

Are Some Species More Likely To Be Endangered Than Others?

By Ahsan Khan

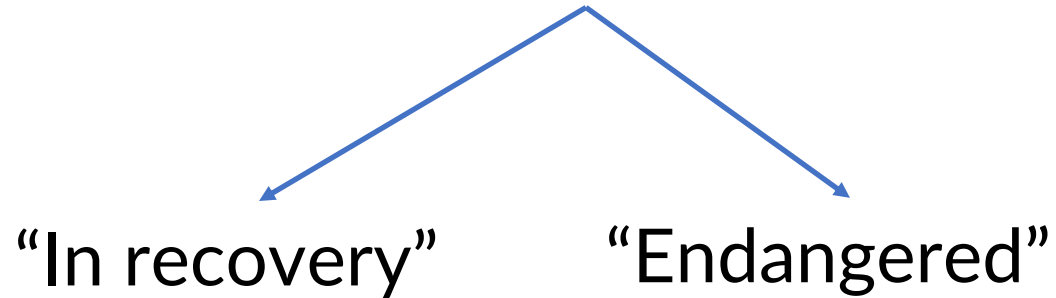
What Data is Available?

- **File:** species_info.csv
- **Provided by:** National Parks Service
- **Contains:**
 - *Specie Category*
 - *Scientific Name*
 - *Common Name(s)*
 - *Conservation Status*

Inconsistencies in Data

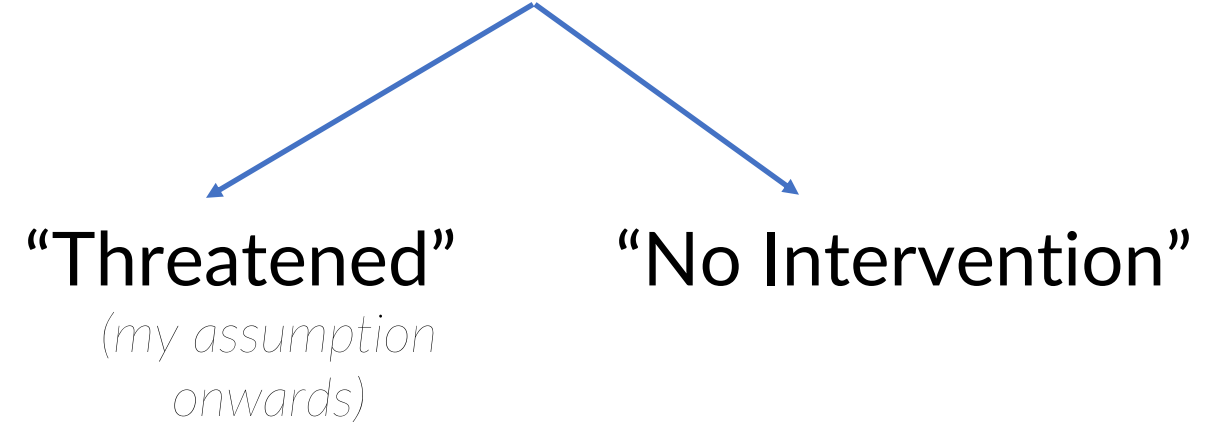
GRAY WOLF

(Mammal)

