Biodiversity for the National Parks

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Datasheet of species_info.csv

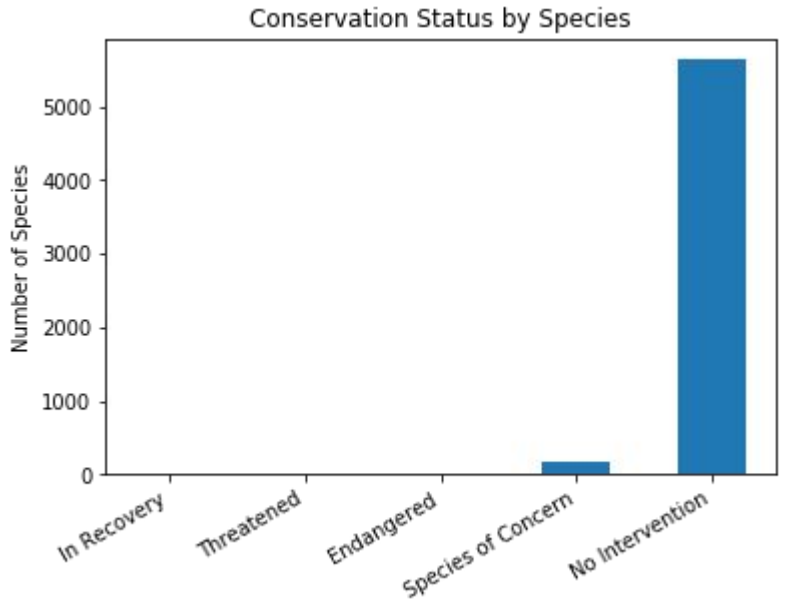
- The file **species_info.csv** has organized into four columns:
  - Category
  - Scientific_name
  - Common_names
  - Conservation_status
- There are seven vast categories of species:
  - Mammal
  - Bird
  - Reptile
  - Amphibian
  - Fish
  - Vascular Plant
  - Nonvascular Plant
- There are 5541 different scientific names of species.
- The conservation status contains five topics along all the species, to better understand we designed a rank, the number one represents the highest risk and the five number lowest risk to the species [1]:

1	2	3	4	5
Endangered	Threatened	In Recovery	Species of Concern	No Intervention

Calculation: Conservation status

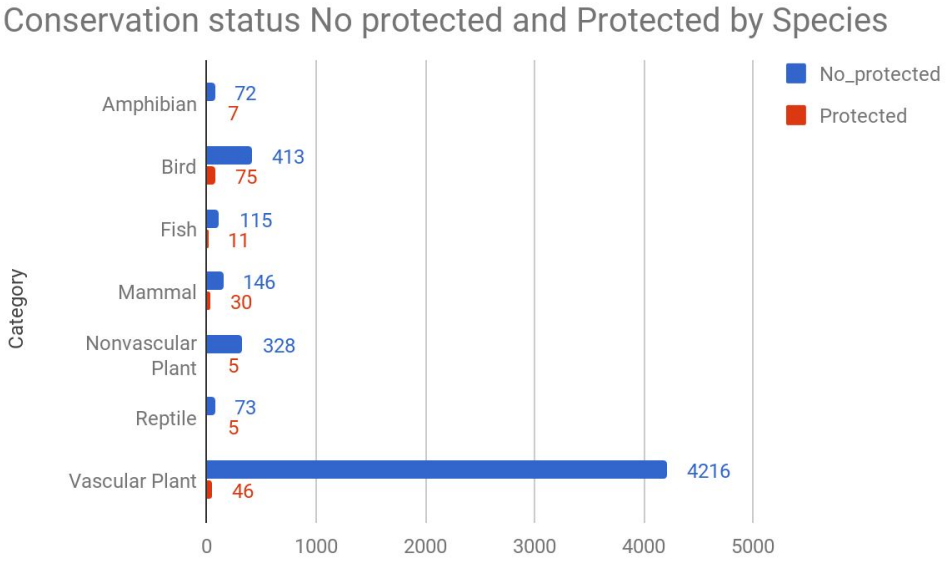
As stated in the conservation status classification, the 96.79% of species does not need intervention. Even though the high number of species without some sort of protection, the scientists worried about the vulnerable species.

	Conservation status	Number of species
1	Endangered	15
2	Threatened	10
3	In Recovery	4
4	Species of Concern	151
5	No Intervention	5363



Calculation: Conservation status

As we mentioned on the previous slide, is a good news a considerable number of species does not need intervention, although there are still species in risk that need attention and track. So, to easily read, we compiled the conservation status classification only in two categories: No protected and Protected [2].



This bar chart gives information about the categories with more species protected, being the top three of the animals the birds, mammals, and fishes, respectively.

Test: Conservation status

According to the graph and tables, it is easy to infer the different values of the protected species and the certain types of species more likely to be endangered. Although we refrain fail interpretations, so we shall test the hypothesis.

