

FRAGMENTATION PATTERNS: YELLOWSTONE NATIONAL PARK VERSUS TARGHEE NATIONAL FOREST

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Introduction

Yellowstone National Park and Targhee National Forest are home to some of America's most majestic landscapes. Recently, however, they have not been treated equally. The national park has been protected and conserved since 1872 in order to preserve the park's natural and cultural features. However, the national forest surrounding the park has not been as fortunate. Clear-cutting, logging, and other commercial projects have greatly altered the landscape. This poster's objective is to analyze and quantify the difference in landscape pattern between the national park and national forest using aerial imagery (Figures 1 and 2). Our poster will explain the methods and metrics we used to analyze the variation between the two landscapes, the results of our analysis, and the conclusions that we made based on the results.

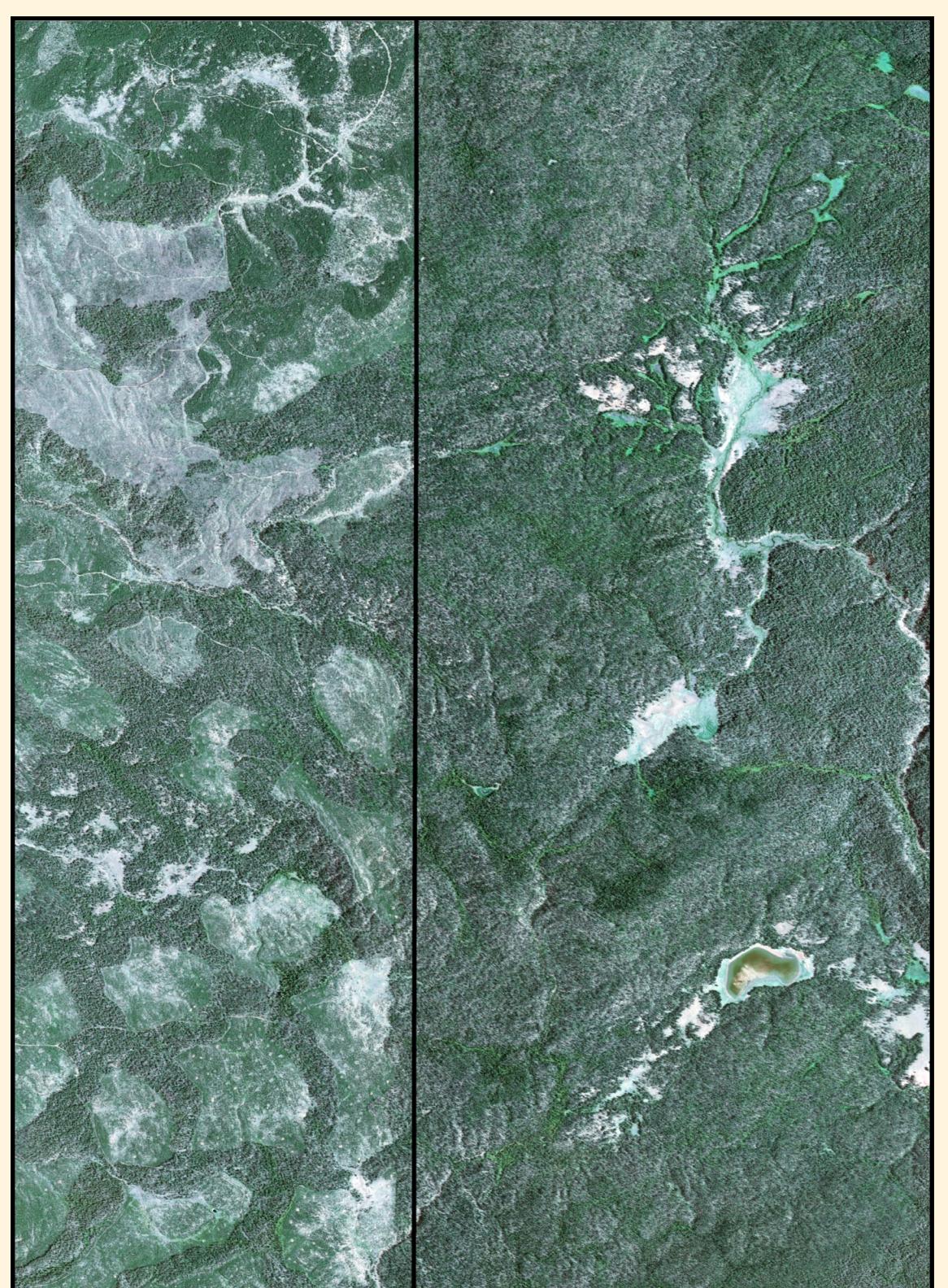


Figure 1: Aerial imagery showing the boundary of Targhee National Forest (left) and Yellowstone National Park (right)