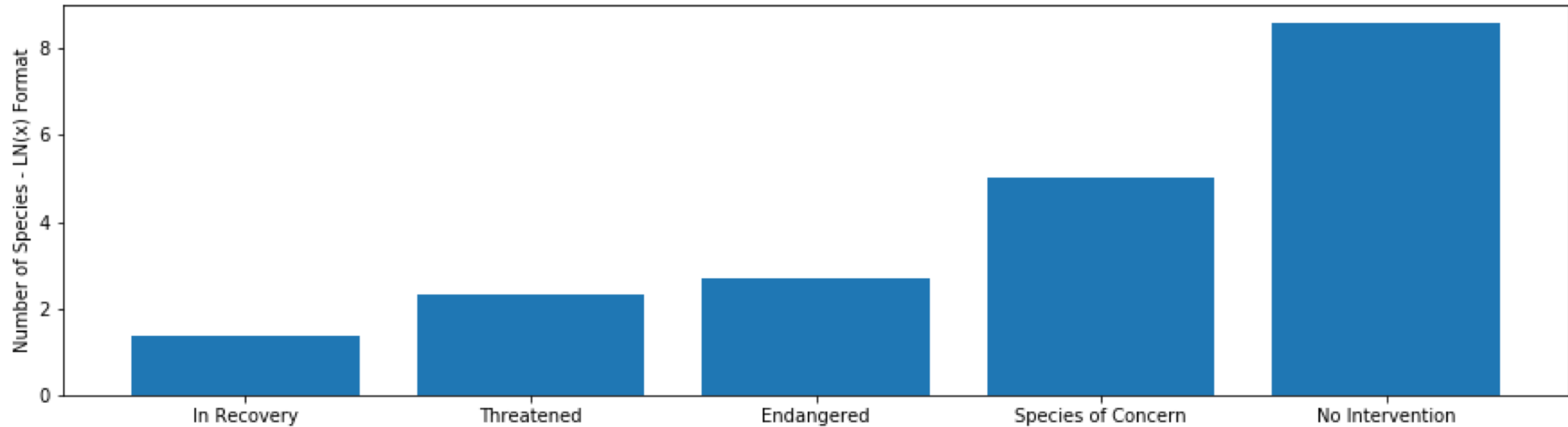


RAINBOW TROUT

(Fish)