Ho = all the species have the same risk to be endangered.
Ha = some species are more vulnerable than other.

Searching accurate conclusions we used the ***chi-squared test*** because the data to compare contains two categorical items.

First, comparing Mammals and Birds.

Category	No_protected	Protected
Mammal	146	30
Bird	413	75

Second, comparing Reptiles and Mammals.

Category	No_protected	Protected
Mammal	146	30
Reptile	73	5

The P value or significance value of the test means the difference between the two variables.

Mammals-Birds: P-value= **0.687** and > 0.05, so we accept the Hypothesis null (Ho) and the difference between the two variables is not relevant.

Reptiles-Mammals: P-value= **0.038** and < 0.05, so we reject the Hypothesis null (Ho) and the difference between the two variables is relevant.

Conclusion: Conservation status

Our first inference was not accurate because the mammals were not more at risk than the birds, but the second deduction was accurate since the mammal's species was more vulnerable than the reptiles.

So, according to the result of hypothesis tests, we suggest to scientists and rangers to develop programs to reinforce the conservation of the thirty mammals species already under protected status (pointed on the previous graph). Some of this mammals' species are Coyote, Wolf, Bat, Myotis, Squirrel, Sheep, Bear, Shrew, Badger, Ringtail, Hare, Rabbit, and Beaver.

The complex geography requires organizing the data of the thirty mammal animals by each park. Knowing the habitat of mammals protected will helps to get readable information and projects.

Foot and mouth disease study at the National Parks

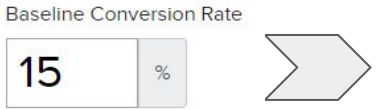
Thanks to conservationists that recorded sightings of different species along four national parks during a week*, we determined the number and location of sheep at the national parks (bar chart below). This information is basic for the foot and mouth disease study who are running scientists and rangers.

*File observations.csv

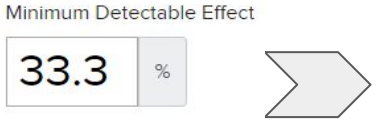
Foot and mouth disease study at the National Parks

According to the observations of sheep per week, the researchers know that 15 percent of sheep at Bryce National Park have the foot and mouth disease. The Yellowstone National Park's rangers want to test the effectiveness of their program to reduce the rate of this disease at least 5 percentage point.

First, it is necessary to calculate the number of observations' sheep or the sample size of sheep at the park to consider the percentage important, through the A/B test sample size calculator online.



Known value - 15% of sheep at Bryce National Park have this disease



The Yellowstone national park's rangers want to be prepared to detect the impact and reduction of the disease at least 5 percentage point. The minimum detectable effect is a percent of the baseline, so 5 is a portion of 15 percent. **Minimum Detectable Effect=**100 * 5 / 15

Use the default level of significance (90%)

The Rangers will look at least 510 sheep, being the sample size and giving significance to the test of effectiveness program.

Determine the time to run the test

How many weeks would the Rangers need to run the test to look enough sheep, by each park at Bryce National Park and Yellowstone National Park?

According to the file observations.csv, we summarized the three of scientific names of sheep by each park, getting:

National Park	Number of Observations per week
Bryce National Park	250
Yellowstone National Park	507

Remember the ideal sample size to use for the test is 510 sheep.

So, a simple inference can help us to determine the time to run the test at the parks:

Bryce National Park: If the conservationist looked 250 sheep per week, How many weeks the Rangers will need to look 510 sheep?
BryceNP_weeks_to_observe_enough_sheep=510*1/250 ⇒ 2 weeks.

Yellowstone National Park: If the conservationist looked 507 sheep per week, How many weeks the Rangers will need to look 510 sheep?
YellowstoneNP_weeks_to_observe_enough_sheep=510*1/507 ⇒ 1 week.

Notes

Note 1:

- Species of Concern: declining or appear to be in need of conservation
- Threatened: vulnerable to endangerment in the near future
- Endangered: seriously at risk of extinction
- In Recovery: formerly Endangered, but currently neither in danger of extinction throughout all or a significant portion of its range
- No Intervention: Not require protection

Note 2: Original table, source of Graph: Conservation status No protected and Protected by Species.

Category	No_protected	Protected	Percent protected
Amphibian	72	7	0.088
Bird	413	75	0.153
Fish	115	11	0.087
Mammal	146	30	0.170
Nonvascular Plant	328	5	0.015
Reptile	73	5	0.064
Vascular Plant	4216	46	0.010

Images cited

“Lesions on Gum of Cow with Foot-and-Mouth Disease in Kenya 1996.” *Foot-and-Mouth Disease Virus*, influentialpoints.com/Gallery/Foot-and-mouth_disease_virus.htm.

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“Surrey Wildlife Trust.” *Surrey Wildlife Trust*, 12 June 2017, www.surreywildlifetrust.org/news/2017/06/12/new-report-shows-urgent-action-needed-protect-nature-surrey-mp-takes-environment-rol.

Tools used: Python- Matplotlib and Pandas