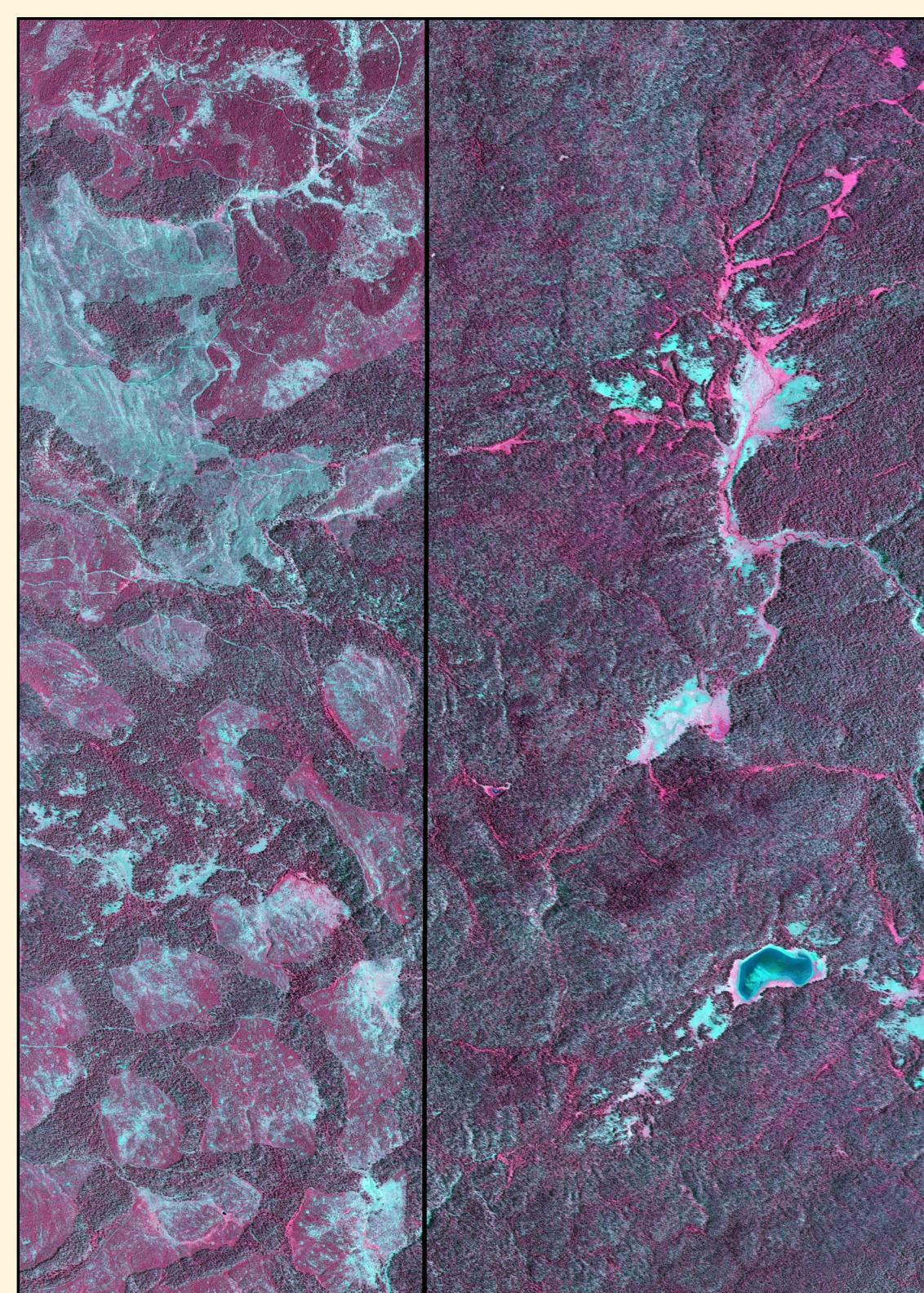
