Analysis of Biodiversity in National Parks

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Species Data Analysis

- Greater number of vascular versus nonvascular plants
- There are more birds, mammals and fish than reptiles and amphibians
- Birds have most protected of any group
- Higher level of species of concern
- Most species require no intervention

Significance Calculation Analysis

```python
import codecademylib
import pandas as pd
from matplotlib import pyplot as plt
from scipy.stats import chi2_contingency

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
```

```
0.687594809666
0.0383555902297
```

In order to determine the significance of endangered status between different categories of species, the Chi-squared test on the right was performed.

The null hypothesis in our test was that the difference was a result of chance.

The chi-squared test result of our first test yielded a p-value of ~0.68.
Based on this result, the conclusion is that the difference between the percentages of protected birds and mammals is not significant and is a result of chance.

A second chi-squared test was ran comparing the percentages of protected reptiles and mammals. The chi-squared test result was a p-value of ~0.038. This result is significant and it can be concluded that certain types of species are more likely to be endangered than others.

Endangered Species Recommendation

Based on the significance calculations performed, I recommend that Conservationists place greater emphasis on providing safeguards and resources to select species that have a greater likelihood of becoming endangered. Specifically based on the calculations, these species would be within the category of Birds, Mammals and Vascular Plants. Meanwhile, Fish, Reptiles, Amphibians and Nonvascular Plants have a less likelihood of becoming endangered which would allow for less resources to spent on these categories.

Foot and Mouth Disease Study

There was a baseline of 15% occurrence of foot and mouth disease in sheep at Bryce National Park. The results of our calculations determined that in order to be certain that a >5% drop in observed cases of foot and mouth disease in the sheep at Yellowstone was significant at least 510 sheep would need to be observed.

Once analysis was performed on observation data, it was determined that approximately one week of observing in Yellowstone National Park would be necessary in order to see at least 510 sheep, or approximately two weeks in Bryce National Park.

```
baseline = 15

minimum_detectable_effect = 100*5./15

sample_size_per_variant = 870

yellowstone_weeks_observing =
sample_size_per_variant/507.

bryce_weeks_observing = sample_size_per_variant/250.
```

Species Analysis Table Results

	category	not_protected	protected
0	Amphibian	72	7
1	Bird	413	75
2	Fish	115	11
3	Mammal	146	30
4	Nonvascular Plant	328	5
5	Reptile	73	5
6	Vascular Plant	4216	46

	category	is_protected	scientific_name
0	Amphibian	False	72
1	Amphibian	True	7
2	Bird	False	413
3	Bird	True	75
4	Fish	False	115

