Biodiversity for the National Parks

Codecademy Capstone Project

complied by

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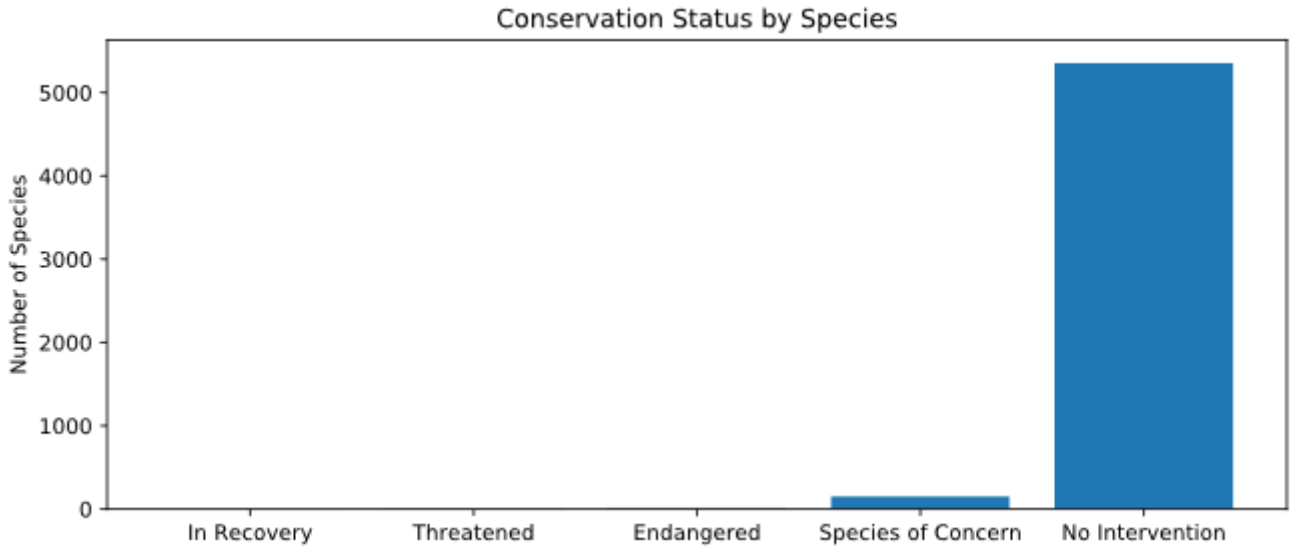
Available Data: Species Information

- Our dataset included information on the conversation status of 5,541 species in seven board categories: Mammals, Birds, Reptiles, Amphibians, Fish, Vascular plants and Non-vascular plants

- These seven categories were then divided into 5 groups: In Recovery, No Intervention, Threatened, Endangered, and Species of Concern