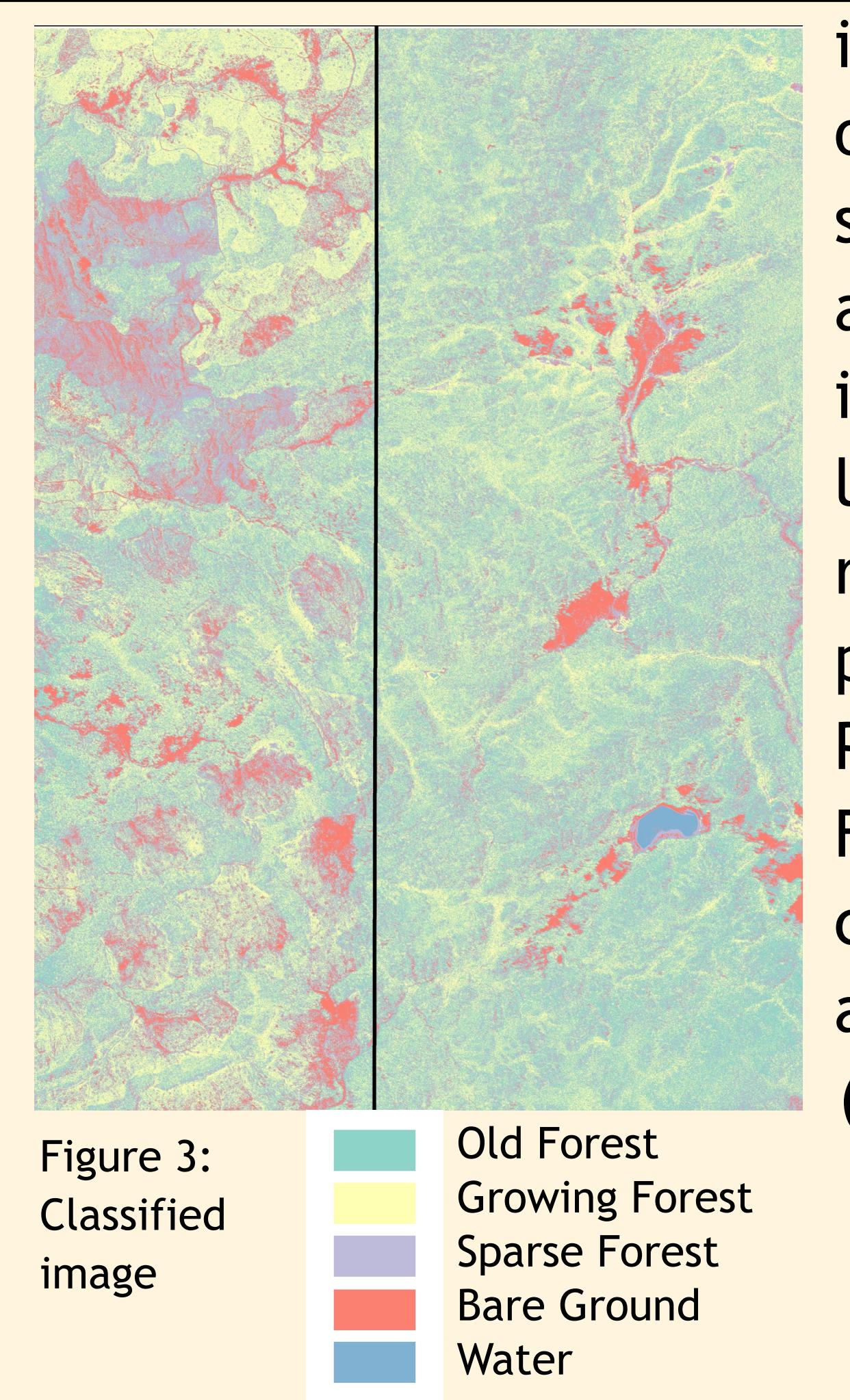


