

Capstone Option 2: Biodiversity for the National Parks

By Amy Willis

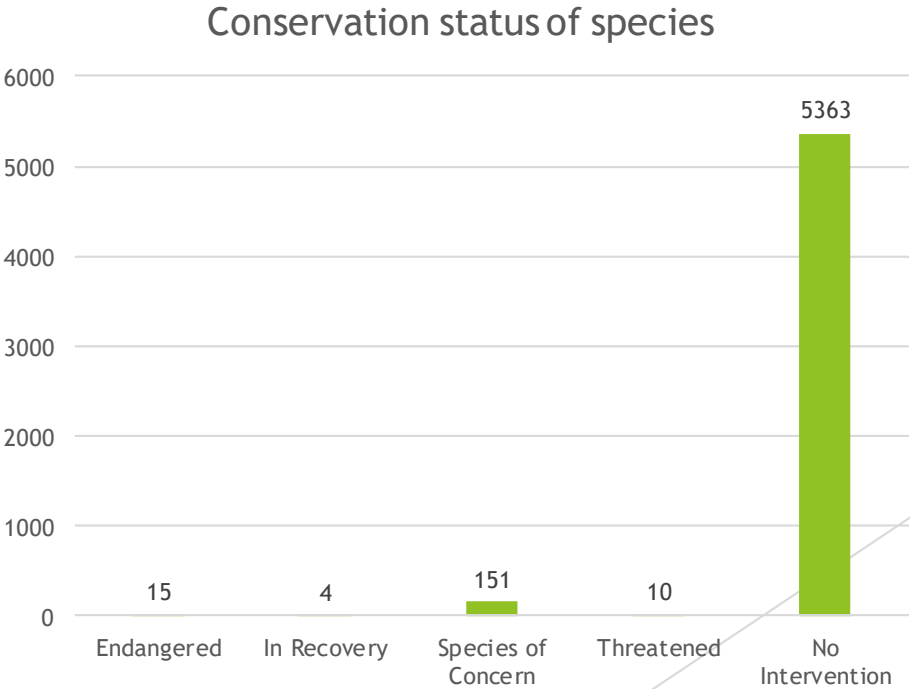


Introduction

- ▶ My name is Amy and I am a biodiversity analyst working on behalf of the National Parks Service
- ▶ Using data from the National Parks Service, I will be presenting the analysis conducted to identify and demonstrate if there are any underlying patterns or themes of species that will become endangered

The table and graph below displays the number of unique species in each conservation status category:

Conservation Status of Species	Count of Species
Endangered (seriously at risk of extinction)	15
In Recovery (formerly endangered but not currently in danger of extinction)	4
Species of Concern (declining population)	151
Threatened (vulnerable to endangerment in near future)	10
No Intervention (no action required)	5363



Are certain types of species more likely to be endangered?

The table below shows all the species types, as well as the number that are not protected and protected (also shown as a % of species population)

Category	Not protected	Protected	Percent Protected (to 2 d.p.)
Amphibian	72	7	8.86%
Bird	413	75	15.37%
Fish	115	11	8.73%
Mammal	146	30	17.05%
Nonvascular Plant	328	5	1.50%
Reptile	73	5	6.41%
Vascular Plant	4216	46	1.08%

Key findings:

- The type of species most likely to be endangered are mammals (17.05% of the species are protected)
- The type of species that is second most likely to be endangered are birds (15.37% of the species are protected)
- The type of species that is least likely to be endangered was vascular plants (1.08% of the species are protected)

Is there a significant difference between the endangerment levels of mammals and birds?

- ▶ To test this, a chi-square test was run using the number of mammals and birds who were protected and not protected in a contingency table

	Protected	Not-protected
Mammal	30	146
Bird	75	413

Key findings:

- ▶ $P\text{-val} = 0.69$ - no significant difference was identified as $p\text{-val} > 0.05$
- ▶ As no significant difference was observed between mammals and birds, we can conclude that any differences were merely due to chance. Neither species is significantly more likely than the other to become endangered

Is there a significant difference between the endangerment levels of mammals and reptiles?