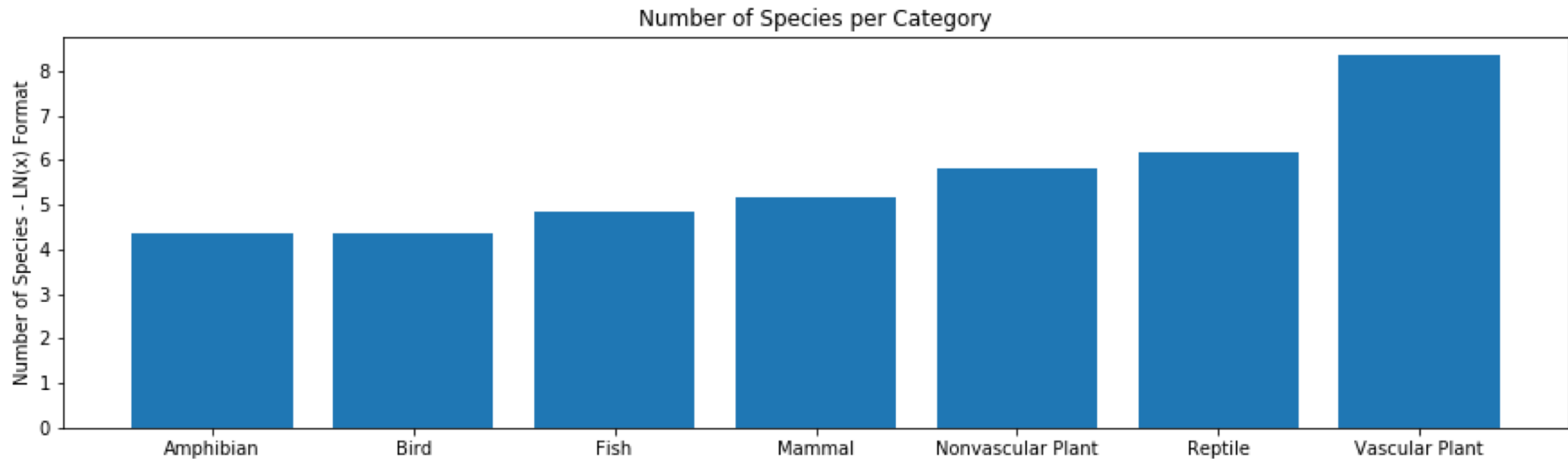


Conservation Status by Species



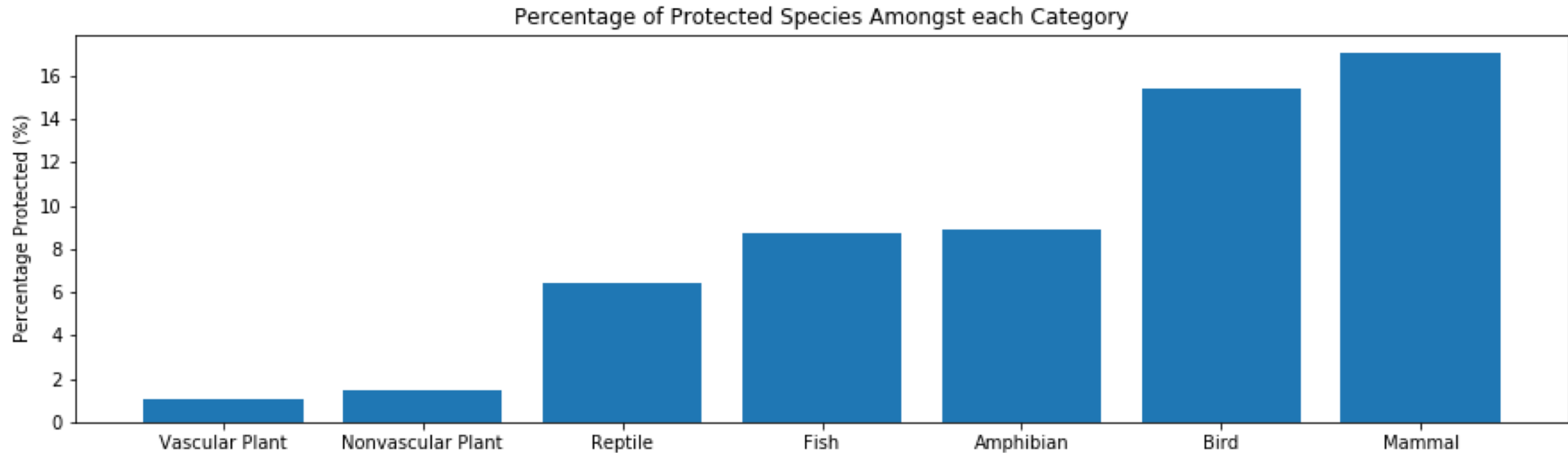
- LN(x) Format to give an order of magnitude.
- Total number of protected species: **179** (*Sum of first 4 bars*)

Highest Number of Species: *Vascular plants...*



- LN(x) format to give an order of magnitude.
- Total number of unique species: **5541**

...Yet, Lowest Percentage of Protected Species



- Mammals & Birds are highest protected species.

Clearly, some species are more likely to be endangered than others!

- Chi-squared Test for ***all*** species:
 - *H0: Distribution among endangered species is due to chance*
 - *H1: Distribution among endangered species is NOT due to chance*
- P-value: *extremely close to zero!*
- ***Reject H0!***

Are Mammals more likely to be endangered than Birds? (1)

- If *percentages* are considered: **YES!**
 - MAMMALS: 17.1%
 - BIRDS: 15.4%
- ***BUT can we be sure?***
 - Conduct Chi-Squared Test:
 - *H0: Distribution among endangered species is due to chance*
 - *H1: Distribution among endangered species is NOT due to chance*

Are Mammals more likely to be endangered than Birds? (2)

- Chi-Squared Test result:
 - P-value = 0.68
 - *Do not reject H_0*
- No significant difference between these species!
- *No, Mammals just as likely to be endangered than Birds!*

Are Mammals more likely to be endangered than Reptiles? (1)

