BIODIVERSITY FOR THE NATIONAL PARKS

An Analysis of Protected Species

Data in the Species_info Database

The “species_info.csv” database comprises information about 5541 unique species, listed by Taxonomic Category, Scientific Name, Common Name, and Conservation Status.

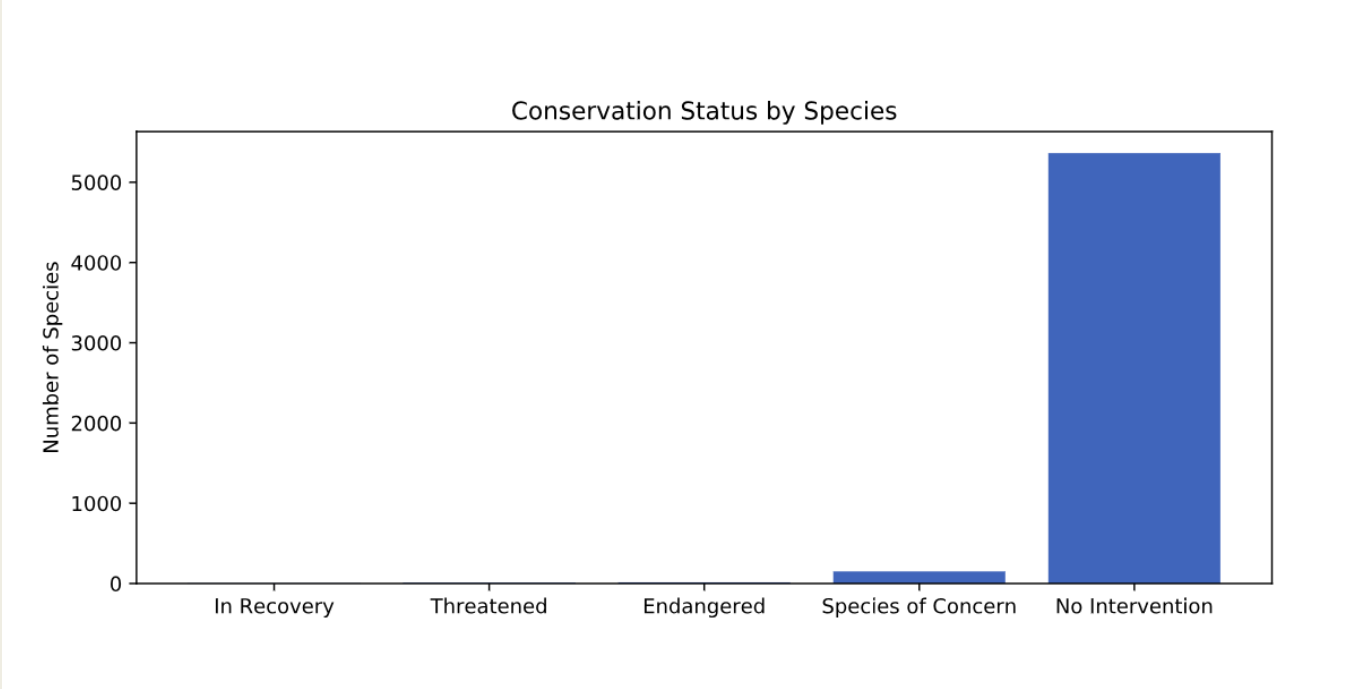
The species list spans 7 different taxonomic categories: Mammal, Bird, Reptile, Amphibian, Fish, Vascular Plant, and Nonvascular Plant.

Conservation Status comprises four different categories: Endangered, In Recovery, Species of Concern, and Threatened. To this list I have added the category ‘No Intervention’ to clarify the relationship between those species that require human intervention and those that do not.

- Species of Concern: declining population or appears to be in need of conservation.
- Endangered: seriously at risk of extinction.
- Threatened: vulnerable to endangerment in the near future.
- In Recovery: formerly Endangered, but currently not in danger of extinction throughout all or a significant portion of its inhabitable range.
- No Intervention: human intervention not required at this time

Conservation Status by Species

Of the 5541 species in our national parks, the vast majority (5363) require no intervention, while 151 are species of concern, 15 are endangered, 10 are threatened, and 4 are in recovery.



Calculating for Significance

The following chart, which indicates the percentage of species that are protected, begs the question: which taxonomic category of species is under greatest threat?

Mammals appear to be more likely to be endangered than Birds, but we need to determine if this is a statistically significant difference, or merely the result of chance.

In order to do so, a chi squared test was performed, comparing Mammals to Birds. The p-value of this test was .688, which falls far short of the .05 threshold required to confidently state that this percentage difference is statistically significant. In terms of the risk of being endangered, Mammals and Birds are statistically indistinguishable.

This is not the case for Mammals and Reptiles. A second chi squared test, which returned a p-value of .038, reveals that the percentage difference between Mammals and Reptiles is statistically significant. The risk of being endangered is, in fact, higher for Mammals than it is for Reptiles.

Percentage of Species, organized by Taxonomic Category, that are protected.

	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

Recommendation for the National Parks

Based on an analysis of the data found in the species_info database, we recommend a course of action that further protects the species at highest risk of becoming endangered. Of the species on the endangered list, Mammals are the taxonomic category at highest risk.

Part II: Foot and Mouth Disease

Over the last few years, steps have been undertaken in Yellowstone National Park to reduce the prevalence of foot and mouth disease in their sheep populations, but it remains to be seen how (or even if) these steps have had a significant effect.

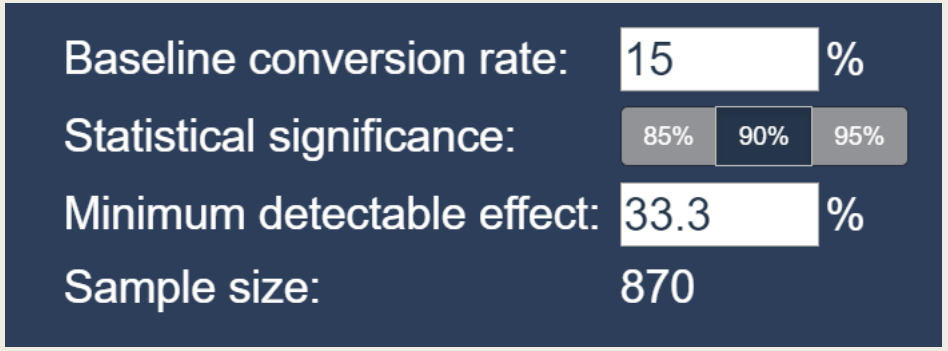
Sample Size Determination

To determine whether the actions of Yellowstone scientists have had a significant effect in reducing the spread of foot and mouth disease, we need to calculate the sample size required to determine if observations in the extant sheep population are statistically significant.

Last year, 15% of observed sheep in Bryce National Park were inflicted with foot and mouth disease, and this will serve as our baseline conversion rate.

Scientists at Yellowstone would like to reliably detect a 5% reduction in the disease within their sheep populations, so our minimum detectable effect is 33.3% (100 * difference/baseline).

Yellowstone researchers are content with a confidence level of 90%, yielding a sample size of 870 sheep that need to be observed for signs of foot and mouth disease.



Observations of Sheep per Week

Given our sample size of 870, observing the requisite number of sheep will take 1.7 weeks (870/507) in Yellowstone National Park, and 3.5 weeks (870/250) in Bryce National Park.

Our recommendation is to perform these observations in Yellowstone National Park, where the higher number of sheep observations per week will expedite the analysis of incidence of foot and mouth disease.

	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