

Photic Environment and Lightscapes Resource Summary Point Reyes National Seashore

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. Photic resources and lightscapes can be important as a natural feature, a cultural feature, or both. Natural lighting conditions 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. Park units 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. The topics in Attachment 1 discuss the importance of dark night skies in relation to park resources and values.



At **Point Reyes National Seashore**, protecting photic resources, lightscapes and naturally dark skies are related to the following park priorities:

- enhancing visitor experience
- conducting interpretive programs regarding the importance of night skies on park ecology
- nighttime setting in the park as it relates to camping, solitude,
- nocturnal wildlife such as migratory birds, shorebirds, pelagic birds, small mammals, owls and bats

Potential Threats

- Artificial light from park facilities and operations
- Artificial light from nearby development, light domes from bright towns/cities
- Artificial light from visitors

Potential Opportunities

- Park lighting plan
- Retrofit of light sources in order to reduce glare, reduce overall light output, direct lights downward and install warmer color lamps
- Coordinate with neighbors and partners to reduce artificial light that could affect park resources and values
- Night sky educational and recreational programming

Existing data/planning:

- Baseline night time conditions from sampling in 2009 <http://www.nature.nps.gov/night/skymap.cfm>
- Predicted ALR conditions based on continental model

Future data/planning:

- Re-measure conditions to describe trend
- Develop a lighting plan
- Pursue IDA International Dark Sky Park status
- Develop night skies goals, indicators and standards in park plans such as wilderness, or visitor use.

NPS policy guidance: Management Policies 2006, section 4.10 Lightscape Management

Quality of the Resource at Point Reyes National Seashore

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 are 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 images 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 on Mt. Vision produced an ALR of 1.89. The modeled median ALR value is 2.18 (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 average natural light from the night sky. At the light levels in the park, the Milky Way is visible but has typically lost some of its detail and is not visible as a complete band. Zodiacal light (or “false dawn” which is faint glow at the horizon just before dawn or just after dusk) is rarely seen. Anthropogenic light likely dominates light from natural celestial features and shadows from distant lights may be seen.

Although the park night sky quality is partially degraded due to the proximity to the multiple population centers, the park provides important coastal habitat for nocturnal wildlife and a unique opportunity for visitors 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.

