



Biodiversity Capstone Project

BY

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Introduction

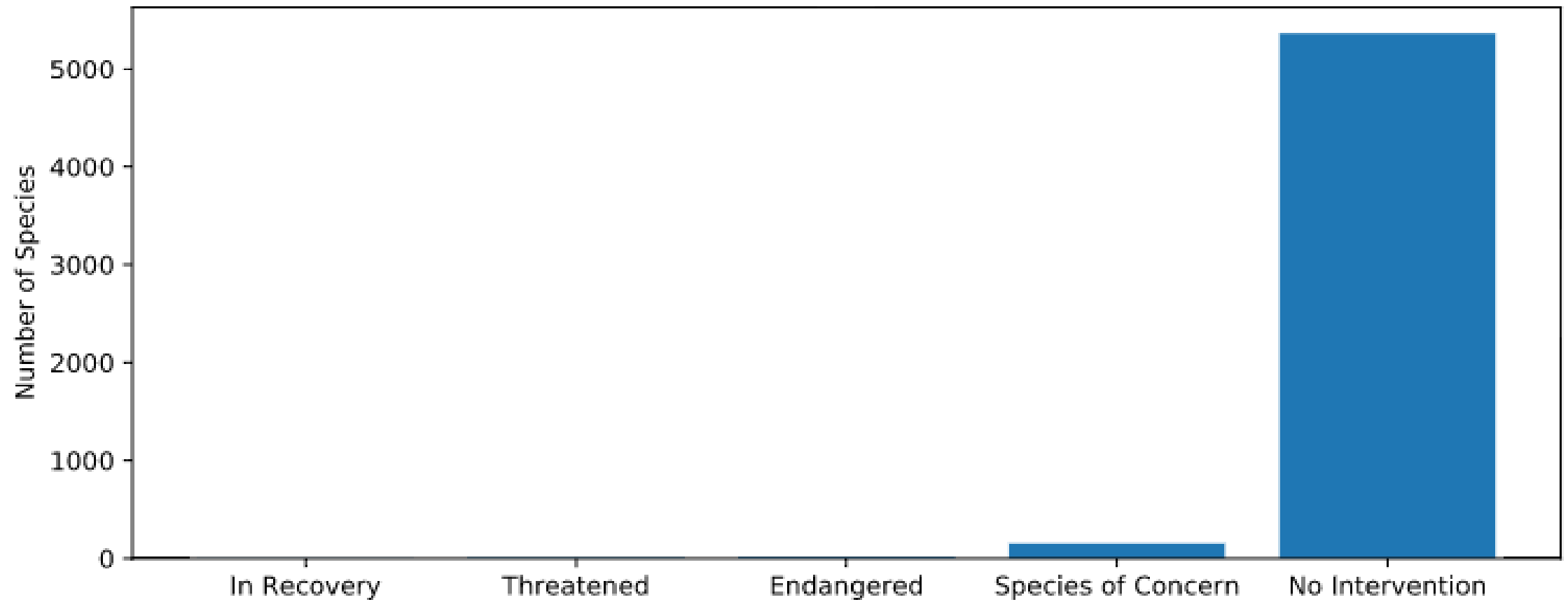
Species

- ▶ Will go over the data represented
- ▶ Anomaly found within the data
- ▶ Discuss endangered status across different categories of species
- ▶ Recommendations based upon my findings with the endangered species

Observations

- ▶ Will take a look at the number of sheep observed in the following parks
 - ▶ Bryce National Park
 - ▶ Great Smoky National Park
 - ▶ Yellowstone National Park
 - ▶ Yosemite National Park
- ▶ Analysis of the Foot and Mouth disease study performed for the Yellowstone National Park

Conservation Status by Species



Data at first glance continued

- Data represented in species_info.csv shows the conservation status of the following species
- There are 5543 different species
 - Vascular Plants make up the majority of the species in the data provided
 - Reptiles make up the minority
- It also described each species' conservation status
 - In recovery
 - Threatened
 - Endangered
 - Species of concern
 - No intervention

Species	# of Species
Amphibian	79
Bird	488
Fish	126
Mammal	177
Nonvascular Plant	333
Reptile	78
Vascular Plant	4262
Grand Total	5543

Digging further into the data

- Canis Lupus (Gray Wolf) appears in the endangered status twice and once in the in recovery status
- Oncorhynchus Mykiss (Rainbow Trout) appears in both no intervention and threatened status
- This anomaly can be explained in that a species can be in both statuses i.e. the Gray Wolf is both endangered and in recovery
 - It also due to the large difference in observations per park, specifically Yellowstone

Conservation Status	# of Species by conservation status
Endangered	15
In Recovery	4
No Intervention	5363
Species of Concern	151
Threatened	10
Grand Total	5543

Examining endangered species

- ▶ Mammals and Birds are most likely to be listed in a protected status
- ▶ Is there significant difference between the two?
- ▶ We can test this by using the Chi-squared test, first we need a null hypothesis
 - ▶ Which will be that this difference is due to chance

