Investigating Species' Biodiversity

Are certain species more likely to become extinct?

Park Observations

The National Parks Service (NPS) has provided a dataset that contains information about certain types of animals as seen below:

- Animal Category (Mammal, Reptile, Bird, etc)
- Scientific Name
- Common Names
- Conservation Status

Table one on the right shows how many species fall under the different conservation statuses and figure one depicts this data in a bar chart.

	Conservation Status	Number of Species
0	Endangered	15
1	In Recovery	4
2	No Intervention	5363
3	Species of Concern	151
4	Threatened	10

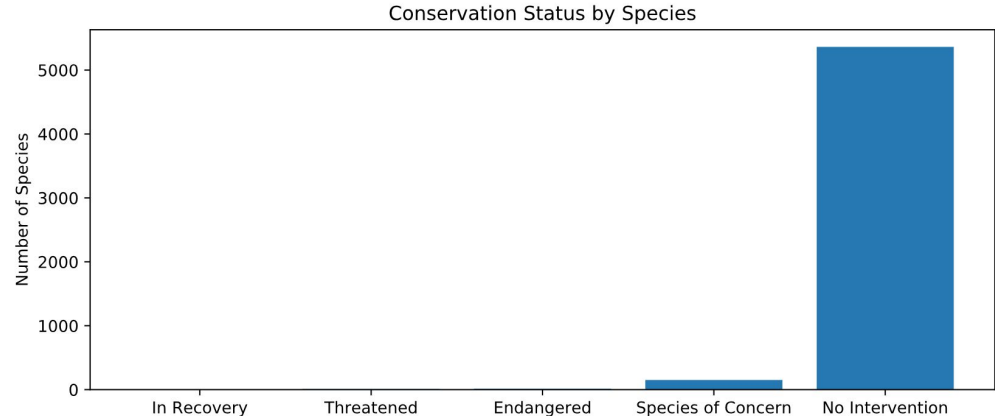Table One - Conservation Status Summary

Figure One - Conservation Statuses

Significance Calculations

A chi-squared test was implemented to detect the significance of the question "Are certain types of animals more likely to be endangered?". A contingency table that was used is depicted on the right, with the resulting p-value of 0.687, indicating the difference was not significant enough to support the question.

However, the difference between reptiles and mammals was significant as seen by a p-value of 0.38.

	Protected	Not-protected
Mammal	30	146
Bird	75	413

Table Two - Chi-squared Table

	Protected	Not-protected
Mammal	30	146
Reptile	5	73

Table Three - Chi-squared Table

Recommendations

Based on the results of the chi-squared test in the previous slide, it can be seen that mammals are significantly more endangered than reptiles as the p value is less than 0.05. Due to this, mammals should have more protections implemented to prevent further extinctions.

Foot and Mouth Disease Study

A program aimed at reducing the rate of foot and mouth disease has been implemented by both Yellowstone and Bryce National Parks. Both parks are interested in how many weeks they will need to observe the sheep population to begin noticing a change.

The graph in figure two depicts the number of sheep available for observation each week, with the equations on the right initially calculating the sample size required to detect a reduction of at least 5% based on the information that in the previous year, roughly 15% of sheep had foot and mouth disease.
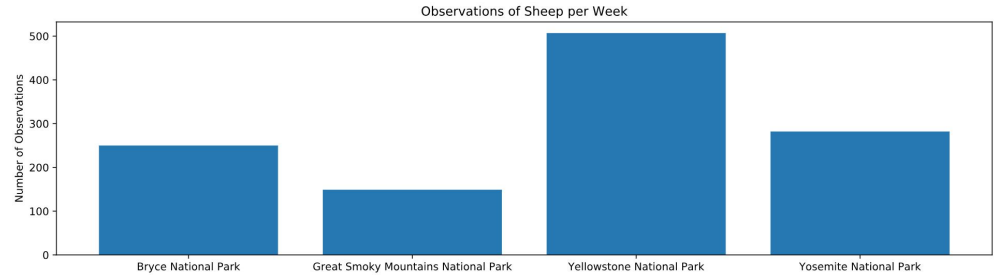

Figure Two - Observations per week

With a baseline of 15% the minimum detectable effect is 33%:

minimum_detectable_effect = 100 * (5./baseline)

Using a sample size calculator, the sample size required is 870, inputting this into the following equation:

Weeks observing = (Sample size)/(Weekly observations)

Yellowstone = 1.72 weeks   Bryce = 3.48 weeks

This means the Yellowstone park will need to spend at least two weeks in observation with the Bryce park observing the sheep for at least four weeks.

Summary

With such a large biodiversity in national parks, the parks themselves present a great opportunity to observe any and all species. With these observations, the parks can identify species that are in need of protection to prevent an extinction and observe the effect of certain programs intended to reduce the spread of certain diseases.