CAPSTONE OPTION 2: BIODIVERSITY FOR THE NATIONAL PARKS

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DATA DESCRIPTION I

1 INFORMATION STORED IN SPECIES_INFO.CSV

	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), Dom...	NaN
3	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	NaN
4	Mammal	Cervus elaphus	Wapiti Or Elk	NaN

2 DIFFERENT SCIENTIFIC NAMES

```
category              7
scientific_name    5541
common_names       5504
conservation_status   4
dtype: int64
```

- There are more scientific names than common names

3 SPECIES CATEGORIES

```
array(['Mammal', 'Bird', 'Reptile', 'Amphibian', 'Fish', 'Vascular Plant',
       'Nonvascular Plant'], dtype=object)
```

4 SPECIES CONSERVATION STATUS

```
array([nan, 'Species of Concern', 'Endangered', 'Threatened',
       'In Recovery'], dtype=object)
```

5 CONSERVATION STATUS COUNT

	conservation_status	scientific_name
0	Endangered	15
1	In Recovery	4
2	Species of Concern	151
3	Threatened	10

6 CONSERVATION STATUS COUNT + NO INTERVENTION

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

- The most animals are either not in danger or “of concern” only a few are endangered or threatened

DATA DESCRIPTION II

7 CATEGORY COUNT

	category	is_protected	scientific_name
0	Amphibian	False	72
1	Amphibian	True	7
2	Bird	False	413
3	Bird	True	75
4	Fish	False	115

8 PIVOTED CATEGORY COUNT

is_protected	category	False	True
0	Amphibian	72	7
1	Bird	413	75
2	Fish	115	11
3	Mammal	146	30
4	Nonvascular Plant	328	5
5	Reptile	73	5
6	Vascular Plant	4216	46

10 PROTECTED IN PERCENT

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

11 INFORMATION STORED IN OBSERVATIONS.CSV

	scientific_name	park_name	observations
0	Vicia benghalensis	Great Smoky Mountains National Park	68
1	Neovison vison	Great Smoky Mountains National Park	77
2	Prunus subcordata	Yosemite National Park	138
3	Abutilon theophrasti	Bryce National Park	84
4	Githopsis specularioides	Great Smoky Mountains National Park	85

- A lot of mammals and birds are protected, so it is useful to check the efficiency of different protection measurements

DATA DESCRIPTION III

12 IS_SHEEP COLUMN ADDED

	category	scientific_name	common_names	conservation_status	is_protected	is_sheep
0	Mammal	Clethrionomys gapperi gapperi	Gapper's Red-Backed Vole	No Intervention	False	False
1	Mammal	Bos bison	American Bison, Bison	No Intervention	False	False
2	Mammal	Bos taurus	Aurochs, Aurochs, Domestic Cattle (Feral), Dom...	No Intervention	False	False
3	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	No Intervention	False	True
4	Mammal	Cervus elaphus	Wapiti Or Elk	No Intervention	False	False

13 IS_SHEEP COLUMN IS TRUE

	category	scientific_name	common_names	conservation_status	is_protected	is_sheep
3	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	No Intervention	False	True
1139	Vascular Plant	Rumex acetosella	Sheep Sorrel, Sheep Sorrell	No Intervention	False	True
2233	Vascular Plant	Festuca filiformis	Fineleaf Sheep Fescue	No Intervention	False	True
3014	Mammal	Ovis canadensis	Bighorn Sheep, Bighorn Sheep	Species of Concern	True	True
3758	Vascular Plant	Rumex acetosella	Common Sheep Sorrel, Field Sorrel, Red Sorrel,...	No Intervention	False	True
3761	Vascular Plant	Rumex paucifolius	Alpine Sheep Sorrel, Fewleaved Dock, Meadow Dock	No Intervention	False	True
4091	Vascular Plant	Carex illota	Sheep Sedge, Smallhead Sedge	No Intervention	False	True
4383	Vascular Plant	Potentilla ovina var. ovina	Sheep Cinquefoil	No Intervention	False	True
4446	Mammal	Ovis canadensis sierrae	Sierra Nevada Bighorn Sheep	Endangered	True	True

DATA DESCRIPTION IV

14 IS_SHEEP COLUMN IS TRUE & MAMMAL

	category	scientific_name	common_names	conservation_status	is_protected	is_sheep
3	Mammal	Ovis aries	Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)	No Intervention	False	True
3014	Mammal	Ovis canadensis	Bighorn Sheep, Bighorn Sheep	Species of Concern	True	True
4446	Mammal	Ovis canadensis sierrae	Sierra Nevada Bighorn Sheep	Endangered	True	True

15 OBSERVATIONS OF SHEEP

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

DATA DESCRIPTION V

16 OBSERVATIONS BY PARK

	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

- From the gathered information, especially from table 10, I came to the conclusion that ‘Mammal’s are the most protected category of species.
- From this I concluded that the species in category `Mammal` are more likely to be endangered than species in `Bird` or ‘Reptile’.
- To test this assumption I conducted a significance test