- If *percentages* are considered: **YES!**
 - MAMMALS: 17.1%
 - REPTILES: 6.4%
- ***BUT AGAIN, can we be sure?***
 - Conduct Chi-Squared Test:
 - *H0: Distribution among endangered species is due to chance*
 - *H1: Distribution among endangered species is NOT due to chance*

Are Mammals more likely to be endangered than Reptiles? (2)

- Chi-Squared Test result:
 - P-value = 0.038
 - *Reject H_0*
- Significant difference between these species!
- *Yes, Mammals are more likely to be endangered than Reptiles.*

Foot and Mouth Disease

Case Study (1): *What is it?*

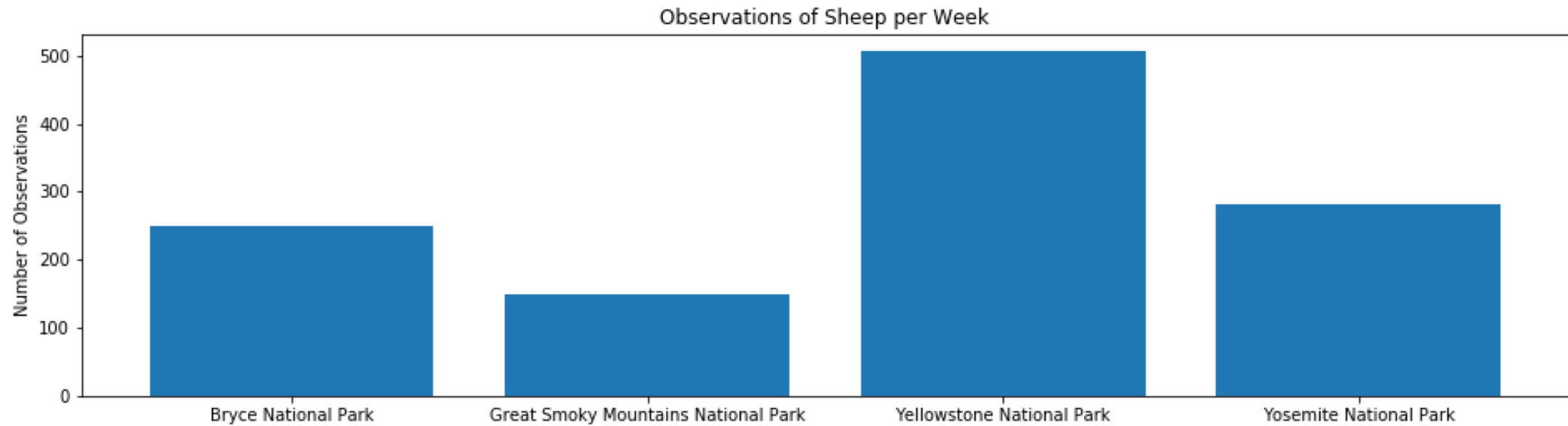
- Scientists running a **program** to reduce rate of disease at Yellowstone National Park.
- Study conducted on **any specie** that includes Sheep.

Foot and Mouth Disease

Case Study (2): *Dataset*

- **Additional File:** observations.csv
- **Provided by:** National Parks Service
- **Contains:**
 - *Number of observations for each unique specie at 4 different parks*

Foot and Mouth Disease Case Study (3): *Sheep Sightings*



Foot and Mouth Disease Case Study

(4): *Sample Size Determination*

- **Baseline 15%:** Recorded number of sheep at Bryce National Park that had foot and mouth disease last year.
- **Minimum sizable effect 33.3%** in order to detect at least 5% reduction in disease cases.
- **Level of significance 90%:** Detect an x% change with 90% confidence.
- Based on these 3 inputs, **sample size required: 870.**

Foot and Mouth Disease Case Study (5): *Conclusion*

1.71

Weeks required to
observe sufficient
number of sheep at
**Yellowstone
National Park**

3.48

Weeks required to
observe sufficient
number of sheep at
Bryce National Park