- ▶ To test this, a chi-square test was run using the number of mammals and reptiles who were protected and not protected in a contingency table

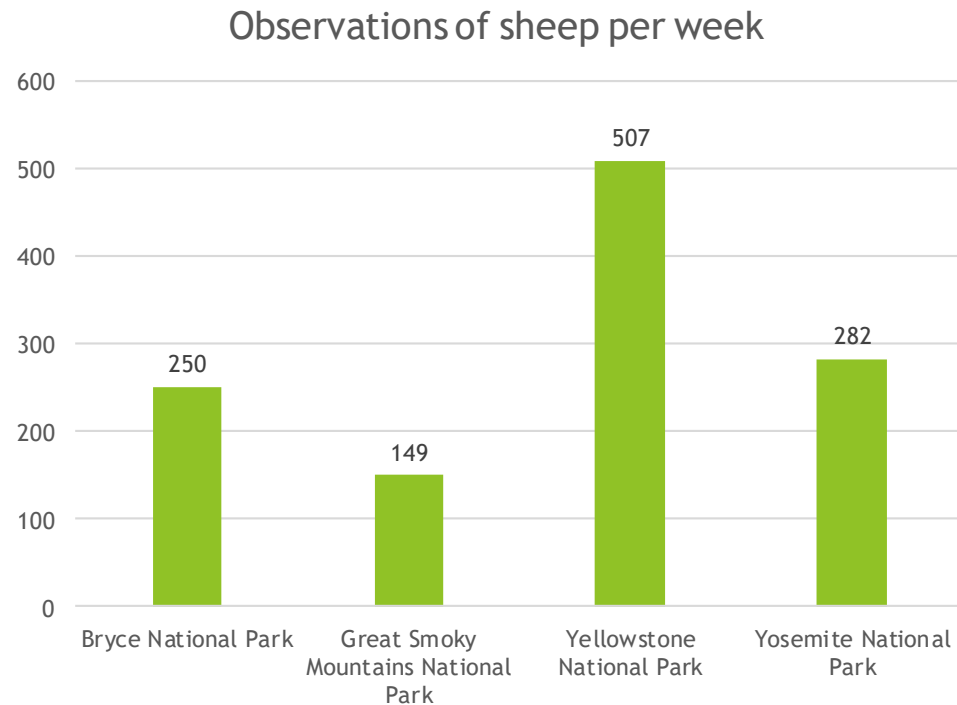
	Protected	Not-protected
Mammal	30	146
Reptiles	5	73

Key findings:

- ▶ $P_{\text{val}} = 0.03$ - a **significant difference** was identified as $p_{\text{val}} < 0.05$
- ▶ As there was a significant difference in endangerment levels between mammals and reptiles, conservationists should aim to put measures in place to protect mammals

In search of sheep

- ▶ A team of scientists have been tracking the movement and recording the sightings of various species of sheep across the national parks
- ▶ This data has been collated and analysed to identify which species of sheep are identified at each of the national parks
- ▶ The below graph shows the total number of sheep observations across all parks per week



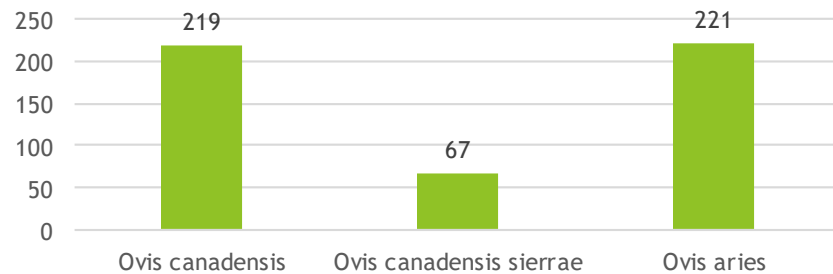
Key findings:

