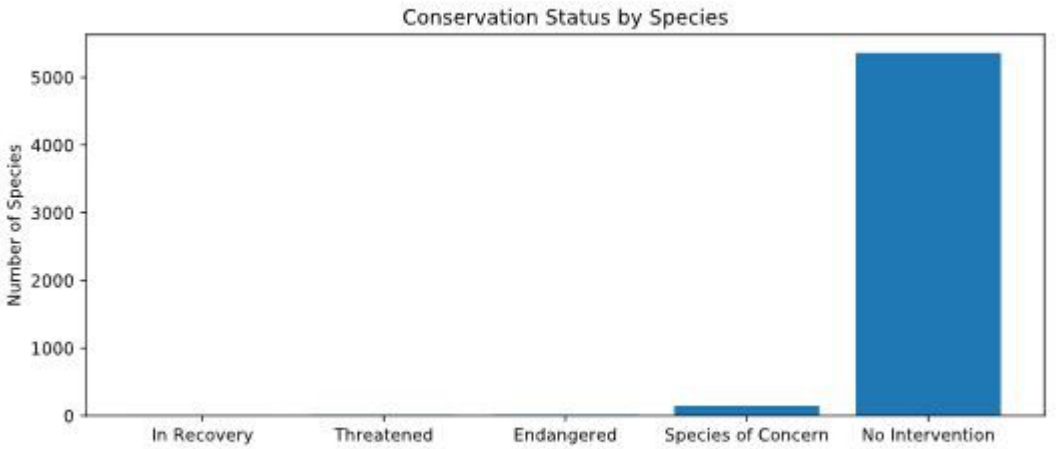
We will attempt to understand the scope of protection needed for these beautiful creatures and if there is a significant difference between species needing protection and not.

Conservation Status Numbers by Category

Conservation Status	Numbers of Species
Endangered	15
In Recovery	4
No Intervention	5363
Species of Concern	151
Threatened	10

- **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 Endangered, but currently not in danger of extinction throughout all or a significant portion of its inhabitable range

Conservation Status by Species



Are Certain Types of Species More Likely to be Endangered?

- To determine this, we first created a new column in our species table to calculate numbers of species that were protected versus species needing no intervention
- We then grouped by both category and protection status
- To make this data easier to view, we used pivot to reorganize our data.

Category	False	True
Amphibian	72	7
Bird	413	75
Fish	115	11
Mammal	146	30
NV Plant	328	5
Reptile	73	5
Vas. Plant	4216	46

Testing for Significance

- Based on our previous observations of our pivoted data, we can conclude it appears Mammals are more likely to be endangered than birds.
- However, we need to now know if this difference is significant or if it could just be due to chance.
- To test this, we utilized the Chi Squared Test for significance
- We determined the p-value of this first test to be approximately 0.688, which would lead us to conclude the difference is most likely due to chance and therefore is unlikely to be significant.
- Following this, however, we ran the same test using Mammals and Reptiles and calucated a p-value of approximately 0.038 which **is** significant.

```
contingency = [[30, 146],
               [75, 413]]

pval = chi2_contingency(contingency)[1]
print(pval)
# No significant difference because pval > 0.05

contingency_reptile_mammal = [[30, 146],
                              [5, 73]]

pval_reptile_mammal = chi2_contingency(contingency_reptile_mammal)[1]
print(pval_reptile_mammal)
# Significant difference! pval_reptile_mammal < 0.05
```

We conclude that certain types of species are more likely to be endangered than others.

Recommendations and Final Thoughts

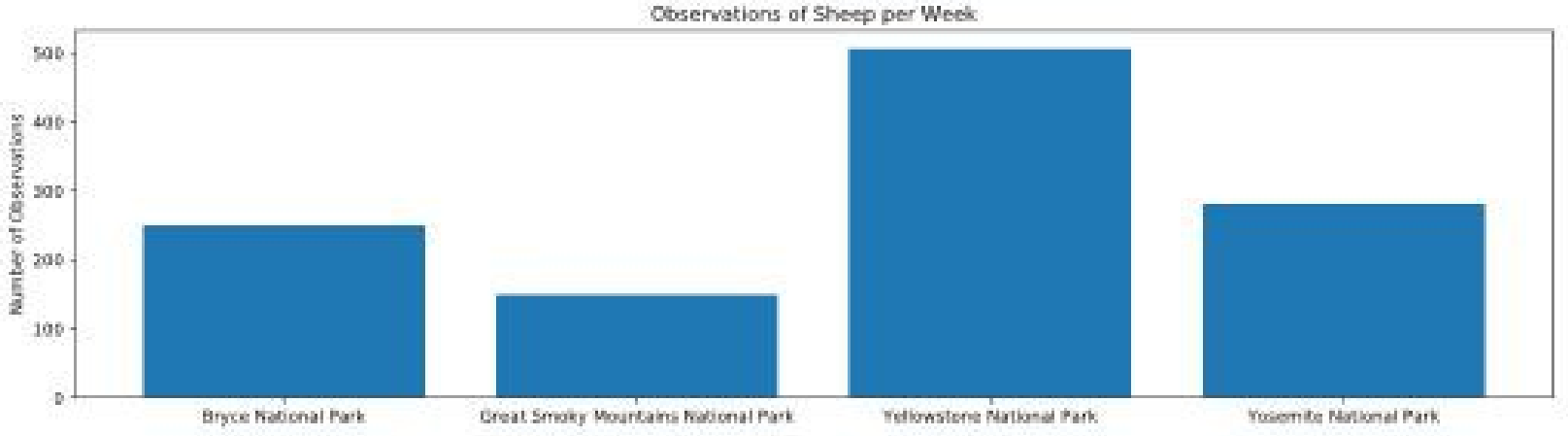
In light of determining that certain species are more likely to be endangered than others, I recommend further study to drill down into specific species, particularly of mammals, to determine root cause of this difference, and enact protection programs accordingly.

Biodiversity of our National Parks Part II: Foot and Mouth Disease

- Our conservation team has been observing a variety of species at a few of our national parks for the past week.
- We have drilled down into tracking sheep populations specifically, in order to monitor their movement and how it may relate to foot and mouth disease.

Park Name	Observations
Bryce National Park	250
Great Smoky Mtns	149
Yellowstone	507
Yosemite	282

Sheep Observation Chart



Foot and Mouth Reduction Effort

- Now that we have a good picture of the sheep populations across some of our parks, we are looking at ways to reduce the rate of foot and mouth disease at Yellowstone National Park.
- We determined first we will need know what sample size will yield significant percentages.
- We used the baseline of 15% as we know last year 15% of sheep at Bryce National Park, had foot and mouth disease.
- We wanted 90% level of significance and we wanted to be able to detect reductions of at least 5%, therefore our minimum detectable effect would be 33.
  - This is a percentage of the baseline, so our calculation for this was:

    minimum_detectable_effect=(5/15)*100 which gives us 33
- Using this knowledge, we calculated that our team will need to spend ~ 1 week observing sheep in Yellowstone and ~3 weeks observing sheep in Bryce to reach our desired sample size of 890 sheep.