The Biodiversity of Our National Parks

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Codecademy Data Analysis Capstone

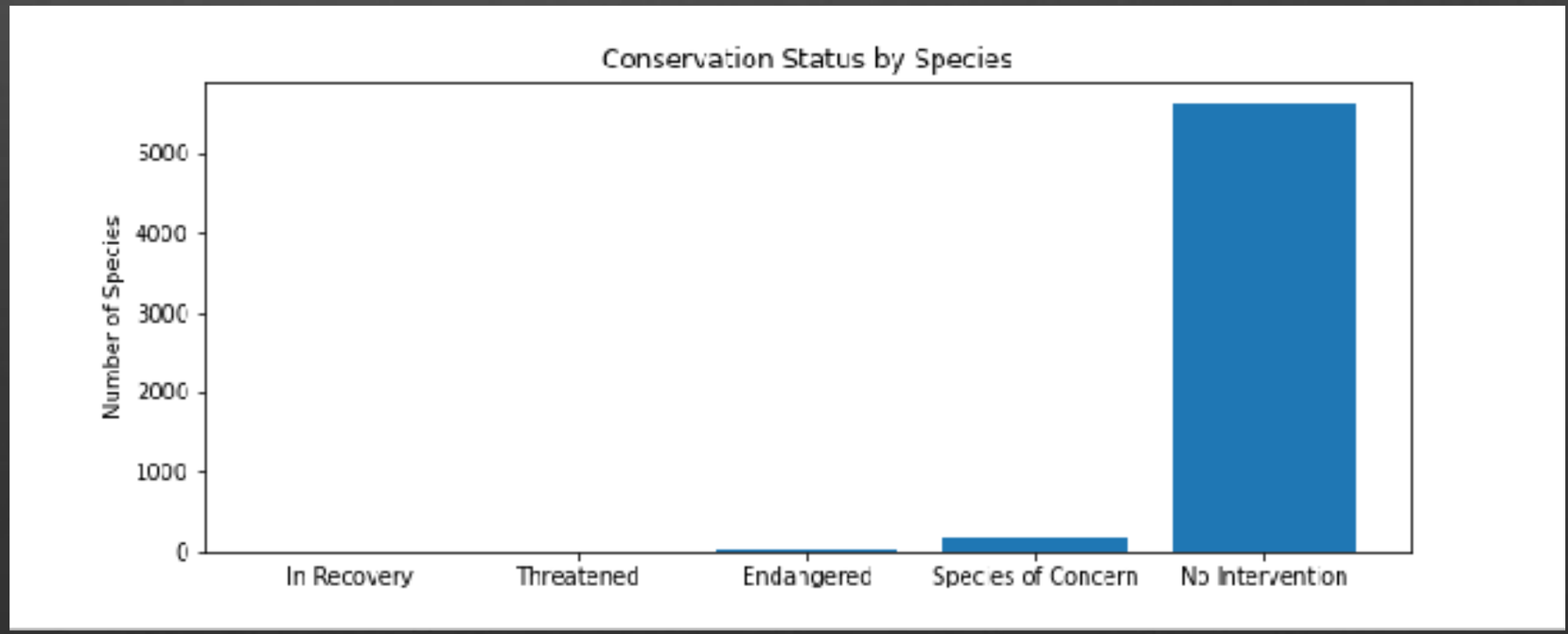
Species Info

- Our species_info.csv contains data on 5,541 unique species across various national parks.
- Along with the scientific name of the species, we have included the common name, category, and conservation status
- There are 7 categories of species: 'Mammal', 'Bird', 'Reptile', 'Amphibian', 'Fish', 'Vascular Plant', and 'Nonvascular Plant'
- There are 5 conservation statuses: 'Species of Concern', 'Endangered', 'Threatened', 'In Recovery', and 'No Intervention' (status for species that had no conservation status)

Conservation Status by Species

- Below, we've counted the number of species by their conservation status, and sorted them from least to greatest
- As you can see, most of our species require no protection (5,633), and 4 are in recovery
- We'll have to keep a careful eye on 151 species that may be in need of conservation (species of concern), and 25 species the are dangerously close to extinction (threatened or endangered)

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



Exploring Category of Species

- Are there certain types of species more likely to be endangered?

- To answer the above question, we created a pivot table (see next slide) and grouped species by their category and their protection status

  - ‘not_protected’ shows the count of unique species that do not require intervention (has a ‘No Intervention’ status

  - ‘protected’ column displays count of unique species that have a conservation status not equal to ‘No Intervention’

Species by Category and Protected Status

	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

Comparing Species Categories

- How can we determine if there is a significant difference between 2 categories of species and their protection status data?
    - For example, ~17% of species in the Mammal category are protected, compared to the ~15% of Bird species protected
    - Is this difference between mammal and bird significant?
- To compare differences in categorical data (which we have with our species categories data), we conducted two chi squared tests

Chi Squared Test #1: Comparing Mammal and Bird

- Null hypothesis: There is no significant difference between the mammal dataset and the bird dataset

  - To reject the null hypothesis, we will look for a p-value of less than 0.05

- After creating a contingency table and using the chi2_contingency() function from scipy.stats, a p-value of 0.686 was returned, greater than 0.05.