SIGNIFICANCE CALCULATION

1 CHI SQUARED TEST, MAMMAL VS BIRD

```
(0.1617014831654557, 0.6875948096661336, 1, array([[ 27.8313253, 148.1686747],
       [ 77.1686747, 410.8313253]]))
```

- No significance between Mammal and Bird measurable
- No statement possible if Mammal or Bird are more likely to be endangered

2 CHI SQUARED TEST, MAMMAL VS REPTILE

```
(4.289183096203645, 0.03835559022969898, 1, array([[ 10.7480315,  67.2519685],
       [ 24.2519685, 151.7480315]]))
```

- Significance between Mammal and Reptile measurable
- Mammal are more likely to be endangered
- It follows the protection of Mammals must be subjected to a more detailed investigation to optimize the projects and measurements.

RECOMMENDATIONS

1 DETERMINATION OF OBSERVATION PERIOD

To determine the effectiveness of the Park rangers program to reduce the rate of foot and mouth disease at the Yellowstone National Park we need more information. To get reliable insights we need to do a further observation of sheep.

In order to determine how many weeks we would need to observe sheep at Bryce National Park and at Yellowstone National Park, I came to the following data.

- Approximately 3.5 weeks would be needed for sheep observations at Bryce National Park (rounded up to be sure)
- Approximately 1.8 weeks would be needed for sheep observations at Yellowstone National Park (rounded up to be sure)

SAMPLE SIZE DETERMINATION

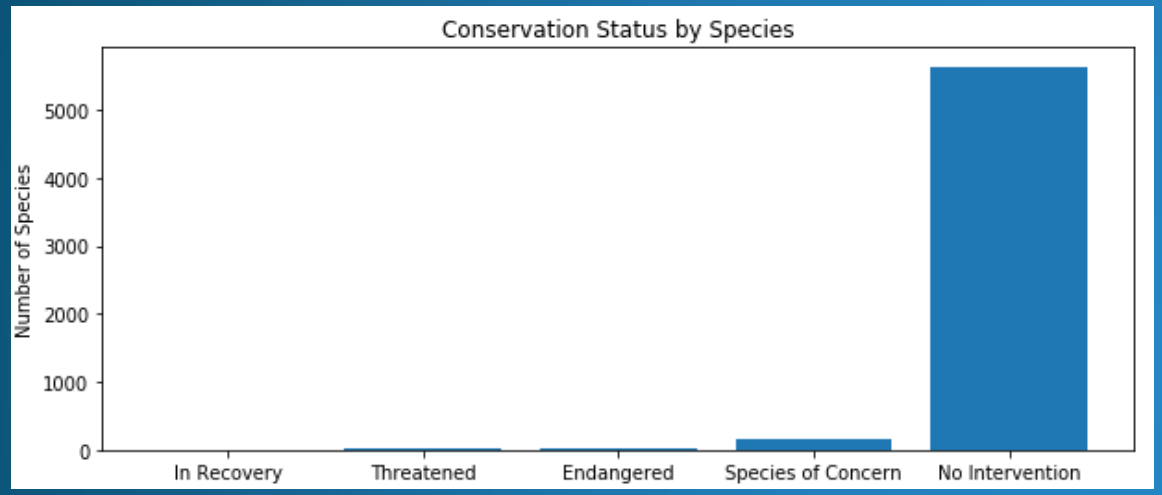
1 SAMPLE SIZE DETERMINATION

- In order to gain reliable data and information, there is a need of a sample size of 870 observed sheep at each park.
- The longer observation periods of Bryce National Park are related to the lower observations of sheep per Week

