Capstone Project 2

Biodiversity for the National Parks

Giel Klijweg

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Data of species

	conservation_status	scientific_name
0	Endangered	15
1	In Recovery	4
2	No Intervention	5363
3	Species of Concern	151
4	Threatened	10

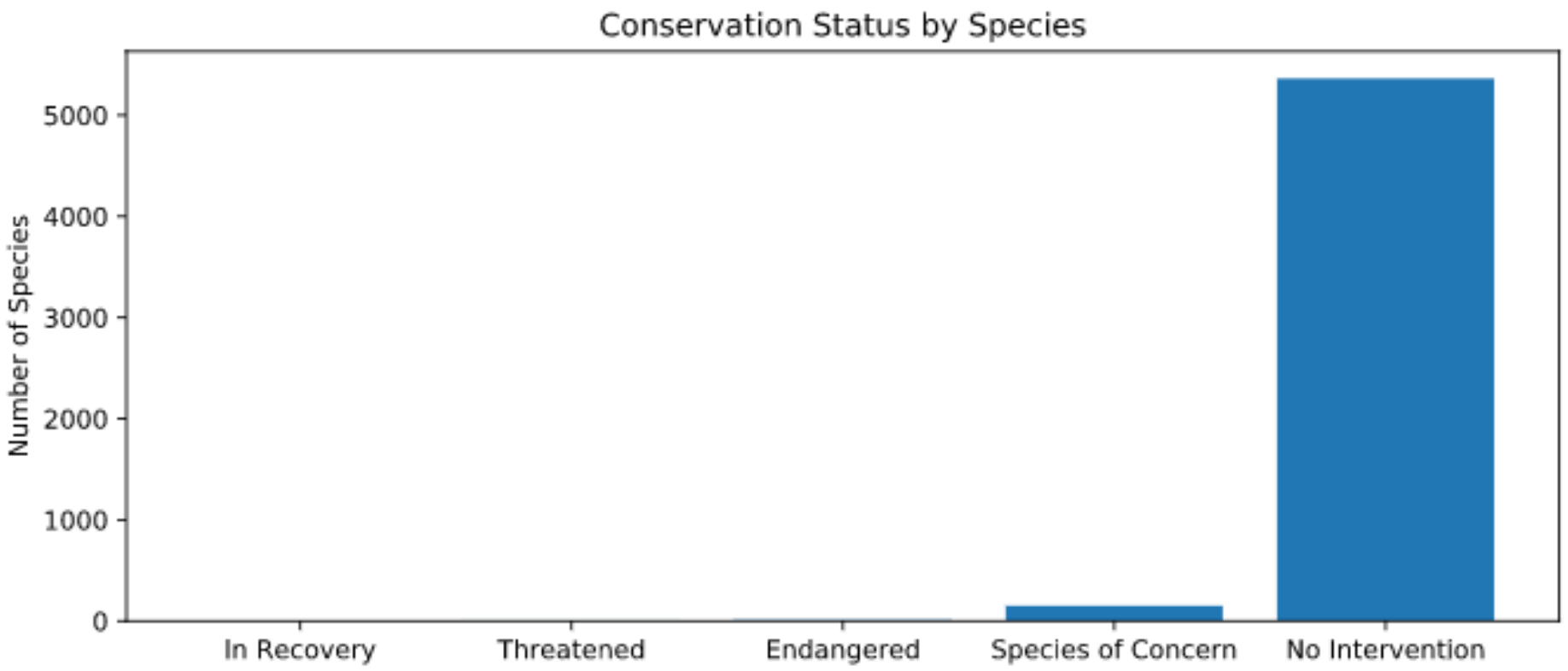
Available data in species_info.csv

The dataset species.info consists of several columns which describe a species. Most importantly whether or not the species is endangered.

- **Category** describes if the species is a mammal, reptile, bird, or (Non)vascular Plant.
- **Scientific_name** gives the scientific name of the species.
- **Common_names** shows the more common name of the species.
- **Conservation** status shows the status of the species, endangered, in recovery, no intervention, species of concern or threatened.

	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), Domesticated Cattle	nan
3	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	nan
4	Mammal	Cervus elaphus	Wapiti Or Elk	nan

Species by conservation status



Species by conservation status

category	not_protected	protected	percent_protected
Amphibian	72	7	8,861%
Bird	413	75	15,369%
Fish	115	11	8,730%
Mammal	146	30	17,046%
Nonvascular Plant	328	5	1,502%
Reptile	73	5	6,410%
Vascular Plant	4216	46	1,079%

- The table on the left shows how many different species from each category are protected or not protected.
- The data shows that species from the category Mammals and Birds have a higher percentage of protected species.
- We tested if there is a significant change that Mammals are more likely to be endangered than Birds. We used a chi-squared test and we found a p-value of ~0.688.
- We can conclude that the difference between the percentages of protected birds and mammals is not significant and is a result of chance.
- We also did a test on the difference between reptiles and mammals. The chi-squared test calculated a p-value of ~0.038, which is significant.
- Therefore, we can conclude that certain types of species are more likely to be endangered than others.
- In this case mammals are more likely to be endangered than reptiles

Recommendations

category	not_protected	protected	percent_protected
Amphibian	72	7	8,861%
Bird	413	75	15,369%
Fish	115	11	8,730%
Mammal	146	30	17,046%
Nonvascular Plant	328	5	1,502%
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- As our tests have shown, certain types of species are more likely to be endangered than others.
- I believe the changing climate affects the ecosystems of multiple species. Several species cannot adapt to their compromised habitat and (natural) restoration of these habitats takes to long.
- In order to help these species conservations should focus on preserving these ecosystems which are habitats of these endangered species, i.e. the Amazon rainforest, the great barrier reef and the Borneo rainforest.
- However, we must not forget that a lot of mammals and birds are already protected. This means that there is awareness. For these species governments should enforce their laws on protecting these species and take stronger measures against poaching.

