

Capstone 2: Biodiversity Project

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Analyzing the Base Data

Out of a total of **5824 listed organisms**, the data highlighted **five (5)** distinct levels of endangerment risk for **seven (7)** distinct species residing in national parks.

Endangerment Levels:

- a. Species of Concern
- b. Threatened
- c. Endangered
- d. In Recovery
- e. No Intervention

Animal Species:

- Amphibian
- Bird
- Fish
- Mammal
- Nonvascular Plant
- Reptile
- Vascular Plant

	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

Above all, Mammals ranked highest in percentage of protected species; 17.05% of mammals qualified for endangered status **a, b, c, and d** as outlined in the Endangerment Levels list above. Vascular Plants ranks lowest in number of protected species under the similar qualifiers at 1.08% percent protected.



Contingency Test Between Species

The likeliness of an organism's species classification to be endangered was tested against a Chi-Squared contingency test.

Mammals vs. Birds:

With a pval of 0.68 and, the result is not significant at $p < 0.05$ at $\text{Chi}^2 = 0.1617$, and thus the hypothesis is rejected: Mammals are not significantly likelier to be Endangered than Birds.

Mammals vs. Reptiles: With a pval of .03, the The result is significant at $p < 0.05$ at $\text{Chi}^2 = 4.2891$ and thus the hypothesis is accepted: Mammals are significantly likelier to be Endangered than Reptiles.

Mammals vs. Birds
Hypothesis: Mammals likelier to be Endangered than Birds.

Actual		
	Protected	Not Protected
Mammal	30	146
Bird	75	413

Expected		
	Protected	Not Protected
Mammal	27.83...	148.17...
Bird	77.17...	410.83

Chi2: 0.1617014831654557
Pval: 0.6875948096661336
Degree of Freedom: 1

Mammals vs. Reptiles
Hypothesis: Mammals likelier to be Endangered than Reptiles.

Actual		
	Protected	Not Protected
Mammal	30	146
Reptile	5	73

Expected		
	Protected	Not Protected
Mammal	24.25...	151.75...
Bird	10.75...	67.25...

Chi2: 4.289183096203645
Pval: 0.03835559022969898
Degree of Freedom: 1



Contingency Test Between Species: A Recommendation

Mammals vs. Birds:

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Mammals vs. Reptiles: With a pval of .03, the The result is significant at $p < 0.05$ at $\text{Chi}^2 = 4.2891$ and thus the hypothesis is accepted: Mammals are significantly likelier to be Endangered than Reptiles.

A recommendation for conservationists: Endangerment is a vital concern across all species of organisms, as the integrity of the food chain can be significantly altered by the lack of any single plant or animal. That being said, additional care and support should be provided to Mammalians and Birds, as statistical testing shows that they are more likely to be endangered in this data set.



Foot and Mouth Disease Study

Scientists know that 15% of sheep at Bryce National Park have foot and mouth disease. They want to be able to detect reductions of at least 5 percentage point.

The minimum detectable effect was calculated by dividing the desired 5% reduction of Foot and Mouth Disease (F&MD) found in sheep by the known 15% baseline percentage of sheep affected with F&MD.

Minimal Detectable Effect = $(0.05/0.15) * 100 = 33.3333333333\ldots\%$

By holding a 90% Statistical Significance Level and using the 15% Baseline level, it was calculated that the Sample Size per Variation to determine a 5% reduction in F&MD was 510 Sheep per week.

According to this data set, **Bryce National Park** Sheep Sightings is 250 sheep a week. When divided, conservationists will need **approximately two (2) weeks** to observe the needed sample size to evaluate Statistically Significant Levels of F&MD reduction.

According to this data set, **Yellowstone National Park** Sheep Sightings is 507 sheep a week. When divided, conservationists will need **approximately one (1) week** to observe the needed sample size to evaluate Statistically Significant Levels of F&MD reduction.

Additional Figures

A: A bar graph of Protected Classification vs. Number of Species.

B: A bar graph of National Parks vs. Sheep Sightings