- This means we can’t reject our null hypothesis and there isn’t a significant difference between Mammal and Bird!

Chi Squared Test #2: Comparing Mammal and Reptile

- Is the difference between Reptile (6% protected) and Mammal (17% protected) significant?

- Null hypothesis: There is no significant difference between Mammal dataset and Reptile dataset
    - Reject the null hypothesis if p-value is less than 0.05

- With a new contingency table and using the chi2_contingency() function, a p-value of 0.038 was returned, less than 0.05.

- We CAN reject our null hypothesis! There IS a significant difference between Mammal and Reptile!

Recommendations of Endangered Species

- While mammal and bird categories may not have a significant difference between each other, they are still the top two categories of species that are more likely to become endangered than the other categories.
    - This is determined by looking at percent_protected values: The higher this value, the more likely the species is to become endangered
- Vascular and nonvascular plant species are least likely to become distinct.

Sheep Observations

- Our observations.csv file contains recorded sightings of different species at several national parks over the past 7 days

- We’ve added to our species data (discussed in the previous slides) an ‘is_sheep’ column and filtered the data to only include mammal sheep species

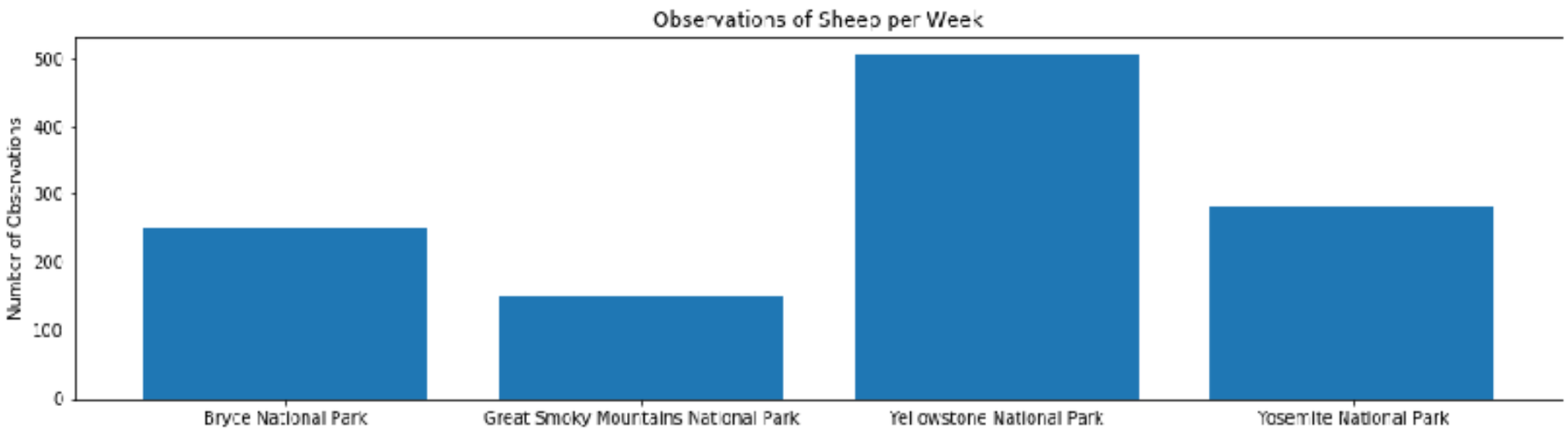
    - Our data contains 3 sheep species: Domestic sheep, Bighorn sheep, and Sierra Nevada Bighorn sheep

- Our observations data was then merged with our species data.
- Below, we found the total sheep observations across the 3 species, grouped by the national park

	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

- Below is the data from the previous slide’s dataframe as a bar chart.

- Yellowstone National Park saw the most sheep observations (507 sightings) out of the four parks we have data.



Foot and Mouth Disease Study Amongst Parks' Sheep

- 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.

- We want to find out whether or not this program is working (A/B Test), and to detect reductions of at least 5 percentage points.

Finding the Sample Size for our A/B Test

- We used Optimizely to find the sample size we needed for each variation, or the number of sheep observations that needed to be made at each park
- For the calculator:
  - Baseline conversation rate: 15%
  - Minimum Detectable Effect: 33.33%
  - Statistical Difference: 90%

Sheep Studies Conclusions

- Optimizely calculated a sample size of 510 per variation (510 sheep for both Bryce and Yellowstone)
- To observe enough sheep, we would need about 2 weeks at Bryce National Park (510/250 = 2.04 weeks) and about 1 week at Yellowstone National Park (1.0059 weeks)