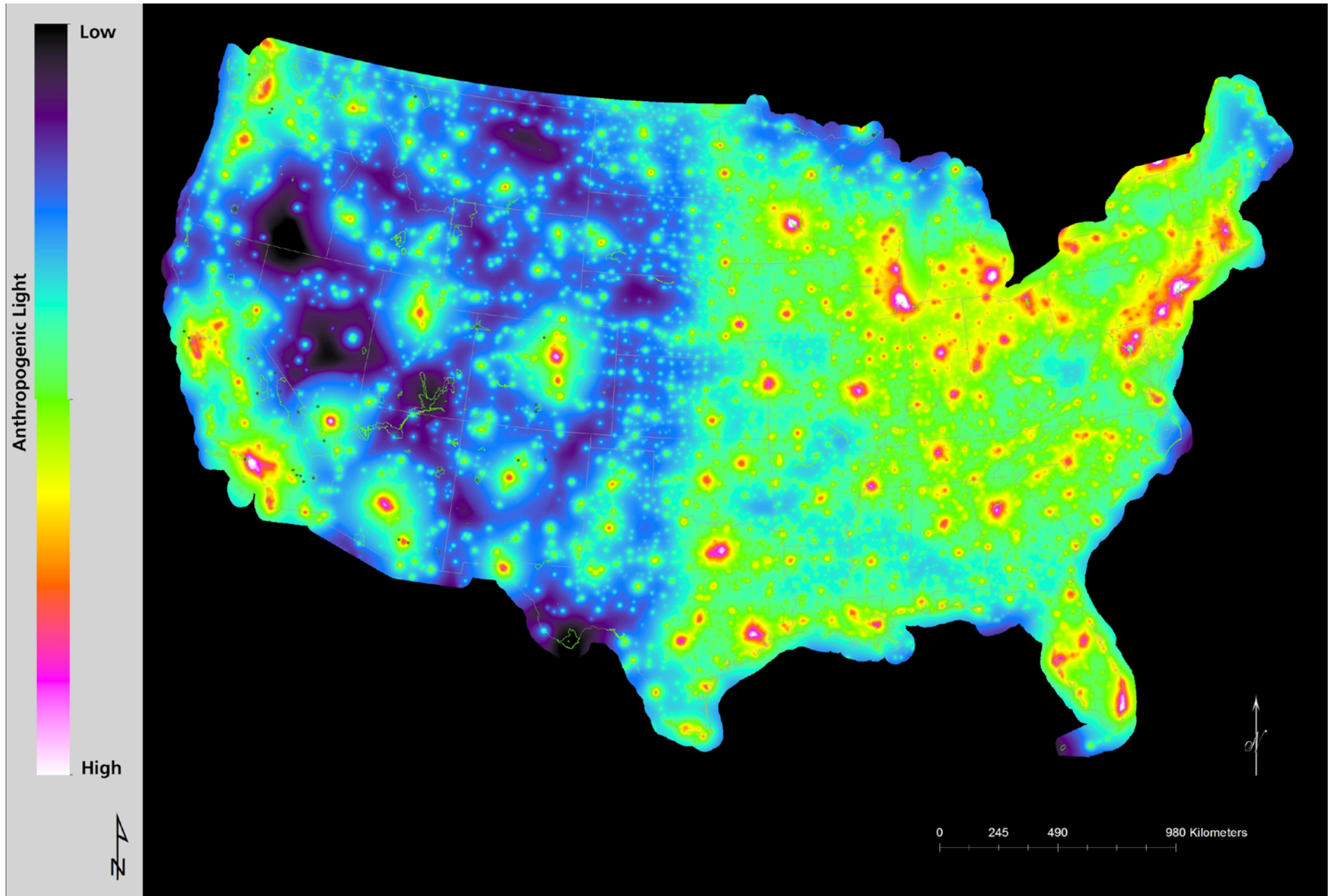
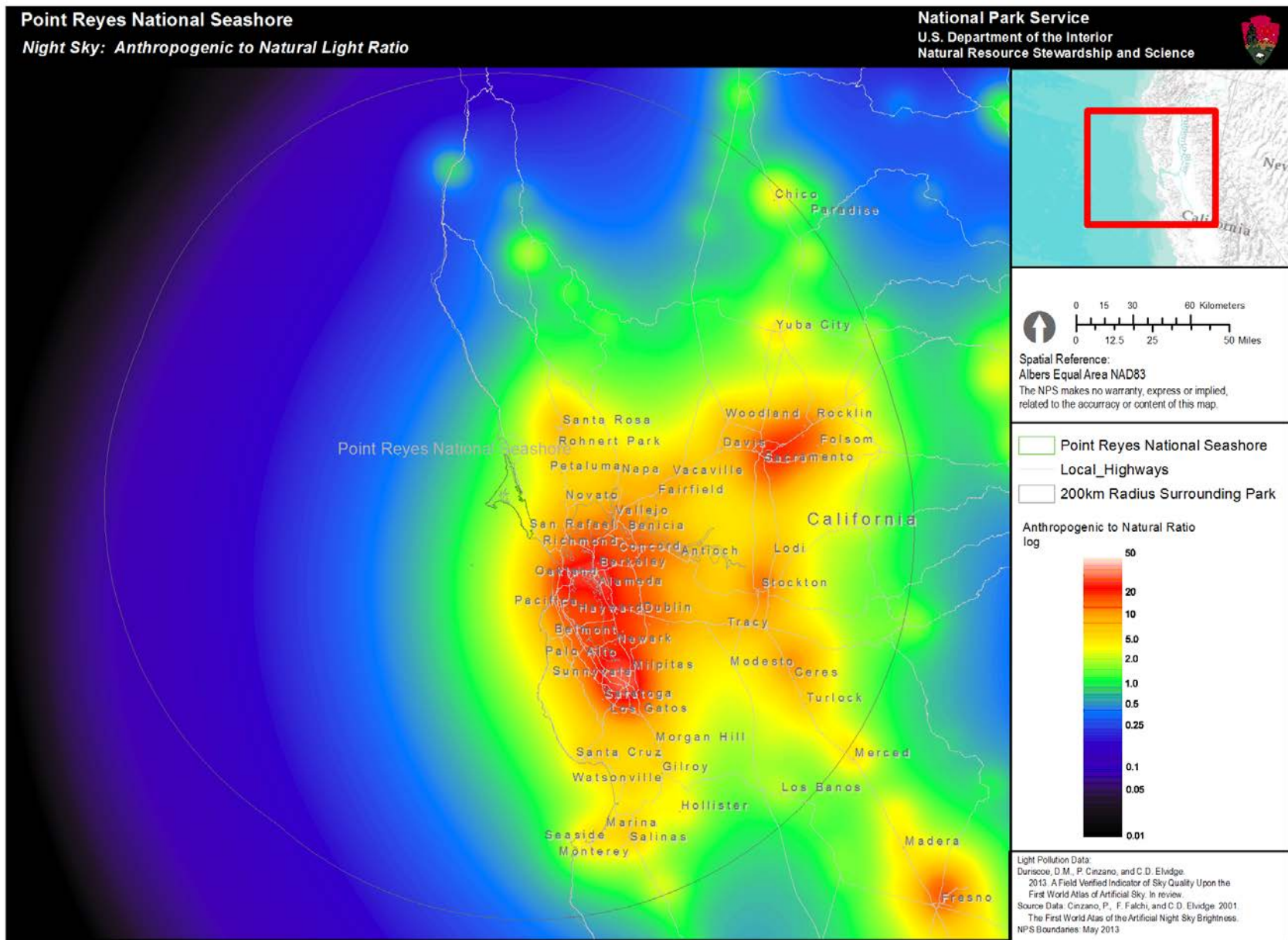


