Capstone Project: Biodiversity for the National Parks

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National Parks Service Biodiversity Project

- The National Parks Service provided a file of 5541 species and provided the following data for each species

  - The scientific name of each species

  - The common names of each species

  - The species conservation status

- The data provided by the National Parks Service was used to perform some data analysis on the conservation statuses of these species.

National Parks Service Biodiversity Project - Categories

- Each species was categorized into one of the following 7 categories
    - Mammal
    - Bird
    - Reptile
    - Amphibian
    - Fish
    - Vascular Plant
    - Nonvascular Plant

Category	# Not Protected	# Protected	% Protected
Amphibian	72	7	8.8%
Bird	413	75	15.4%
Fish	115	11	8.7%
Mammal	146	30	17.0%
Nonvascular Plant	328	5	1.5%
Reptile	73	5	6.4%
Vascular Plant	4216	46	1.1%

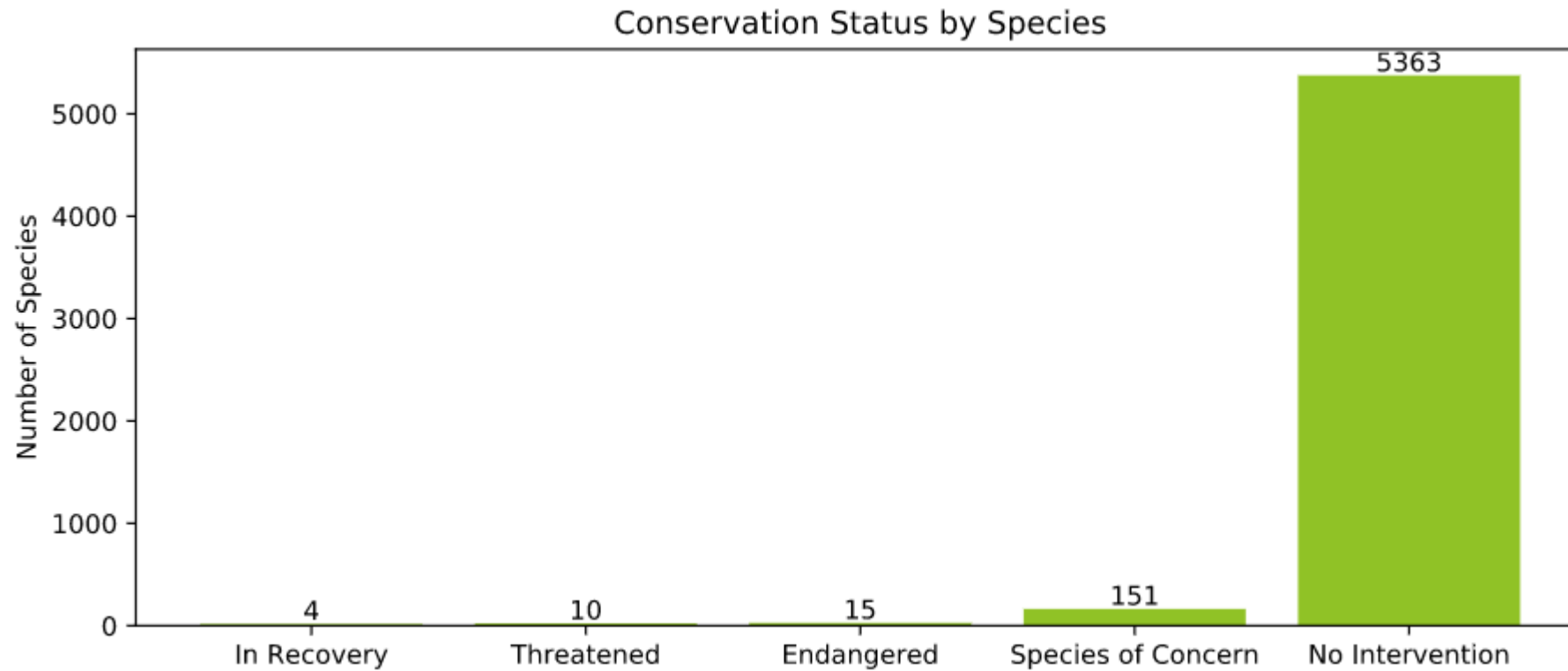# National Parks Service Biodiversity Project - Conservation Status by Category

Number of species categorized in each of the conservation statuses by category

Protected is any conservation statuses that needs or has needed intervention.

