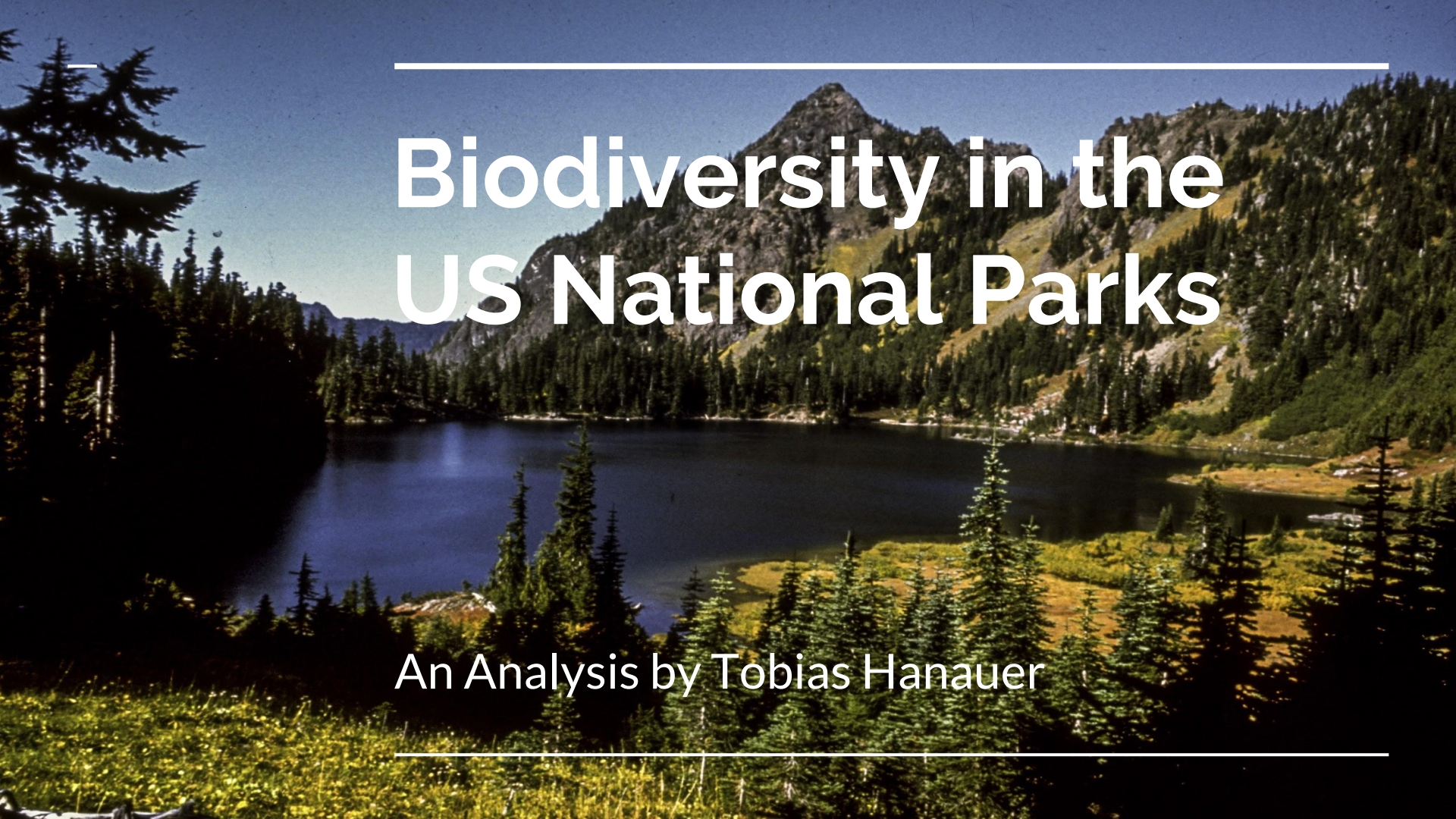


Biodiversity in the US National Parks

An Analysis by Tobias Hanauer

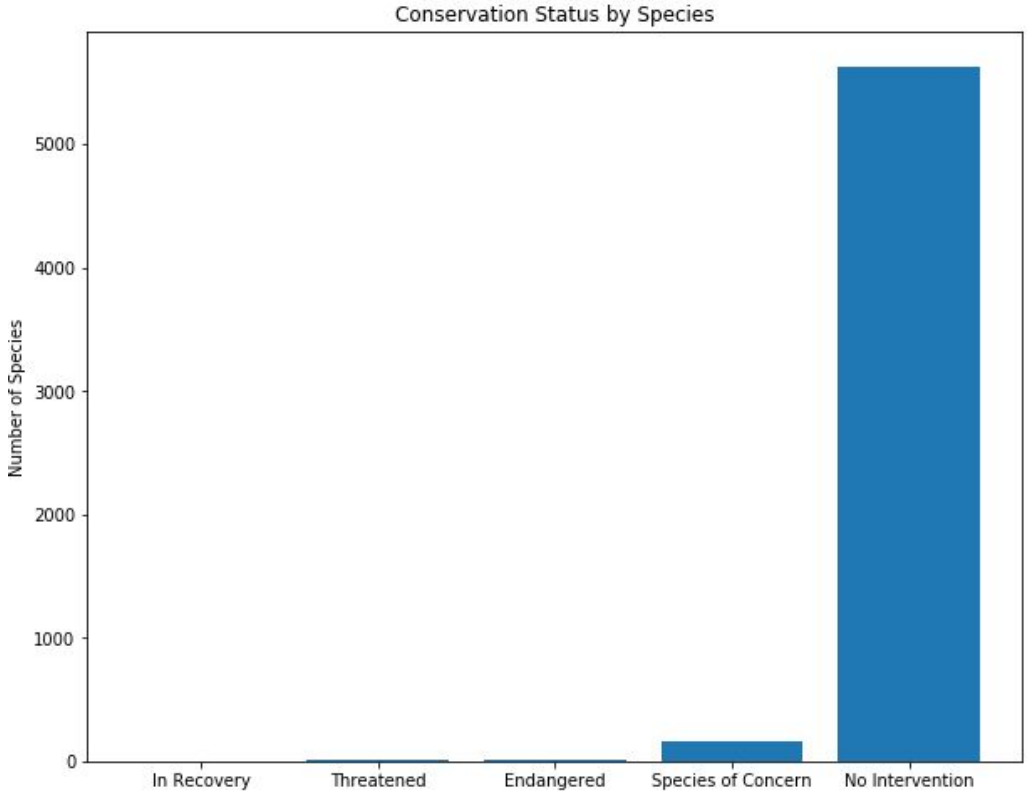
Species and their Conservations Status in the National Parks

5,541 different species are living in the Parks

	category	scientific_name
0	Vascular Plant	4262
1	Bird	488
2	Nonvascular Plant	333
3	Mammal	176
4	Fish	125
5	Amphibian	79
6	Reptile	78

- 5,541 different species are living in the parks
- the species can be sorted into 7 different categories
- ~ ¾ of the species are vascular plants

Only 180 species need special protection



- the data contains 5 different conservation status
- 4 out of the 5 status are special protection status
- the majority needs no protection, but be aware that ¾ of the species are vascular plants - so the status for each category could vary quite a lot

Some additional findings in the data

- in total we have 5,824 entries in our list, but only 5,541 unique species => some species have several entries
    - e.g. Canis lupus has three entries and belongs two two different conservation status

	category	scientific_name	common_names	conservation_status
8	Mammal	Canis lupus	Gray Wolf	Endangered
3020	Mammal	Canis lupus	Gray Wolf, Wolf	In Recovery
4448	Mammal	Canis lupus	Gray Wolf, Wolf	Endangered

- whereas the multiple entries for the species were no problem for the counting of the species, here those entries can lead to problems:
    - e.g. the rainbow trouts are counted doubled

	category	scientific_name	common_names	conservation_status
560	Fish	Oncorhynchus mykiss	Rainbow Trout	No Intervention
3283	Fish	Oncorhynchus mykiss	Rainbow Trout	Threatened

➔ maybe the conservation status differs from park to park
➔ park should be included in the next analysis

