Biodiversity in America's National Parks

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Introduction

We examined data on the conservation status of various species in four national parks of the USA:

- Bryce National Park
- Great Smoky Mountains National Park
- Yellowstone National Park
- Yosemite National Park

This data comprised information on 5824 species in seven broad categories, Mammal, Bird, Reptile, Amphibian, Fish, Vascular Plant, and Nonvascular Plant.

Species Conservation Issues

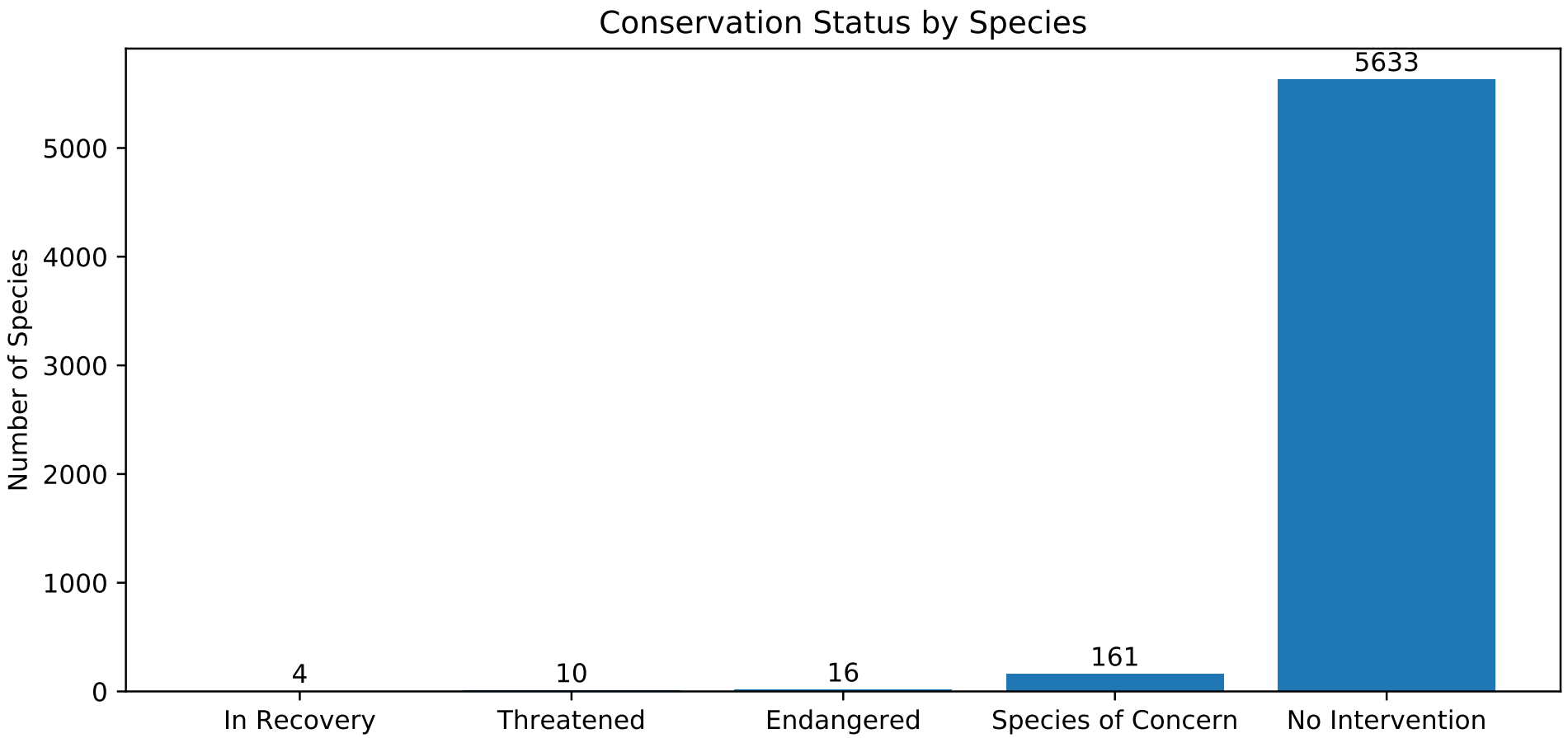
Conservation status of species

In terms of their "conservation status", species have been grouped into five classes. These conservation status classes are defined as follows:

- Endangered: Seriously at risk of extinction;
- Threatened: Vulnerable to endangerment in the near future;
- Species of Concern: Declining or appear to be in need of conservation;
- In Recovery: Formerly "Endangered", but currently neither in danger of extinction throughout all or a significant portion of its range; and
- Not Protected: In none of the above four classes.