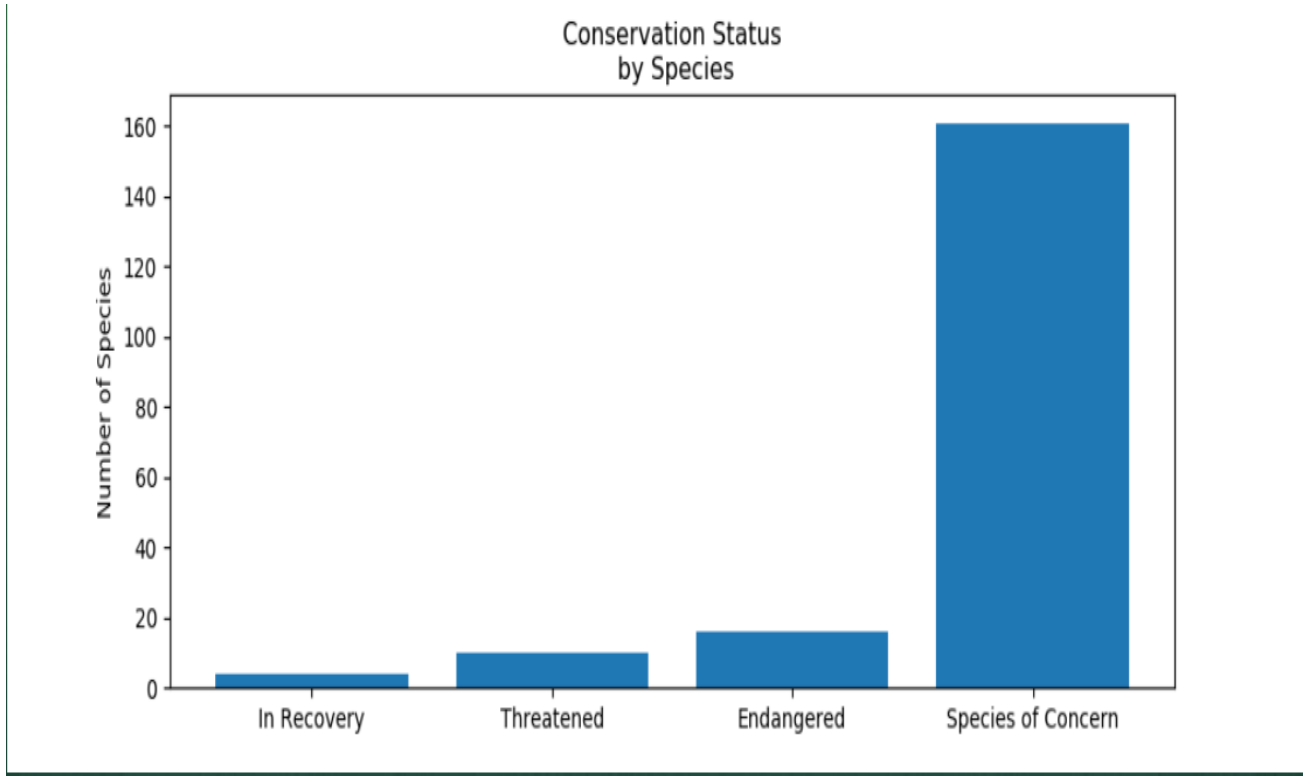
- Data obtained from the following locations: Yellowstone National Park (Wyoming), Yosemite National Park (California), Great Smoky Mountains National Park (Tennessee/North Carolina), and Bryce National Park (Utah)

A Holistic Look Provides Some Assurance



A Deeper Look at Species of Concern

Of the 5,541 species observed, 180 are labeled with a conservation status that requires monitoring by the National Parks Services.



Drilling Down Into the Data

Are certain types of species more likely to be endangered?

- Mammals (17.04%) are more likely to be endangered than any other category of species
- Birds (15.36%) are the second most likely to be endangered of all categories of species

Category	Not Protected	Protected	Percent Protected
Amphibian	72	7	8.86%
Bird	413	75	15.37%
Fish	115	11	8.73%
Mammal	146	30	17.05%
Nonvascular Plant	328	5	1.50%
Reptile	73	5	6.41%
Vascular Plant	4216	46	1.08%

Findings

At a glance and based on the information at hand, it seems that Mammals are slightly more likely to be endangered than Birds. However, we must perform a significance test to determine the validity of this statement.

These two datasets are categorical, which necessitates the use of a Chi Squared Test. If we have two or more categorical datasets that we want to compare, we should use a Chi Square Test.

A Chi Squared Test was conducted and resulted in a p-value of 0.6875, meaning that there is no significant difference in the probability of Mammals being endangered in comparison to the probability of Birds being endangered. Stated differently, Mammals and Birds share a similar probability of being endangered. We then tested to determine if the respective differences between Reptiles and Mammals probabilities' of being endangered is significant. Again, we used the Chi Squared Test, which yielded a **p-value of 0.0383**. This p-value indicates that there is, indeed, a significant difference in the probabilities of Reptiles being endangered in comparison to the probability of Mammals being endangered.

Recommendations Based on Findings

Based on our findings that both mammals and birds are the highest probability species to be endangered and that they are equally endangered, it is recommended that conservationists focus their conservation efforts on these two species.

All species are important and concern for the endangered reptiles, fish, and amphibians is not without merit. However, given that mammals and birds each have a proportionally large percentage of their populations that are endangered at greater than 17% and 15% respectively and knowing that reptiles and mammals are not probabilistically equally endangered (based on our Chi Squared Test, which yielded a p-value of 0.0383, allowing us to reject the null hypothesis), it is integral that efforts are undertaken to ensure that these endangered species do not go extinct. Extinction of these mammals and birds could cause further degradation of their ecosystems, which could in turn cause more species of all categories to become endangered in the future.

