Night Skies and Photic Environment Resource Summary Marsh-Billings-Rockefeller NHP

National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science
Natural Sounds & Night Skies Division

The quality of the nighttime environment is relevant to nearly every unit in the NPS System. The 2006 NPS Management Policies (section 4.10) speak of the importance of a natural photic environment to ecosystem function and the importance of the natural lightscape for aesthetics. A lightscape can be important as a natural feature, a cultural feature, or both. Natural lightscapes are also important to wilderness character and have been identified under the Clean Air Act Amendments as an air quality related value. Therefore, the importance of lightscapes and photic environments is related to an array of park resources and values and has broad implications for park management.

When developing the foundation document, park staff should consider night skies as a resource with inherent value that may be recognized when appropriate in the Fundamental Resource and Value, Other Important Resource and Value, or another section of the document. In addition, parks should consider the photic environment and lightscapes as important factors that can have a profound effect on the quality of many other park resources and values such as wildlife, wilderness character, visitor experience, cultural landscapes and historic preservation. This approach provides parks with a degree of flexibility regarding when and how night skies can be addressed in the foundation document. The topics in Attachment 1 discuss the importance of night skies in relation to park resources and values. Please see Attachment 2 for an example of how Bryce Canyon National Park incorporated night skies into various sections of the foundation document.

Quality of the Resource at Marsh-Billings-Rockefeller National Historic Park

One way the Natural Sounds & Night Sky Division (NSNSD) scientists measure the quality of the photic environment is by measuring total sky brightness averaged across the entire sky and comparing that value to natural nighttime light levels. This measure, called the Anthropogenic Light Ratio (ALR), can be directly measured or modeled when observational data is unavailable. Lower ALR levels reflect higher quality night sky conditions.

Figure 1 provides modeled ALR levels for the contiguous U.S. This figure illustrates the quality of the night skies found throughout the country and across the national park system. Figure 2 provides modeled night sky quality for the local area surrounding the park. These attachments provide an important landscape scale context for considering night sky quality at the park.

The modeled median ALR value is **1.89** (Figure 2). An anthropogenic light ratio of 0.0 would indicate pristine natural conditions, while a ratio of 1.0 would indicate that anthropogenic light was 100% brighter than the natural light from the night sky. Therefore, at Marsh-Billings-Rockefeller NHP, the sky is predicted to be 189% brighter than a natural sky.

At these light levels the Milky Way is visible overhead, but has lost most of its fine details while dim celestial objects may not be visible. Full visual dark adaptation may be possible in the western end of the park; however shadows will be visible from nearby anthropogenic light sources, which will dominate the eastern horizon. Although the park night sky quality is degraded due to the proximity to multiple population centers, the conditions may be better than surrounding areas and represent an important yet threatened resource.