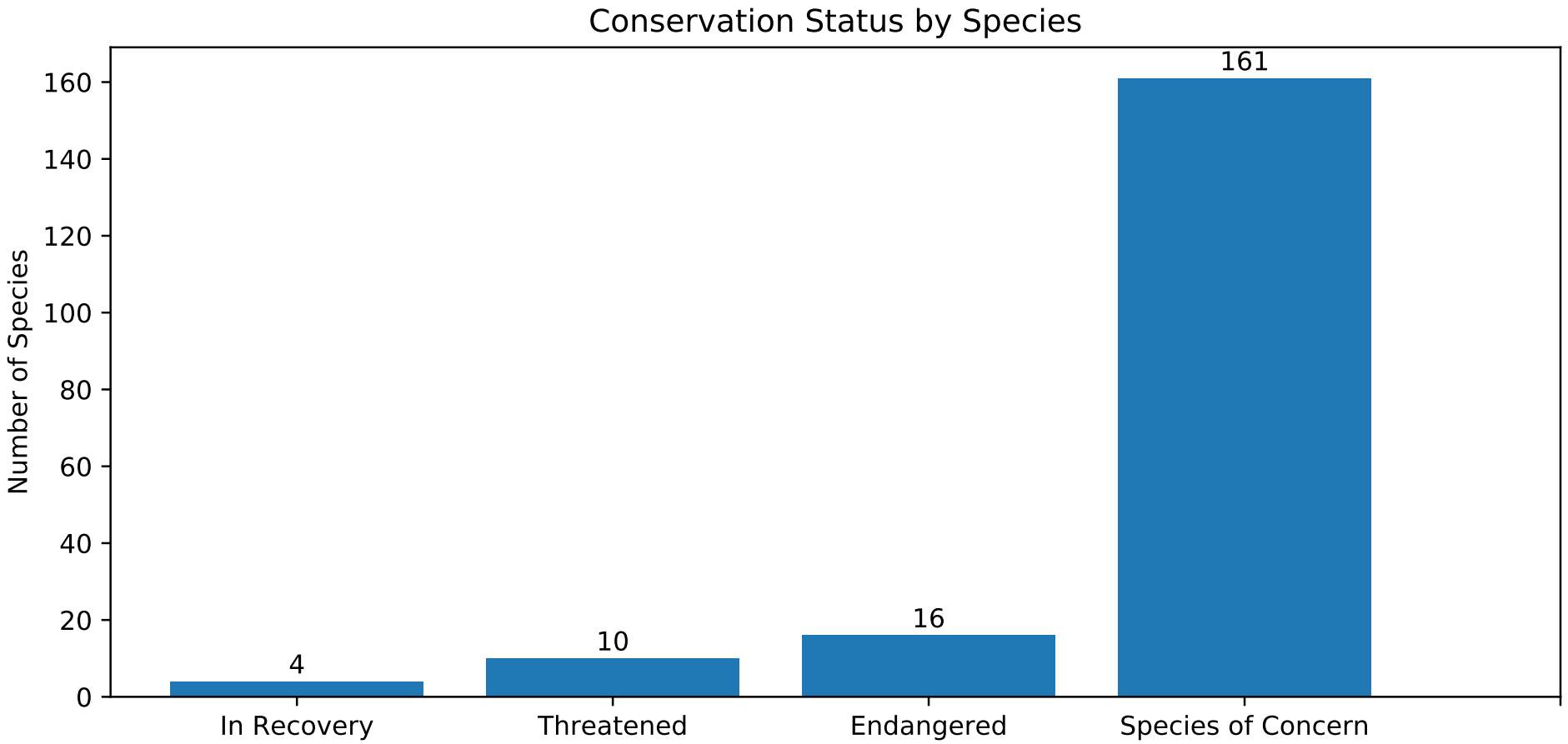
Species statuses

The numbers of species in each "Conservation status" class is as follows:



Species statuses (cont.)

The previous chart is dominated by the 5633 species that are "Not Protected". So a closer look at the other 191 status species gives us this chart.



Species statuses (cont.)

Treating the first four conservation classes as "Protected", we have the following numbers for the seven broad categories mentioned in the Introduction:

Category	Protected	Not Protected	Percent Protected
Amphibian	7	73	8.75
Bird	79	442	15.16
Fish	11	116	8.66
Mammal	38	176	17.76
Nonvascular Plant	5	328	1.50
Reptile	5	74	6.33
Vascular Plant	46	4424	1.03

Recommendations on conservation status

Given limited resources, we would recommend focusing attention on the categories of "Bird" and "Mammal" for conservation work in the immediate future, as these categories have the highest percent of "Protected" species.

