Night Skies and Photic Environment Resource Summary Glacier National Park

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 Glacier National 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. Figure 3 is a 360-degree panorama captured at the park that depicts total sky brightness in false colors, and is intended provide information on nearby light domes and other sources of natural and anthropogenic light.

Ground based observations collected in 2009 from Logan's Pass produced an ALR of 0.17. Compared to other non-urban NPS units, this is a good condition. The modeled median ALR value is 0.27 (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 Logan's Pass in Glacier National Park, the sky is predicted to be 17% brighter than a natural.

At these light levels, most observers feel they are in a natural environment. The Milky Way is visible from horizon to horizon and may show great detail, with fine details such as the Prancing Horse. Zodiacal light (or "false dawn" which is faint glow at the horizon just before dawn or just after dusk) can be seen under favorable conditions, and there is negligible impact to dark adaptation looking in any direction.

Glacier National Park provides important habitat for nocturnal wildlife, recreational activities after dark, and a unique opportunity for the public to enjoy night sky resources. By providing overnight camping, leading night sky programs, and conducting night sky quality monitoring, the park has demonstrated that it is dedicated to protecting night sky resources. Further, national parks are tasked with preserving night sky quality and can serve as an example to surrounding communities and agencies by taking steps to mitigate anthropogenic light internally, providing the best opportunity for visitors to enjoy the night sky.