Figure 2: False color image showing the boundary of Targhee National Forest (left) and Yellowstone National Park (right)

Data & Methods

We obtained 2013 NAIP imagery from the U.S. Geological Survey Earth Explorer website, a repository of remotely sensed imagery. The image resolution is 0.5 meters. Using ENVI, an image processing software, we classified our



Largest Patch Index	Measures dominance by quantifying the percentage of total land area comprised by the largest patch
Edge Density	Measures the complexity of the shapes of patches
Contagion Index	Measures the extent to which pixels of land cover types are aggregated
Patch Density	Measures the number of patches on a per unit area basis that allows comparison between landscapes of various size
Percentage of Landscape	Measures the proportional abundance of each land cover type in the landscape
Aggregation Index	Measures the ratio of the observed number of like adjacencies to the maximum number of like adjacencies

Table 1: Description of metrics

Results

The largest patch in the park is almost five times the size of the largest patch in the forest. There are 30 more meters of edge per hectare in the forest than in the park. Land cover types are more aggregated in the national park and more dispersed in the national forest. There are approximately 2500 more patches per 100 hectares in the national forest (Table 2).

	Largest Patch Index	Edge Density	Contagion	Patch Density
Forest	5.3349	5140.8284	22.9585	25990.425
Park	25.4496	5107.6811	28.2784	23499.11
Difference	20.1147	33.1473	5.3199	2491.315

Table 2: Landscape metrics

image into five categories: old forest, growing forest, sparse forest, bare ground, and water (Figure 3). Then, in FRAGSTATS, a spatial analyst software, we used metrics to quantitatively compare Yellowstone National Park to Targhee National Forest. The landscape and class metrics that we used are listed in the table below (Table 1).

The national park has more old forest, less sparse forest, and less bare ground than the national forest (Figure 4). The old forest is more aggregated in the national park. The sparse forest is more aggregated in the national forest (Figure 5).

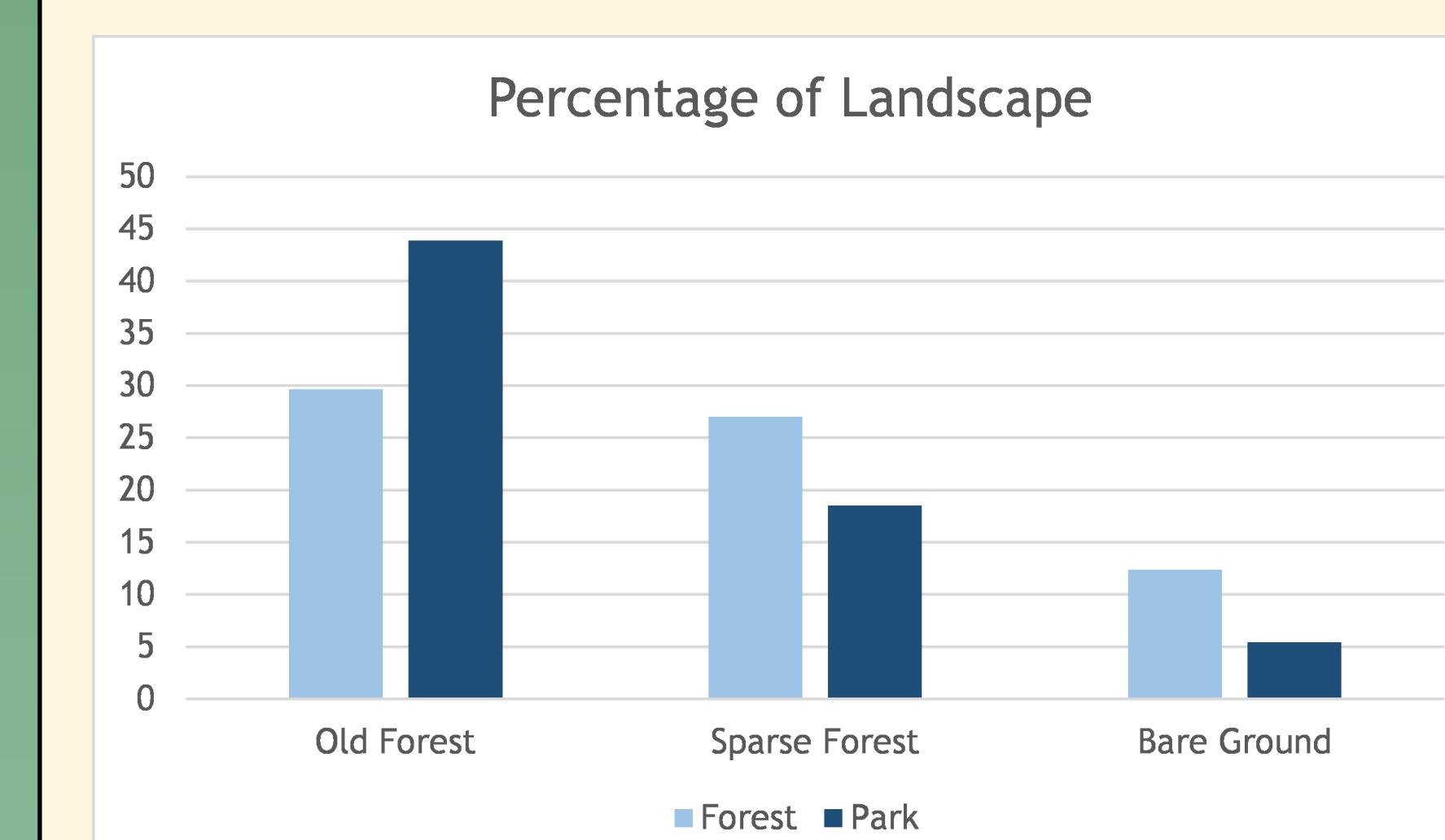


Figure 4: A comparison of the Percentage of Landscape class metric between different land covers in the forest and park