Figure 1. *Anthropogenic Light Ratios (ALRs) for the Contiguous US.* White and red represents more environmental influence from artificial lights while blues and black represent less artificial light.



Created by NPS Natural Sounds & Night Skies Division and NPS Inventory and Monitoring Program MAS Group on 20150601

Figure 2. Regional view of anthropogenic light near Point Reyes NS. White and red represents more environmental influence from artificial lights while blues and black represent less artificial light. The scale is small in order to show regional context and to show how far reaching the impacts of artificial lighting can be. While Point Reyes NS may be influenced by artificial light it still maintains more naturalness than surrounding areas and serves as a harbor of dark skies.

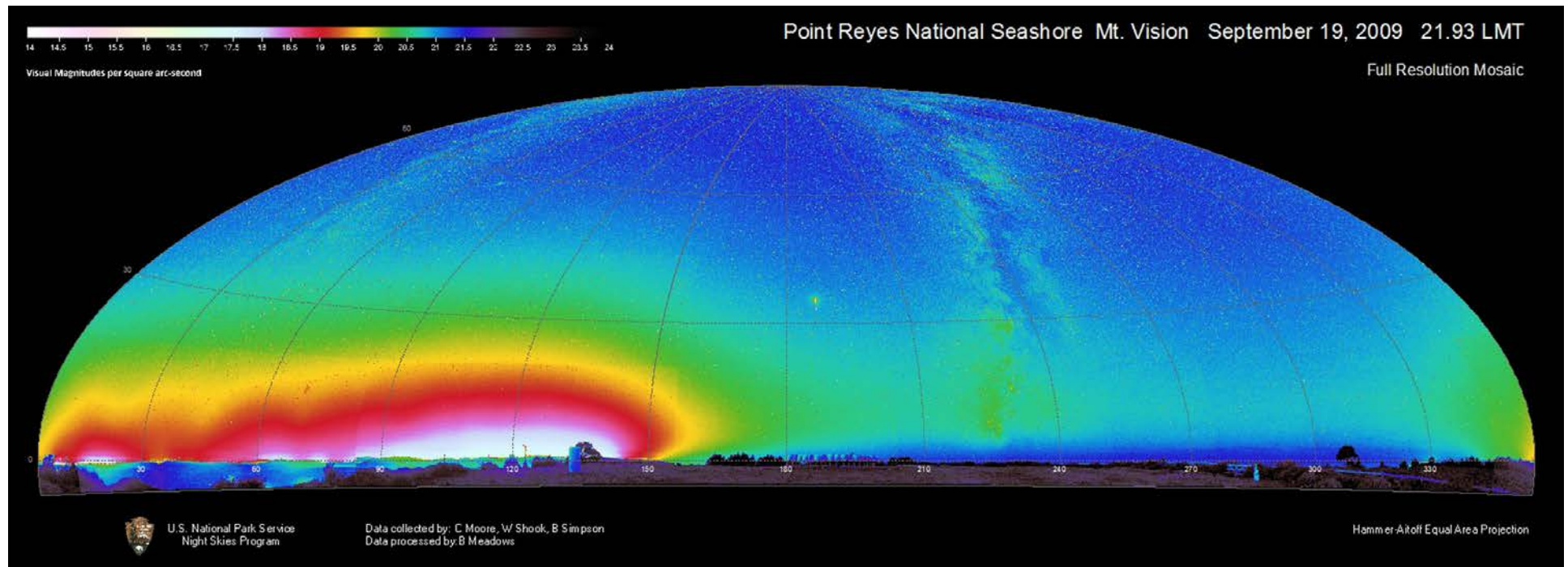


Figure 3. *Panoramic image of all (natural and anthropogenic) sources of light as observed from Mt. Vision at Point Reyes National Seashore in 2009.* This image was captured with highly sensitive photographic equipment in order to demonstrate the extent of sky glow from human light sources. White and red represents more environmental influence from artificial lights while blues and black represent less influence. Images with less anthropogenic light may display celestial objects like stars or the span of the Milky Way.