- The highest number of sheep observed was at Yellowstone National Park
- The lowest number of sheep observed was at Great Smoky Mountains National Park

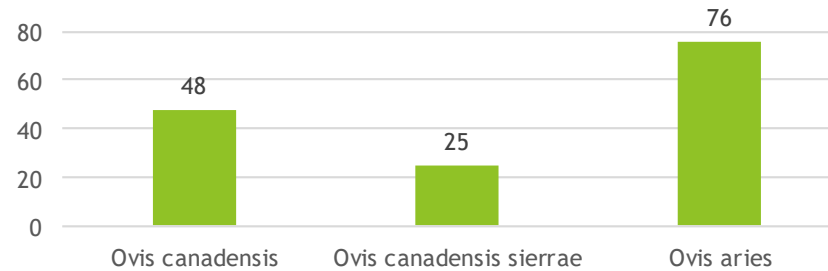
In search of sheep

- ▶ Three different types of sheep were identified across the four national parks (see graphs below for observation numbers)
 - ▶ *Ovis canadensis*
 - ▶ *Ovis canadensis sierrae*
 - ▶ *Ovis aries*
- ▶ **Key finding:** the highest observation rates for all three sheep types were observed in Yellowstone National Park

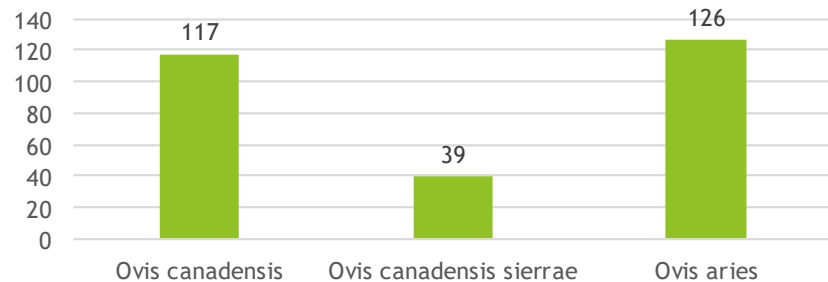
Yellowstone National Park sheep observations



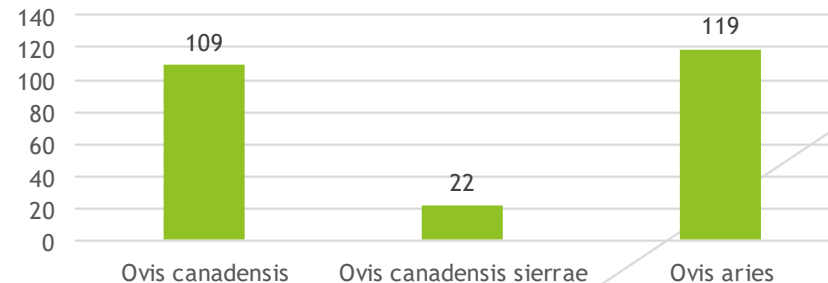
Great Smoky Mountains National Park sheep observations



Yosemite National Park sheep observations



Bryce National Park sheep observations



Foot and mouth reduction effort

- ▶ Scientists at Yellowstone National Park have run a programme which aims to reduce the rate of foot and mouth disease - now they want to test whether this is working or not
- ▶ Last year at Bryce National Park, 15% of sheep had contracted foot and mouth disease. With this information, combined with the sheep observation data, the following has been calculated:
 - ▶ If the scientists wanted to be sure there was at least a 5% drop in cases of foot and mouth at **Yellowstone National Park**, they would need to observe at least **507** sheep which would take scientists approximately **1.76 weeks** to hit this target level of observations
 - ▶ If the scientists wanted to be sure there was at least a 5% drop in cases of foot and mouth at **Bryce National Park**, they would need to observe at least **250** sheep which would take scientists approximately **3.56 weeks** to hit this target level of observations