Biodiversity Project

Conservation status analysis
Sheep migration analysis
Foot and mouth disease analysis

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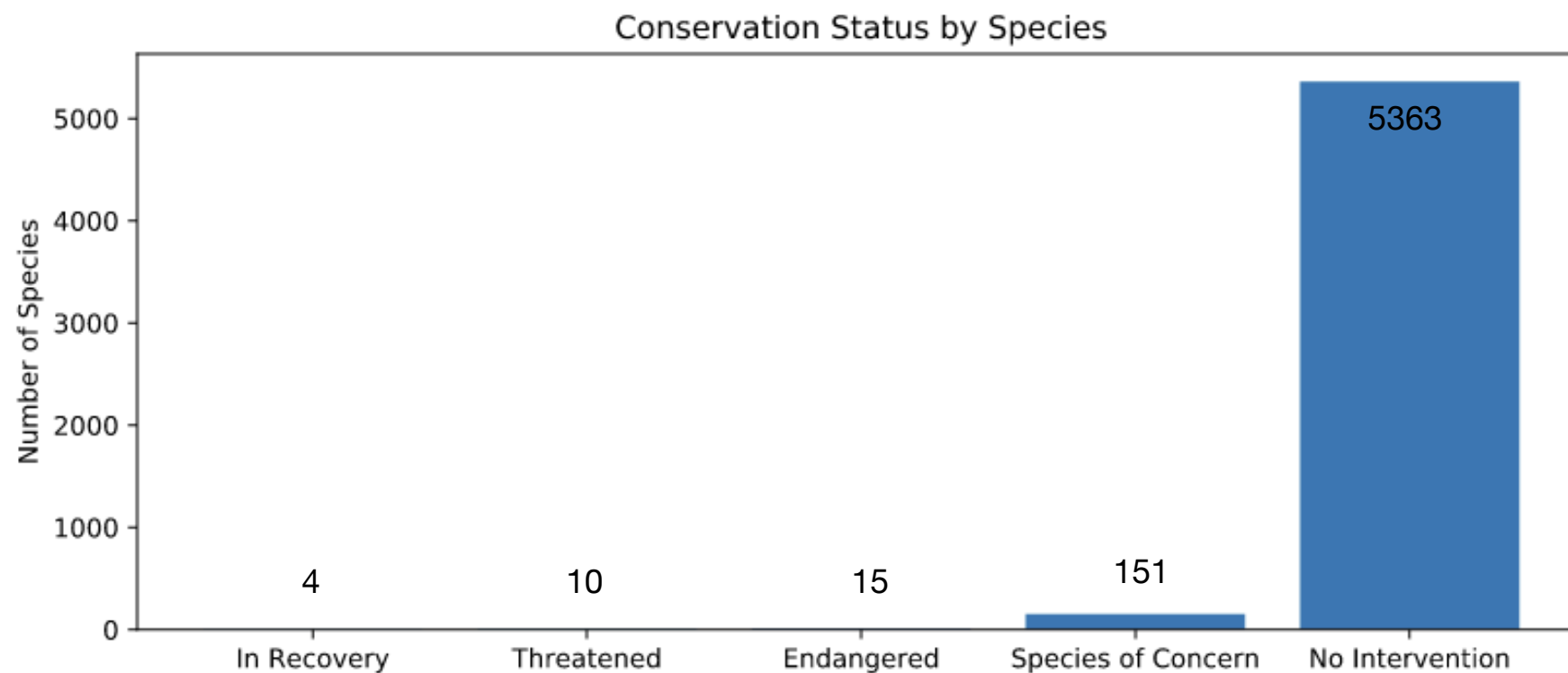
Conservation statuses and endangering patterns

- Majority of the species require no intervention, they are not endangered, in recovery, threatened or in concern. Good news for the Nation Parks.

Conservation statuses and endangering patterns

https://gist.github.com/8cb9b19068dda411a4f156e459bea876

category	not_protected	protected	percent_protected
Amphibian	72	7	0.088608
Bird	413	75	0.153689
Fish	115	11	0.087302
Mammal	146	30	0.170455
Nonvascular Plant	328	5	0.015015
Reptile	73	5	0.064103
Vascular Plant	4216	46	0.010793

- Birds and Mammals have higher percentages and absolute numbers of protected species, suggesting that they may be more endangered than other categories

- Amphibian, Fish and Reptile have similar percentages of endangered species, about twice as small than percentages of endangered Birds or Mammals

- Plants have the smallest percentage of endangered species

Conservation statuses and endangering patterns

https://gist.github.com/aa225bbfecdfbe98a1a1b6d0ffe4aaaa

```python
#difference between birds and mammals is not
significant
contingency= [[30,146],[75,413]]
from scipy.stats import chi2_contingency
chi2, pval, dof, expected =
chi2_contingency(contingency)
print pval
pval = 0.687


#difference between reptiles and mammals is
significant
contingency_1=[[5,73],[30,146]]
chi2, pval, dof, expected =
chi2_contingency(contingency_1)
pval_reptile_mammal=pval
print pval
pval=0.038
```

- Are certain types of species more likely to be endangered? We used chi-squared test to answer the question and looked at Categories with different percentage of endangered species.