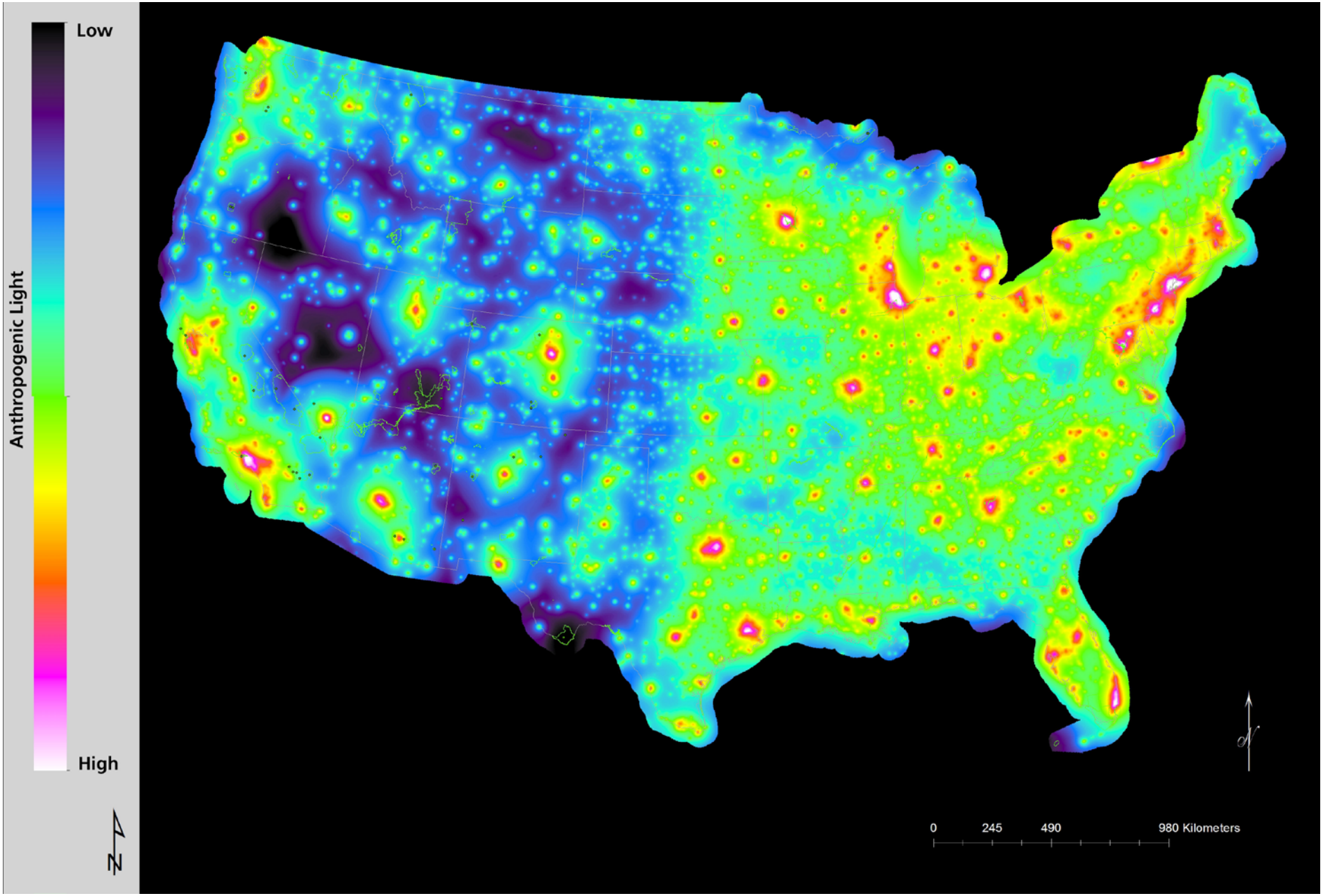
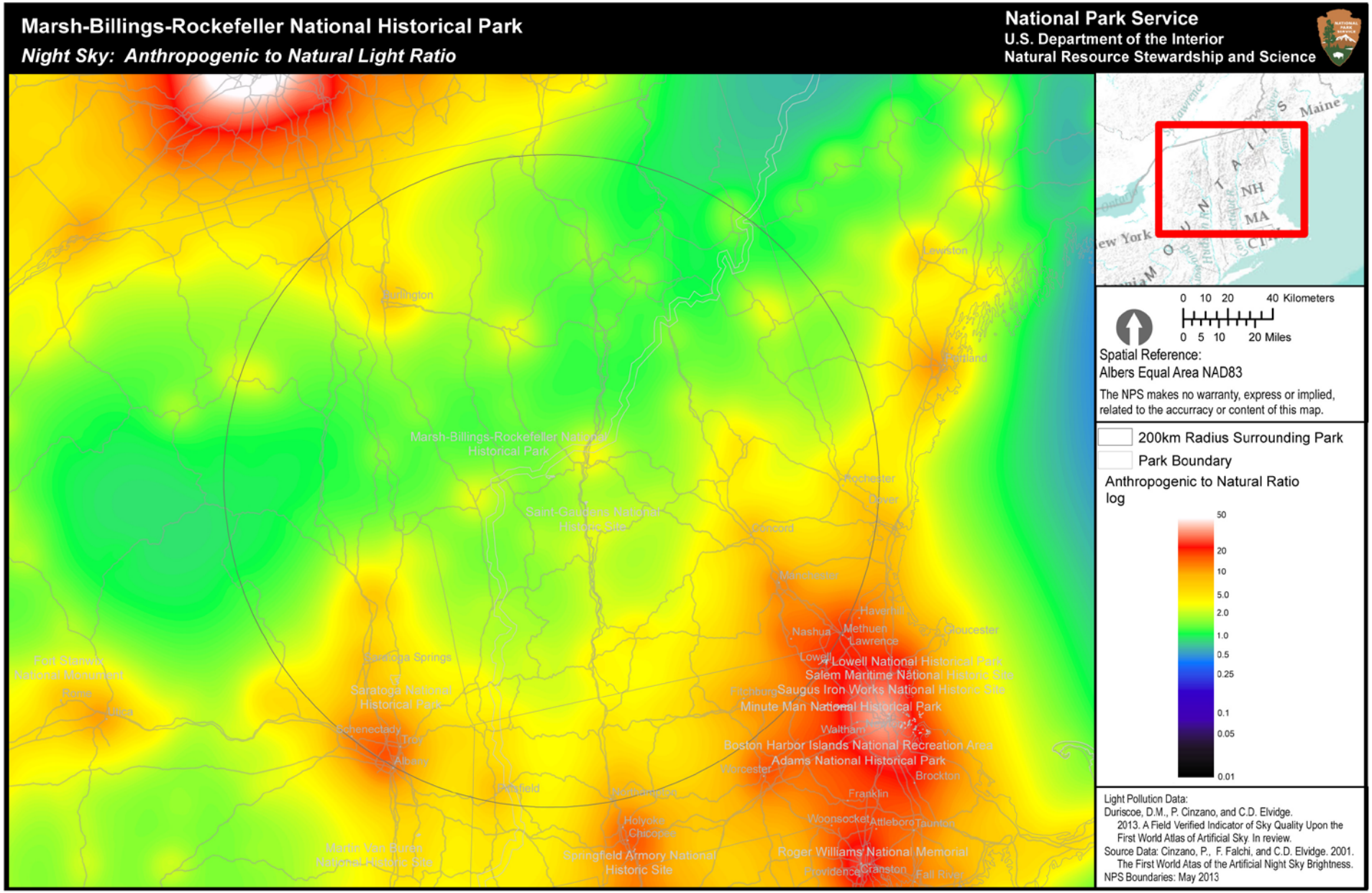


Figure 1 – Anthropogenic Light Ratios (ALRs) for the Contiguous US.



NPS Natural Sounds & Night Skies Division and NPS Inventory and Monitoring Program MAS Group 20130730

Figure 2 – Regional ALR near Marsh-Billings-Rockefeller National Historic Park