Foot and Mouth Disease Study

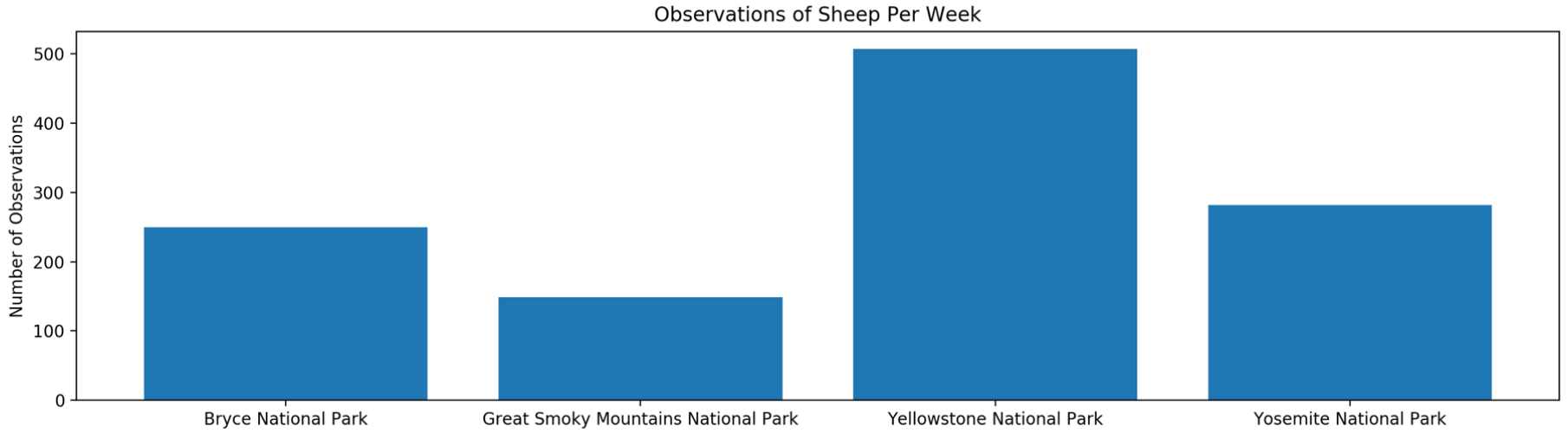
Foot-and-mouth disease is an infectious and potentially fatal viral disease that affects a wide variety of cloven-hoofed animals, including sheep. The virus causes a high fever for 2 to 6 days, followed by blisters inside the mouth and on the feet that may rupture and cause lameness, a physical disability that limits a physical ability, mobility, dexterity, and stamina.

Conservationists have compiled the recorded sightings of different species at four national parks over the past week. Of particular interest to our scientists are the sightings of sheep. Adjacent is a table that shows the number of observations of sheep at each National Park.

National Park Name	Number of Observations
Bryce National Park	250
Great Smoky Mountains National Park	149
Yellowstone National Park	507
Yosemite National Park	282

Foot and Mouth Disease Study (cont.)

The graph below are observations of sheep over the past week at four National Parks.



Foot and Mouth Disease Study (cont.)

We know that 15% of sheep at Bryce National Park have foot and mouth disease. Park rangers and Yellowstone National Park have been running a program to reduce the rate of foot and mouth disease at this park. We wanted to test the efficacy of this program by being able to detect reductions of at least 5%. For instance, if 10% of sheep in Yellowstone have foot and mouth disease, we would like to know this with confidence.

In order to accomplish this, we had to determine the number of sheep that would have to be observed from each park. To achieve this, we used the following variables:

- Confidence level of 90%
- Minimum-detectable-effect of 33.33 (our baseline (15%) divided our desired ability to detect reductions of at least 5% X 100)
- Baseline of 15% (our expected conversion rate is the percentage of sheep atBryce National Park that have foot and mouth disease)

Foot and Mouth Disease Study (cont.)

Using a sample size calculator, we determined that our sample size must be 510 sheep. We then determined how many weeks we would need to observe sheep at Bryce National Park and Yellowstone National Park to observe enough sheep as follows:

- Bryce = 510 (our sample size variant) / 250 (number of observations per week at Bryce) = 2.04
- Yellowstone = 510 (our sample size variant) / 507 (number of observations per
- week at Yellowstone) = 1.00

Thus, we would have to observe sheep for approximately 2 weeks at Bryce National Park and just 1 week at Yellowstone National Park.