  - Mammals are not significantly different than Birds to be endangered, and both Mammals and Bird have highest percentages of endangered species.

  - Mammals are more likely to be endangered than Reptiles

Conservation statuses and endangering patterns

- Recommendations:

- Mammals and Bird have highest percentages of endangered species and are more likely to be endangered. Thus species from both of these Categories require higher attention and protection, than species from other Categories.

- We would like to examine Endangered to Recovery dynamic next time and hopefully see more species moving from Endangered to Recovery category and well as observe decrease of the protected species overall

Sheep movement analysis

https://gist.github.com/4e7938ab04cce1754e0e7951b038bd2e
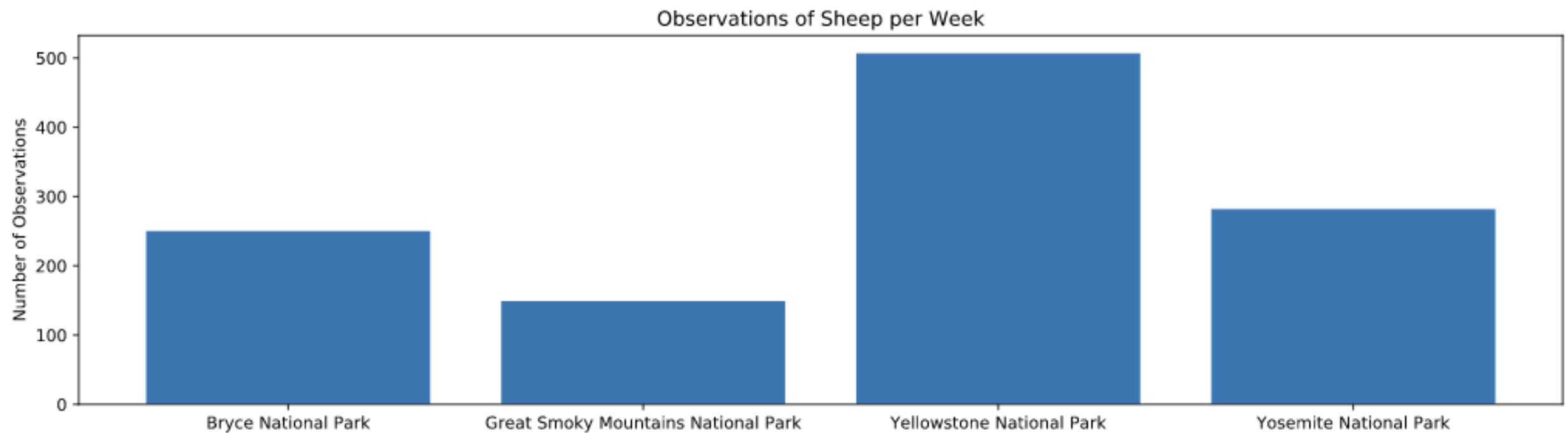
- Most of the sheep were observed in Yellowstone National Park, followed by Yosemite National Park

Sheep movement analysis

https://gist.github.com/06230e7e8e40eb6fbdaab103a4eb460c

	category	scientific_name	common_names	conservation_status	is_protected	is_sheep	park_name
0	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	No Intervention	False	True	Yosemite National Park
1	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	No Intervention	False	True	Great Smoky Mountains National Park
2	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	No Intervention	False	True	Bryce National Park
3	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	No Intervention	False	True	Yellowstone National Park
4	Mammal	Ovis canadensis	Bighorn Sheep, Bighorn Sheep	Species of Concern	True	True	Yellowstone National Park

- Within a same park territory sheep with different endangered status were observed

- Same sheep species were seen in several parks, these animals migrate a lot

Foot and mouth disease analysis

sample size determination

https://gist.github.com/ccbd2f2b1bf65ee62a1cc749080f8c85

```
baseline = 15

minimum_detectable_effect = 100*5./15
print minimum_detectable_effect
minimum_detectable_effect= 33


sample_size_per_variant = 870


yellowstone_weeks_observing = sample_size_per_variant/507.
print yellowstone_weeks_observing
yellowstone_weeks_observing=1.71


bryce_weeks_observing = sample_size_per_variant/250.
print bryce_weeks_observing
bryce_weeks_observing=3.48
```

- Given baseline and minimum detectable effect information, scientists will need to observe 870 animals to test their hypothesis. If 10% or less of 870 sheep in each park have foot and mouth disease, they will be able to say with confidence, that the treatment works. It will take 1.71 weeks of observations in Yellowstone park and 3.48 weeks in Bryce park.