National Parks Service Biodiversity Project - Conservation Statuses

- Each species was also assign one of the following conservation statuses
  - Species of Concern
    - Declining population or appears to be in need of conservation
  - Endangered
    - Seriously at risk of extinction
  - Threatened
    - Vulnerable to endangerment in the near future
  - In Recovery
    - Formerly Endangered, but currently not in danger of extinction throughout all or a significant portion of its inhabitable range.
  - No Intervention

National Parks Service Biodiversity Project
- Conservation Status by Species

Number of species categorized in each of the conservation statuses

National Parks Service Biodiversity Project - Endangered Species

▶ 0.27% of the species provided are categorized as Endangered

▶ The 15 endangered species are categorized as the following categories

  ▶ 7 (46.7%) are Mammals

  ▶ 4 (26.7%) are Birds

  ▶ 3 (20.0%) are Fish

  ▶ 1 (6.7%) is a Vascular Plant

  ▶ 1 (6.7%) is an Amphibian

National Parks Service Biodiversity Project - Threatened Species

- 0.18% of the species provided are categorized as Threatened
- The 10 threatened species are categorized as the following categories
  - 2 (20.0%) are Mammals
  - 4 (40.0%) are Fish
  - 2 (20.0%) are Vascular Plants
  - 2 (20.0%) are Amphibian

National Parks Service Biodiversity Project - Significance Calculations

- Although mammals and birds have the two highest percentages of protected species the difference is not significant. (pval of ~ 0.688)

- There is a significant difference between mammals and reptiles (pval of ~0.038)

- There is also a significant difference between mammals and Nonvascular Plants / Vascular Plants; and a significant difference between reptiles and Nonvascular Plants / Vascular Plants

# National Parks Service Biodiversity Project - Recommendations

► The following recommendations can be made based of significance calculations

　► Mammals are more likely to be endangered than reptiles, Nonvascular Plants, and Vascular Plants

　► Reptiles are more likely to be protected than Nonvascular Plants and Vascular Plants

► With 17.0% of mammals being protected, and 46.7% of the species categorized as endangered being mammals conservation efforts should be focused on mammals.

Foot and Mouth Reduction Effort

► A team of scientists have been tracking the movements of various species of sheep across different national parks to help monitor the Park Rangers effort to reduce the rate of foot and mouth disease.

► The scientist observed a total of 1,188 sheep in the 4 parks.

► The following sheep were observed in the park

  ► Ovis aries

    ► Commonly known as Domestic Sheep, Mouflon, Red Sheep, Sheep (Feral)

  ► Ovis Canadensis

    ► Commonly known as Bighorn Sheep, Bighorn Sheep

  ► Ovis canadensis sierra

    ► Commonly known as

Observations of Sheep per Week
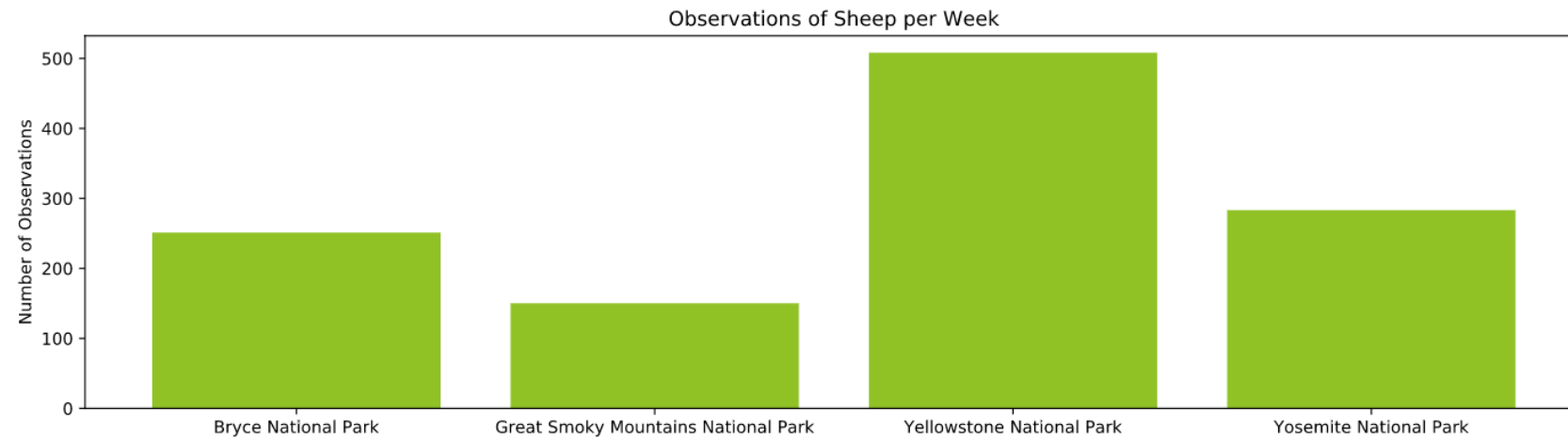
Observations of Sheep by Park

Number of various species of sheep observed at each of the different national parks

Foot and Mouth Reduction Effort - Sample Size Determination

- The scientists want to verify if the foot and mouth reduction effort was able to reduce the amount of sheep that have the disease by 5%

- The following factors were used to determine the sample size needed.
  - The year before Bryce National Park had 15% of sheep with the disease.
  - The scientists want to see a 5% reduction

- The following was used to calculate the sample size.
  - The baseline conversion rate is 15%
  - The minimum detectable effect is 33.33%
  - The statistical significance is 90%

- For the study to show the foot and mouth percentages are significant the number of sheep that would need to observed from each park is 870.
  - At Yellowstone National Park it will take 1.7 weeks to observe 870 sheep
  - At Bryce National Park it will take 3.5 weeks to observe 870 sheep