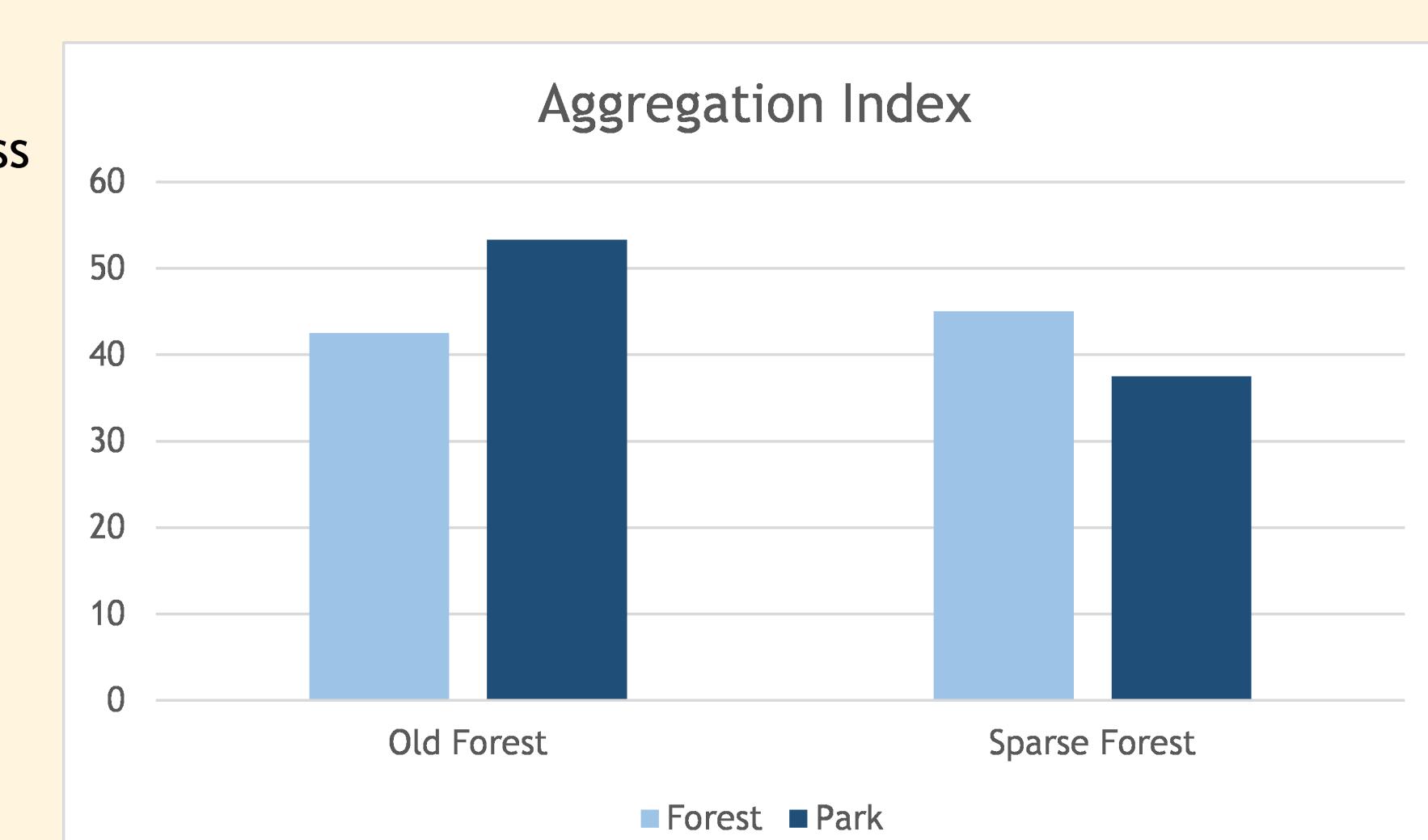


Figure 5: A comparison of the Aggregation Index class metric between different land covers in the forest and park

Conclusion

Targhee National Forest is more fragmented than Yellowstone National Park due to the difference in designated land use. Clear cutting in the national forest has contributed a substantial amount to the variation in pattern between landscapes. Because the national forest is more fragmented, organisms have a more difficult time thriving. The national park is more conducive to the success of wildlife ecosystems because it contains less fragmented habitat. By measuring the effects of clear cutting in Targhee National Forest, researchers can know how to better protect forest ecosystems in the future.



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