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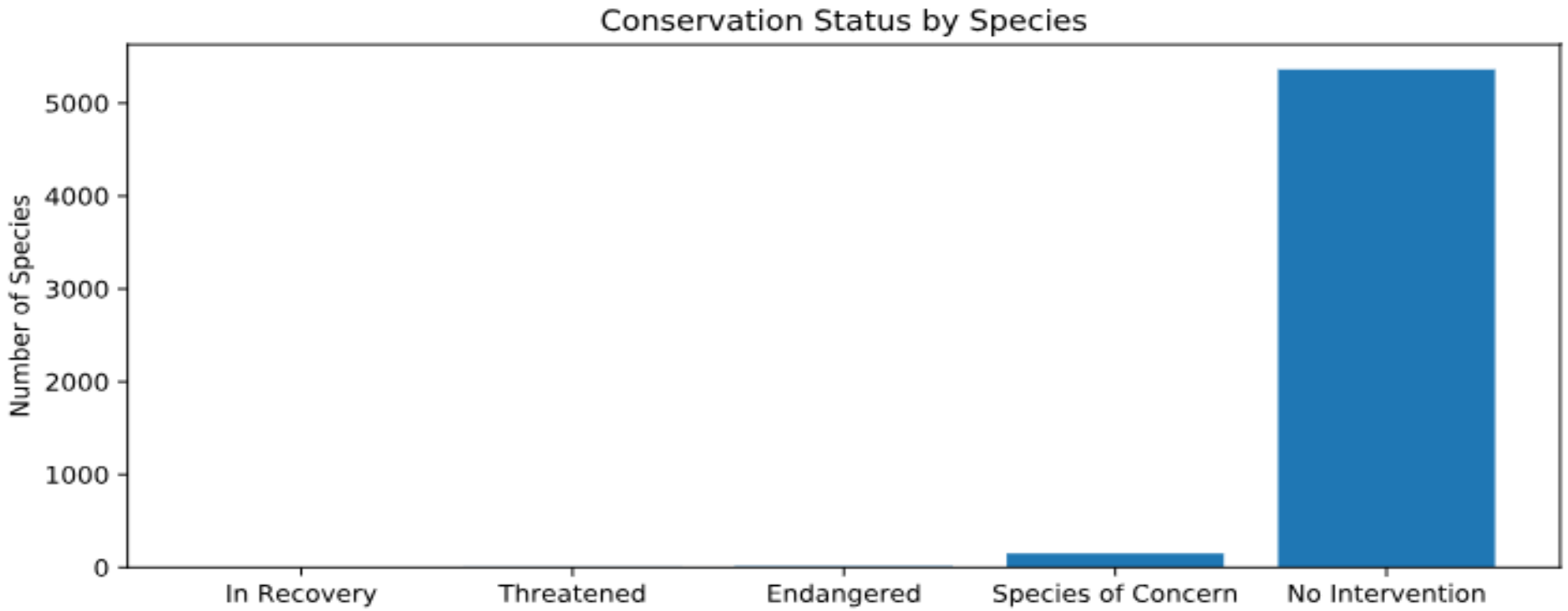
	category	scientific_name	common_names	conservation_status
0	Mammal	Clethrionomys gapperi gapperi	Gapper's Red-Backed Vole	NaN
1	Mammal	Bos bison	American Bison, Bison	NaN
2	Mammal	Bos taurus	Aurochs, Aurochs, Domestic Cattle (Feral), Dom...	NaN
3	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	NaN
4	Mammal	Cervus elaphus	Wapiti Or Elk	NaN

	conservation_status	scientific_name
0	Endangered	15
1	In Recovery	4
2	Species of Concern	151
3	Threatened	10

Conservation Analysis Graphical Representation



Sheep Analysis Table Results

	category	scientific_name	common_names	conservation_status	is_protected	is_sheep
3	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	No Intervention	False	True
1139	Vascular Plant	Rumex acetosella	Sheep Sorrel, Sheep Sorrell	No Intervention	False	True
2233	Vascular Plant	Festuca filiformis	Fineleaf Sheep Fescue	No Intervention	False	True
3014	Mammal	Ovis canadensis	Bighorn Sheep, Bighorn Sheep	Species of Concern	True	True
3758	Vascular Plant	Rumex acetosella	Common Sheep Sorrel, Field Sorrel, Red Sorrel, Sheep Sorrel	No Intervention	False	True
3761	Vascular Plant	Rumex paucifolius	Alpine Sheep Sorrel, Fewleaved Dock, Meadow Dock	No Intervention	False	True

	category	scientific_name	common_names	conservation_status	is_protected	is_sheep
3	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	No Intervention	False	True
3014	Mammal	Ovis canadensis	Bighorn Sheep, Bighorn Sheep	Species of Concern	True	True
4446	Mammal	Ovis canadensis sierrae	Sierra Nevada Bighorn Sheep	Endangered	True	True

Sheep Analysis Table Results (Cont.)

	scientific_name	park_name	observations	category	common_names	conservation_status	is_protected	is_sheep
0	Ovis canadensis	Yellowstone National Park	219	Mammal	Bighorn Sheep, Bighorn Sheep	Species of Concern	True	True
1	Ovis canadensis	Bryce National Park	109	Mammal	Bighorn Sheep, Bighorn Sheep	Species of Concern	True	True
2	Ovis canadensis	Yosemite National Park	117	Mammal	Bighorn Sheep, Bighorn Sheep	Species of Concern	True	True
3	Ovis canadensis	Great Smoky Mountains National Park	48	Mammal	Bighorn Sheep, Bighorn Sheep	Species of Concern	True	True
4	Ovis canadensis sierrae	Yellowstone National Park	67	Mammal	Sierra Nevada Bighorn Sheep	Endangered	True	True

	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

Sheep Analysis Graphical Representation