



# Landscape Context of Bighorn Canyon National Recreation Area

## 2015 Natural Resource Report

Bighorn Canyon National Recreation Area (BICA) is a relatively long and narrow stretch of land bordering the canyon of the Bighorn River as it flows north from Wyoming into Montana. Stewards of BICA face land and resource management challenges influenced by the conditions and management of the surrounding landscape. To better understand BICA's resources in a landscape context, park managers in 2005 identified "Land Use" as one of several vital signs to be monitored over the long term as part of the National Park Service (NPS) Inventory and Monitoring Program—Greater Yellowstone Network. Recognizing the same need across many parks, the NPS developed a standard suite of landscape analysis methods and tools (NPScape) in 2010. The NPScape Program assesses the human footprint, ecological attributes, and the different conservation practices in place at the landscape scale to help managers understand their effects on resources within parks (Figure 1).

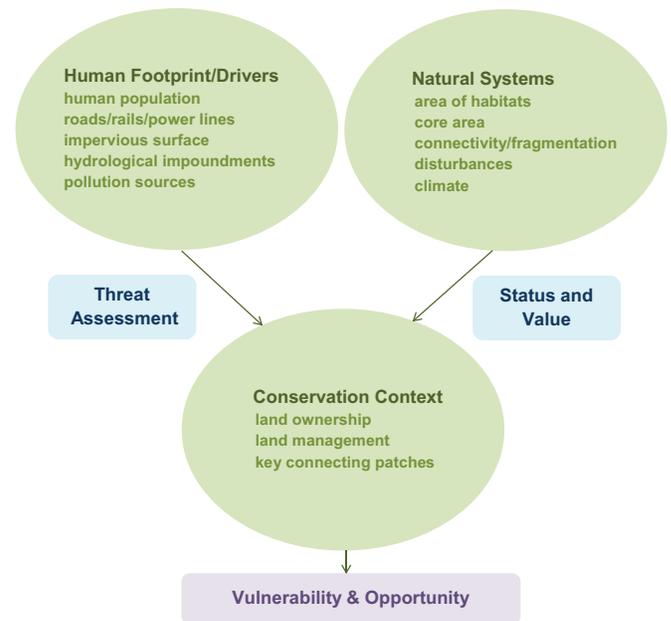


Figure 1. Landscape scale factors affecting resource conservation vulnerability and opportunity. Adapted from NPScape: <http://science.nature.nps.gov/im/monitor/npscape/concept.cfm>.

### Landscape Metrics

In cooperation with NPScape, the Greater Yellowstone Network is monitoring changes to housing, population, roads, land cover, conservation status, and climate conditions over time. The study area includes BICA and all surrounding lands within a 30-kilometer buffer of BICA's boundary (Figure 2). This Resource Brief summarizes the baseline report of landscape conditions (Daley et al. 2015) available from <https://irma.nps.gov/App/Reference/Profile/2223148> (see complete reference in footer).

### Housing density

Housing density is relatively low within the study area, based on a Spatially Explicit Regional Growth Model (SERGoM) and US Census data from 2010. Most residential land use in the area around BICA is rural, with rather slow growth over the past few decades. Since 1970, exurban and suburban areas grew slightly, in contrast to a slight decline in rural area. The exurban growth primarily occurs adjacent to established communities like Lovell.

### Human population

Human population within the study area has been low over the past three decades, based on US Census Bureau data from 1990, 2000, and 2010. Population density remains at just over one person per square kilometer after experiencing a slight increase in the 1990s. This corresponds with the low housing densities over the past few decades.

### Roads

The types of roads and their location and density in the BICA landscape are important considerations for resource management because of potential habitat fragmentation effects and traffic factors that include sound, light, and vehicle/wildlife collision potential. Roads may also affect the water content of adjacent soils, and the resulting vegetation. Roads are often the vectors for the spread of invasive plants, which are a specific concern to park managers. Overall road density in the study area is low, and most roads in the study area are not highways or interstates, based on ESRI data from 2005.