The significant differences between these two categories can be demonstrably shown using standard statistical tests (specifically the χ^2 test), highlighting our cause for concern for these categories of species in the near future.

Foot and Mouth Disease in Sheep

Foot and mouth disease in sheep

Previous observations and tests have determined that 15% of sheep in the National Parks have foot and mouth disease.

Recently, park rangers at some of the national parks have been running programs to reduce the rate of foor and mouth at that park.

Can we get some evidence that the program is working?

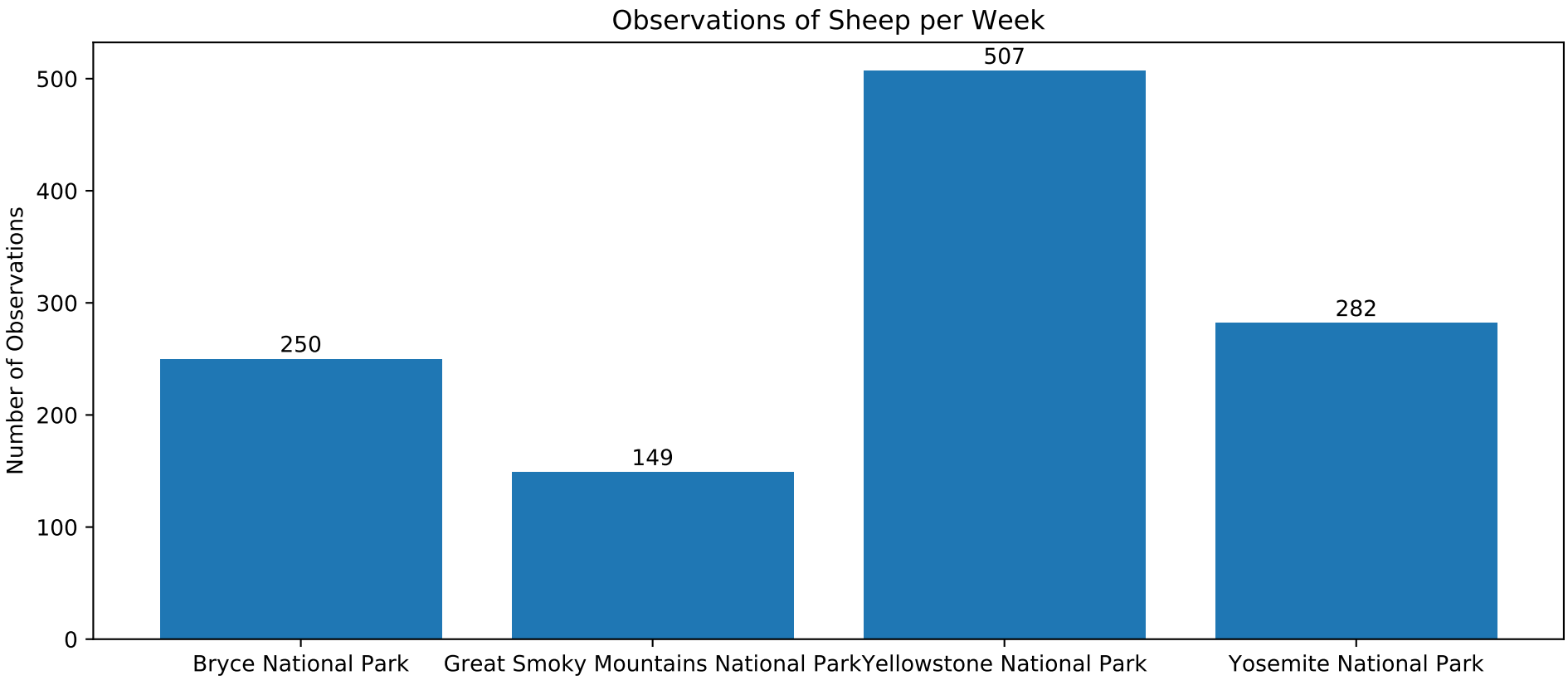
Statistically speaking, we want to determine if the rate of infection has dropped to 10% or less, with a 90% statistical significance.

How can we test this?

Clearly we need a number of observations and tests to determine if the program has been effective.

Sheep observations across parks

Recent (total) observations of three species of sheep:



Testing effectiveness of treatement

Assuming recent rates of observation continue, for Bryce National Park we would need (slightly more than) two weeks of observation/testing to determine if the treatment has had a noticeable (i.e. statistically siginificant) effect or not.

Similarly, assuming current rates of observation continue, park rangers at Yellowstone would need a week to collect enough observations/tests to determine if the treatment plan is showing a measurable effect or not.