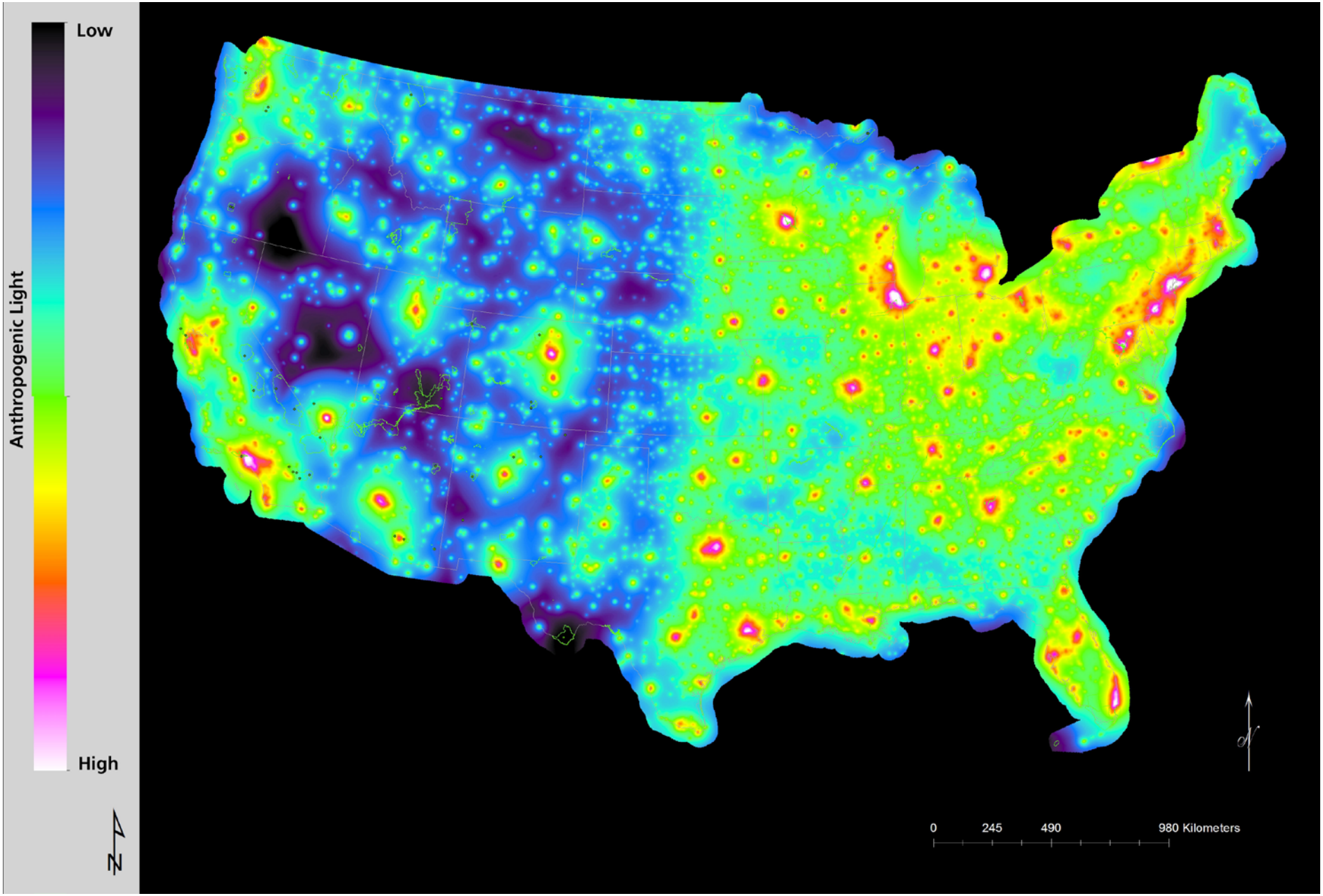

Figure 1 – Anthropogenic Light Ratios (ALRs) for the Contiguous US.