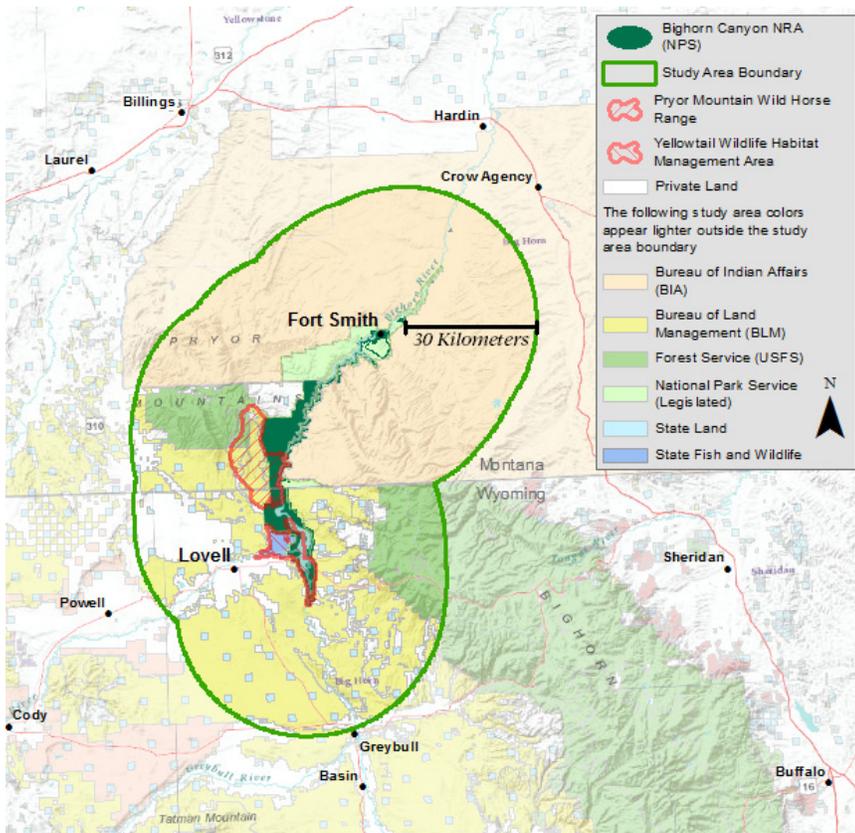


Figure 2. Surface management/ownership of land within 30 km of Bighorn Canyon National Recreation Area's managed boundary.

extractive uses, such as logging and mining, based on the US Geological Survey's Gap Analysis Program Protected Areas Database for the United States (PAD-US).

### Climate

Ongoing and future climate change will likely affect all aspects of park management, including natural and cultural resource protection as well as park operations and visitor experience. Effective planning and management requires a thorough understanding of the climate's past dynamics, present conditions, and projected future change. Climate awareness involves understanding variations in average conditions as well as planning for particular climate-related events such as more intense storms, flooding, or drought, any of which may substantially affect the conditions of park resources.

While road density is low, smaller roads are widespread across the study area, and most corresponding roadless areas (continuous patches of land at least 500 meters from a road) are less than 10 square kilometers in size. These roads increase the likelihood of the spread of invasive plants over a more widespread area, and the roadless patch size is a consideration for managing wildlife. Further research is needed about the impacts from small roads to wildlife movements and habitats within the study area.

### Land cover

Natural land cover, primarily in the form of shrub/scrub and herbaceous vegetation, occurs over most of the area, except for concentrated areas of cultivated crops and hay/pasture lands near the Shoshone and Bighorn Rivers. Forested areas make up about 13% of the study area. In the decade from 2001 to 2011 almost no change took place in the balance of natural versus converted land cover, based on the National Land Cover Database.

### Conservation status

Lands within and around BICA are managed for different levels of protection, including Endangered Species Act protection on federal lands. With Crow tribal lands to the north, and the Pryor Mountain Wild Horse Range and Yellowtail Wildlife Habitat Management Area overlapping and adjacent to BICA, cooperative management of protected lands is a defining theme for park managers. Most of the public land in the study area is managed to protect natural land cover while allowing some

Recent data from BICA found that since 1983, four key temperature variables, including annual mean temperature, maximum temperature of the warmest month, minimum temperature of the coldest month, and mean temperature of the warmest quarter, have reached the uppermost limits of all observed temperatures since 1901.

### Discussion

This initial analysis of landscape conditions within and around BICA draws attention to the following prevailing and prospective landscape-scale considerations for BICA managers:

- the potential spread of exotic plants along roadsides
- the reduced ability to manage for ecological processes such as natural fire
- the potential for low level extractive land uses, such as logging and mining
- the impacts of climate change on vegetation, water, and other resources and natural processes

This report serves as a baseline for evaluating future changes in housing density, human population, roads, land cover, conservation status, and climate, using standardized landscape-level data and analytical procedures that are repeatable over time and thus conducive to long-term monitoring. As new comparative data for these landscape metrics become available, online updates to this analysis will be presented using interactive viewers like the NPScape Map Viewer (<http://science.nature.nps.gov/im/monitor/npscape/viewer/>).