Category	Not Protected	Protected	% Protected
Amphibian	72	7	8.86%
Bird	413	75	15.36%
Fish	115	11	8.73%
Mammal	146	30	17.04%
Nonvascular Plant	328	5	1.50%
Reptile	73	5	6.41%
Vascular Plant	4216	46	1.07%

Chi-squared test: Mammals vs Birds

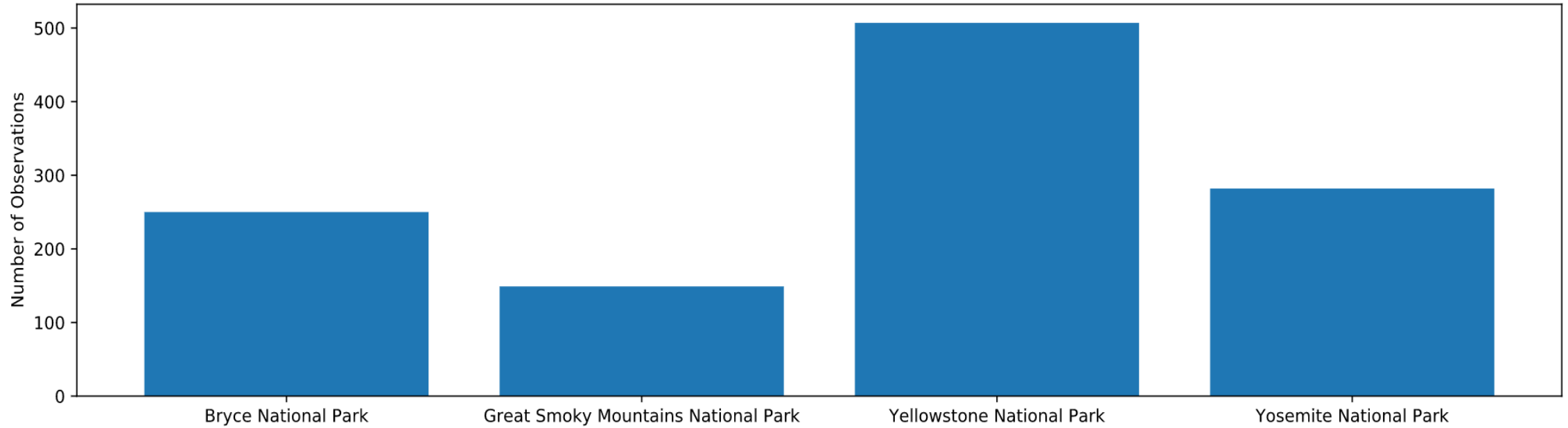
- ▶ Using the Chi-squared test we are able to examine if there is a statistical difference between percentage of protected statuses of species
- ▶ The P Value (p) for Mammals vs Birds came in at 0.688 which is greater than 0.05
 - ▶ When $p < 0.05$ there is a significant difference
 - ▶ When $p > 0.05$ there is not a significant difference
- ▶ Mammals vs Birds percentages are not significant
- ▶ Using the same test but different species, Reptiles vs Mammals, the P Value came in at 0.038, so it is significant
- ▶ In certain cases, i.e. Reptiles vs Mammals, species are more likely to be endangered than others

Recommendations for Endangered species

- ▶ Focus on species preservation for species with a higher percentage of protected status
 - ▶ Mammals and Birds
- ▶ With greater emphasis being put into the species with higher percentages it will allow the at risk species to be stabilized
- ▶ In the following slides you will see a study performed for the Park Rangers at Yellowstone National Park to combat Foot and Mouth disease
 - ▶ Similar studies across the hardest hit species will help to further aid in the reestablishing the most at risk species



Observations of Sheep per Week



Foot and Mouth disease study

- ▶ The aim of this study to get at least a 5% reduction in foot and mouth disease in sheep located in Yellowstone National Park
 - ▶ To achieve this an A/B test sample size calculator will be utilized to help identify how many sheep will need to be observed to obtain the 5% reduction in foot and mouth in Yellowstone National Park
- ▶ Bryce National Park recorded last year that 15% of the sheep located in Bryce National Park had foot and mouth disease
 - ▶ 15% will be used as our baseline conversion rate
 - ▶ Baseline conversion rate is the number of conversions divided by the total number of sheep
- ▶ The minimum detectable effect for this study will be 33.33%
 - ▶ $(100 * 5) / 15$
 - ▶ Minimum Detectable Effect is the smallest relative change in conversion rate we are interested in detecting
- ▶ 90% will be the statistical significance
 - ▶ We are accepting a 10% false positive rate

Foot and Mouth continued

- ▶ To obtain the 5% reduction in of foot and mouth disease in sheep located in Yellowstone, the Park Rangers would have to observe 510 sheep
- ▶ This would take no more then 1 week to accomplish the task
 - ▶ $510 / 507$ (number of sheep observed in Yellowstone, see graph Observations of Sheep per Week) = 1.0059
- ▶ The same study would take about two weeks in Bryce