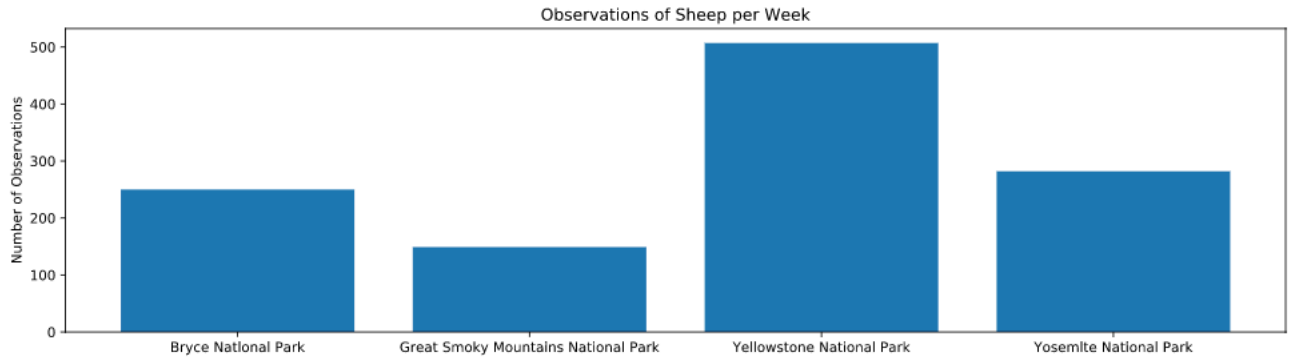
Foot and mouth disease study

scientific_name	park_name	observations	category	common_names	conservation_status	is_protected	is_sheep
Ovis canadensis	Yellowstone National Park	219	Mammal	Bighorn Sheep, Bighorn Sheep	Species of Concern	True	True
Ovis canadensis	Bryce National Park	109	Mammal	Bighorn Sheep, Bighorn Sheep	Species of Concern	True	True
Ovis canadensis	Yosemite National Park	117	Mammal	Bighorn Sheep, Bighorn Sheep	Species of Concern	True	True
Ovis canadensis	Great Smoky Mountains National Park	48	Mammal	Bighorn Sheep, Bighorn Sheep	Species of Concern	True	True
Ovis canadensis sierrae	Yellowstone National Park	67	Mammal	Sierra Nevada Bighorn Sheep	Endangered	True	True
Ovis canadensis sierrae	Yosemite National Park	39	Mammal	Sierra Nevada Bighorn Sheep	Endangered	True	True
Ovis canadensis sierrae	Bryce National Park	22	Mammal	Sierra Nevada Bighorn Sheep	Endangered	True	True
Ovis canadensis sierrae	Great Smoky Mountains National Park	25	Mammal	Sierra Nevada Bighorn Sheep	Endangered	True	True
Ovis aries	Yosemite National Park	126	Mammal	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	No Intervention	False	True
Ovis aries	Great Smoky Mountains National Park	76	Mammal	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	No Intervention	False	True
Ovis aries	Bryce National Park	119	Mammal	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	No Intervention	False	True
Ovis aries	Yellowstone National Park	221	Mammal	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	No Intervention	False	True

Foot and mouth disease study

	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

- The previous slide shows data on the three different sheep species observed in four different national parks.
- The species of sheep are Ovis canadensis, Ovis canadensis sierrae and aries.
- The national parks where the sheep have been observed are Yellowstone National Park, Bryce National Park, Yosemite National Park and Great Smoky Mountains National Park. There are a total of 1.188 observations of the different species sheep in the four national parks.



Foot and mouth disease study

- Based on the information in the previous two slides we can calculate the required sample size in order to calculate the number of sheep that scientists would need to observe from each park to make sure their foot and mouth percentages are significant.
- Last year, scientists recorded that 15% (baseline) of the sheep at Bryce National park had foot and mouth disease. Scientists want to measure if the program is working and want to be able to detect a reduction of at least 5 percentage points.
- Thus the minimum detectable effect is 5%/15% * 100% = 33.33%
- At a 90% level of significance this means the sample per species is equal to 870.
- If the scientists can do 570 observations of sheep per week in Yellowstone National park it would take approximately 1,5 weeks to get enough observations.
- Similar for Bryce National park, the scientists would need approximately 3,5 weeks for the required number of observations.
- The national parks where the sheep have been observed are Yellowstone National Park, Bryce National Park, Yosemite National Park and Great Smoky Mountains National Park. There are a total of 1.188 observations of the different species sheep in the four national parks.