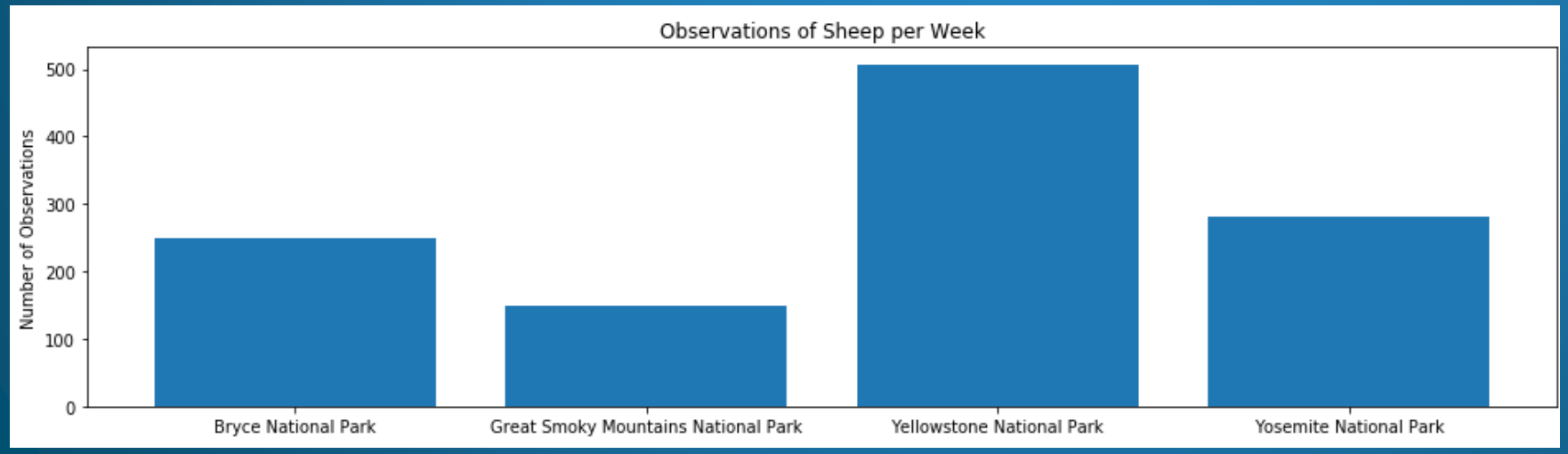
- A further investigation of endangered Mammal species might be worth considering.

GRAPHS

1 CONSERVATION STATUS BY SPECIES

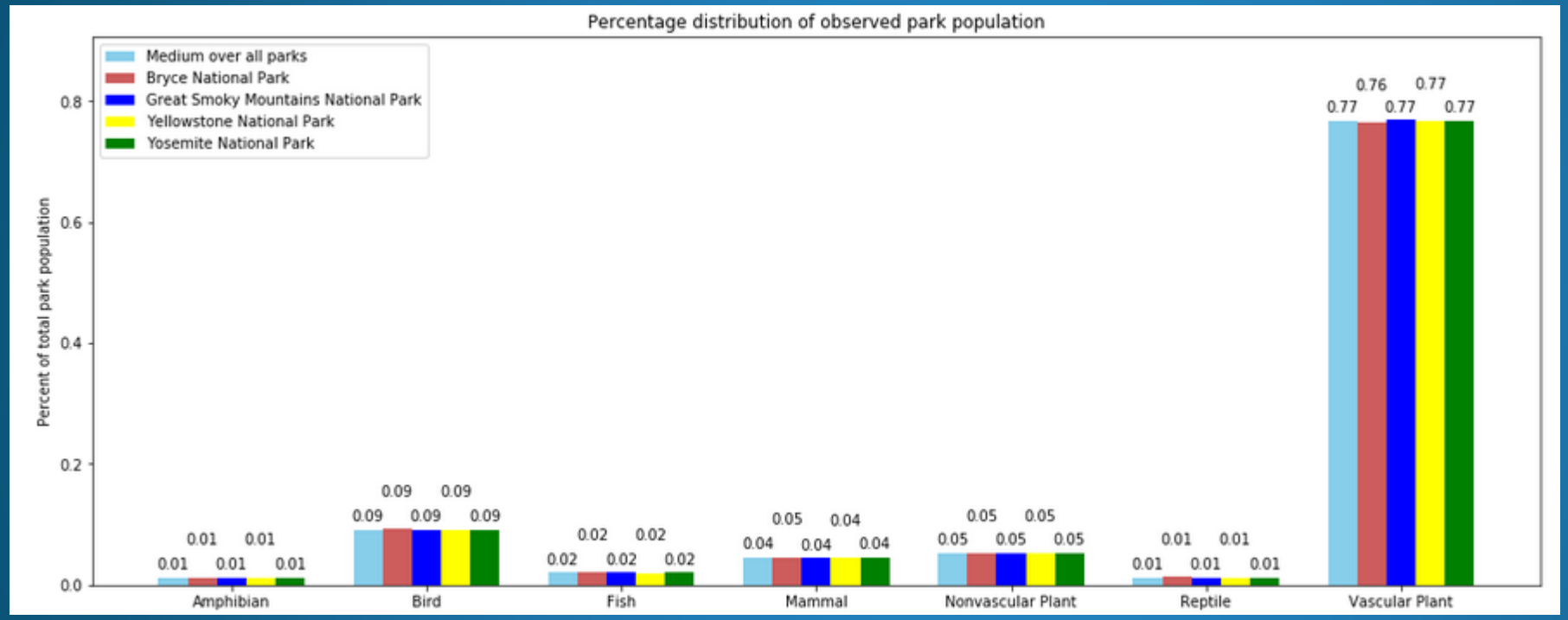


2 OBSERVATIONS OF SHEEP PER WEEK



ADDENDUM

1 PERCENTAGE DISTRIBUTION OF OBSERVED CATEGORIES OF THE DIFFERENT PARK POPULATIONS



- I wanted to further check if there are differences in the category distribution between different parks
- There are only small differences visible