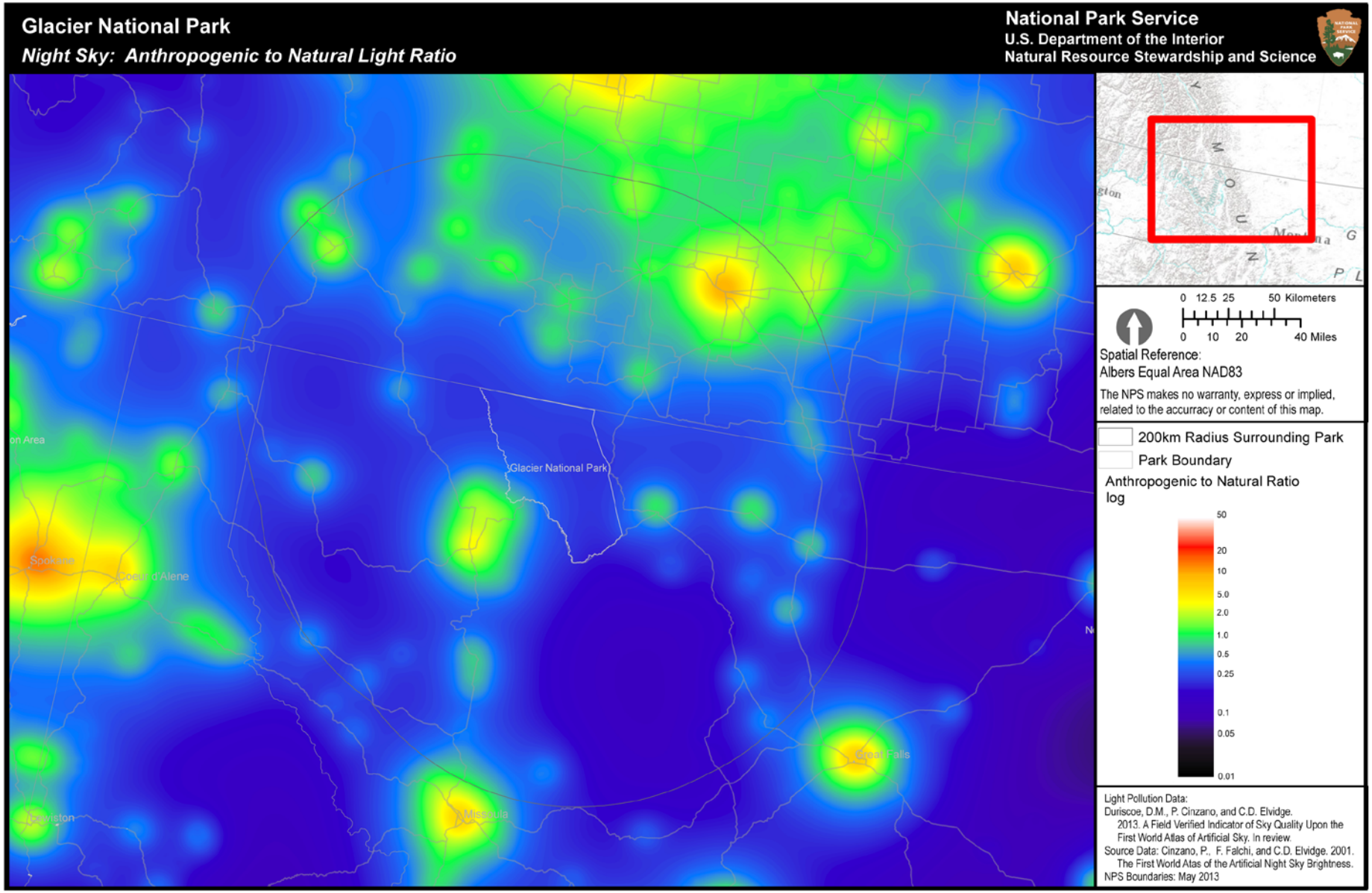

Figure 2 – Regional ALR near Glacier National Park

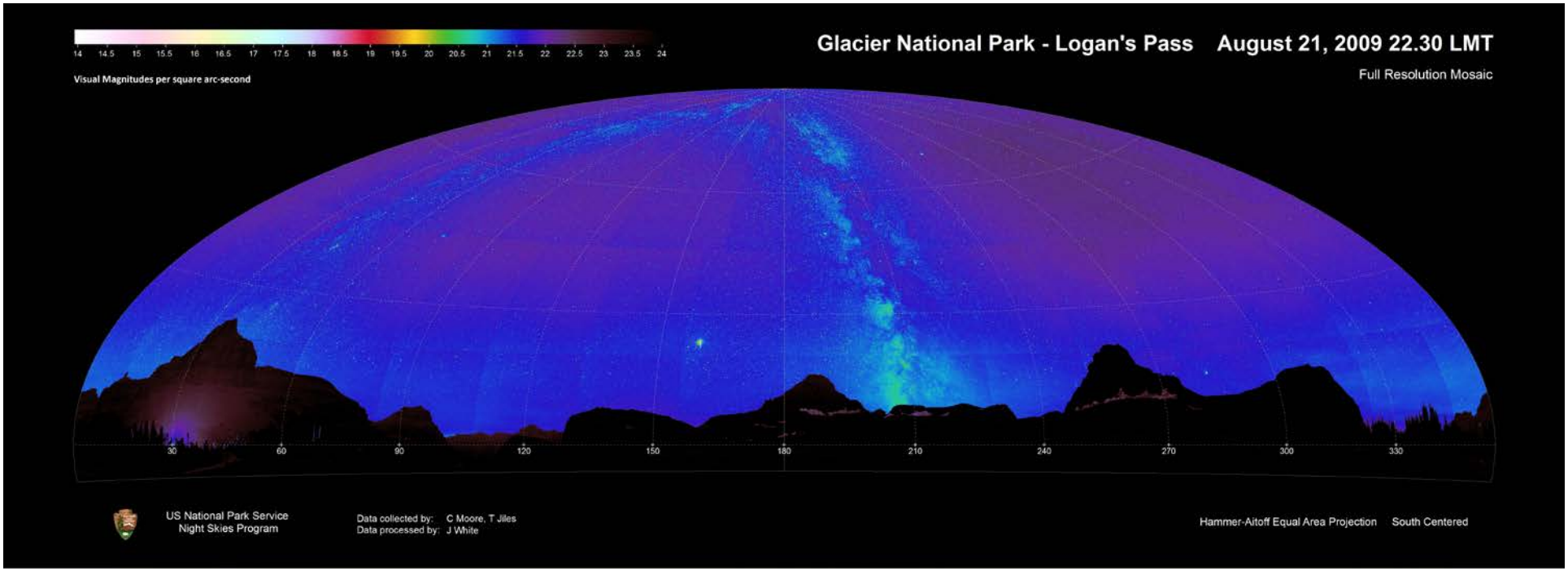

Figure 3 – Panoramic Image from Logan's Pass of natural and anthropogenic sources of light