Protection Status - Deep Dive on Category Lvl

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

- Selection of the significance test
  - data: categorical
  - comparison: 2 data sets
  - => Chi-squared Test
- First guess: mammals are more likely to be endangered than birds
- Second guess: mammals are more likely to be endangered than reptiles
- => null hypothesis the difference is a result of chance

Protection Status - Testing the assumptions

Mammals vs. Birds

- creating the contingency table

	category	not_protected	protected
0	Mammal	146	30
1	Bird	413	75

- running the test
- p ~ 0,69 => p > 0,05

➔ the difference is not significant! - the difference is just a result of chance

Mammals vs. Reptiles

- creating the contingency table

	category	not_protected	protected
0	Mammal	146	30
1	Reptile	73	5

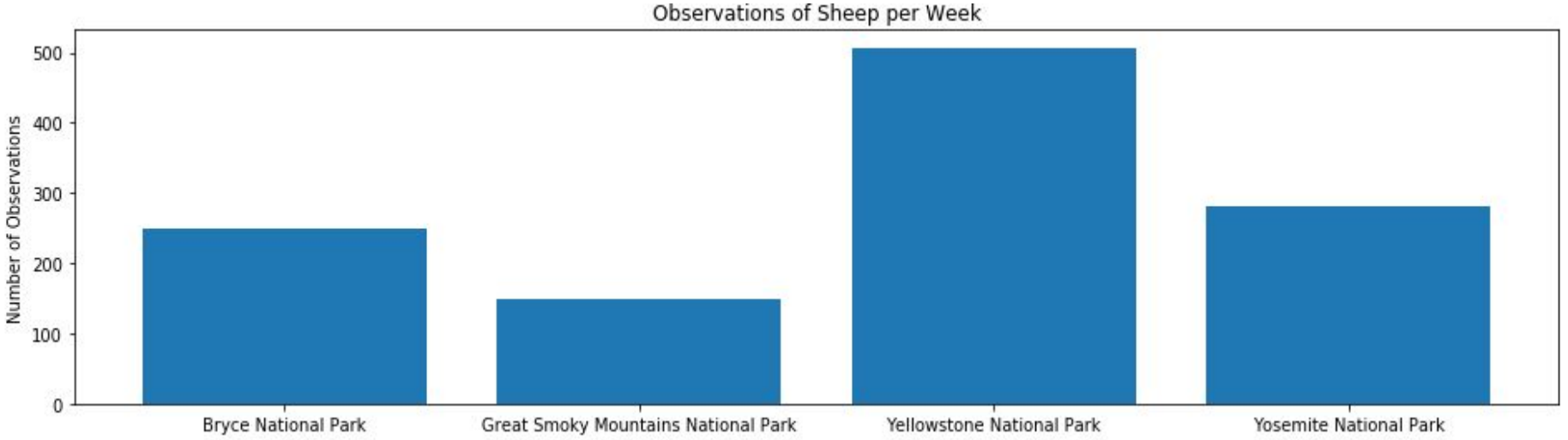
- running the test
- p ~ 0,038 => p < 0,05

➔ the difference is significant!
➔ mammals are more likely to be endangered than reptiles

Recommendation: conservationists should put more effort in protecting the mammals, without neglecting the protection of the others categories!

Foot & Mouth Disease Study

Sheep Observations in the National Parks



- 3 species of sheeps in 4 parks (1,188 observations in total in 7 days)
- total observations

Testing the foot and mouth disease program

- How many sheeps do we have to test to be sure the program reduces the disease by 5 percentage points?
    - baseline = 15%
        - 15% of the sheeps are infected before the program starts
    - minimum detectable effect = 33.33%
        - (0.05 / 0.15)*100
    - sample size = 510
        - Using the sample size calculator at Optimizely

Testing the foot and mouth disease program

- How long does it take to observe 510 sheeps in specific Parks?
    - Bryce National Park: ~ 2 Weeks
        - 510 (sample size) / 250 (observations per week)
    - Yellowstone National Park: ~ 1 Week
        - 510 (sample size) / 507 (observations per week)
    - Great Smoky Mountains National Park: ~ 3,5 Weeks (24 days)
        - 510 (sample size) / 507 (observations per week)
    - Yosemite National Park: ~ 2 Weeks (13 days)
        - 510 (sample size) / 282 (observations per week)