

# Photic Environment and Lightscapes Resource Summary Organ Pipe Cactus National Monument

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 **Organ Pipe Cactus NM**, protecting photic resources, lightscapes and naturally dark skies are related to the following park priorities:

- enhancing visitor experience,
- conducting interpretive programs regarding nocturnal species, desert ecology, and night skies
- nighttime, wilderness, remote setting in the park
- quality nocturnal habitat
- wilderness character

## Potential Threats

- Artificial light from 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:

- Predicted ALR conditions based on continental model

## Future data/planning:

- Collect baseline data
- Develop a lighting plan
- Pursue IDA International Dark Sky Park status
- Develop night skies goals, indicators and standards in related plans and strategies

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

### **Quality of the Resource at Organ Pipe Cactus NM**

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 All-sky Light Pollution 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.

The modeled median ALR value is 0.28 (Figure 2). An ALR 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 these light levels, most observers would feel they are in a near 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 of eyesight looking in any direction.

Although the park night sky quality is partially degraded due to the proximity to developments and light sources, the park provides important habitat for nocturnal wildlife and a unique opportunity for visitors to enjoy night sky resources. By providing overnight camping, protecting wilderness character, and leading night sky programs, 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 human-caused light internally, providing the best opportunity for visitors to enjoy the night sky.

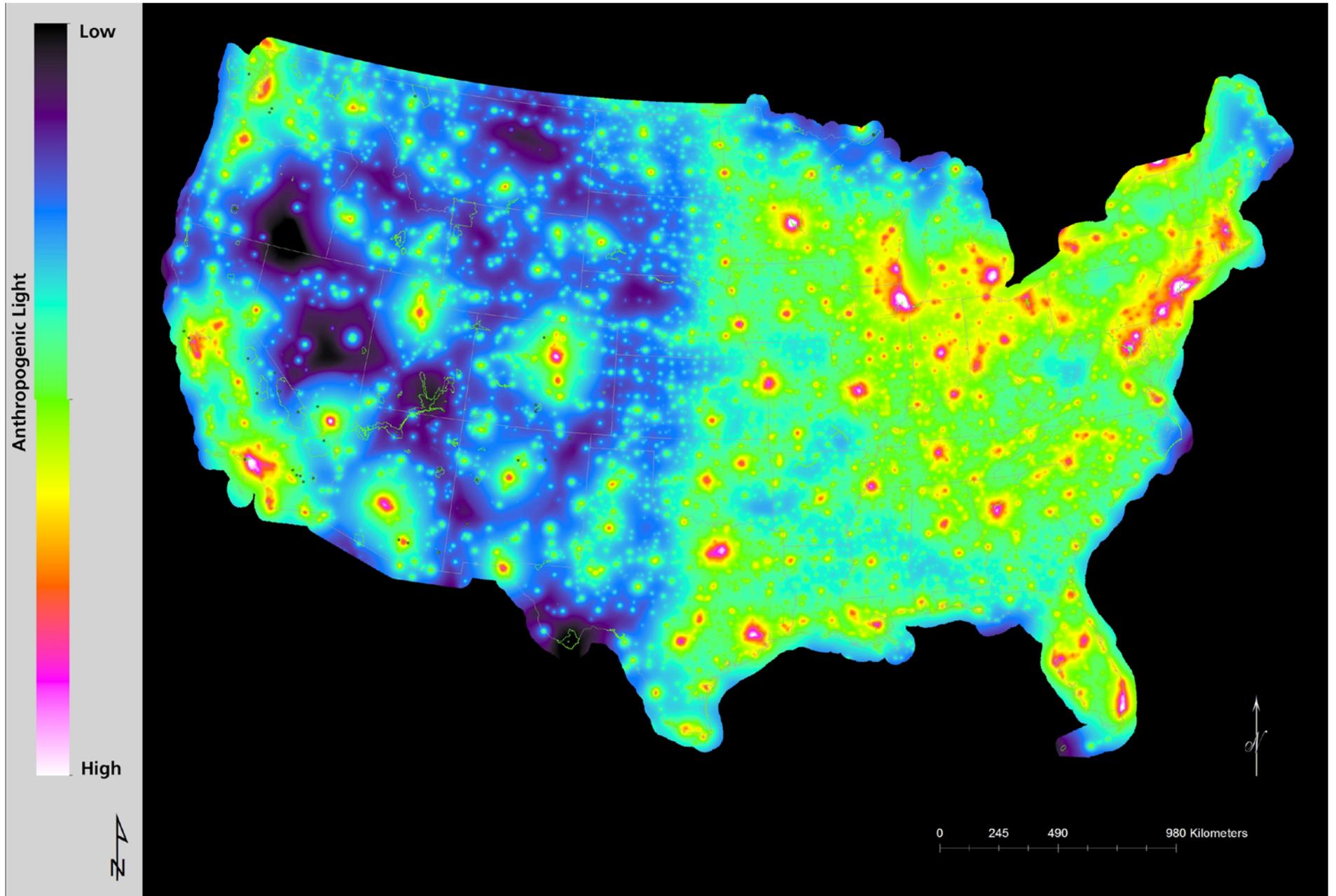
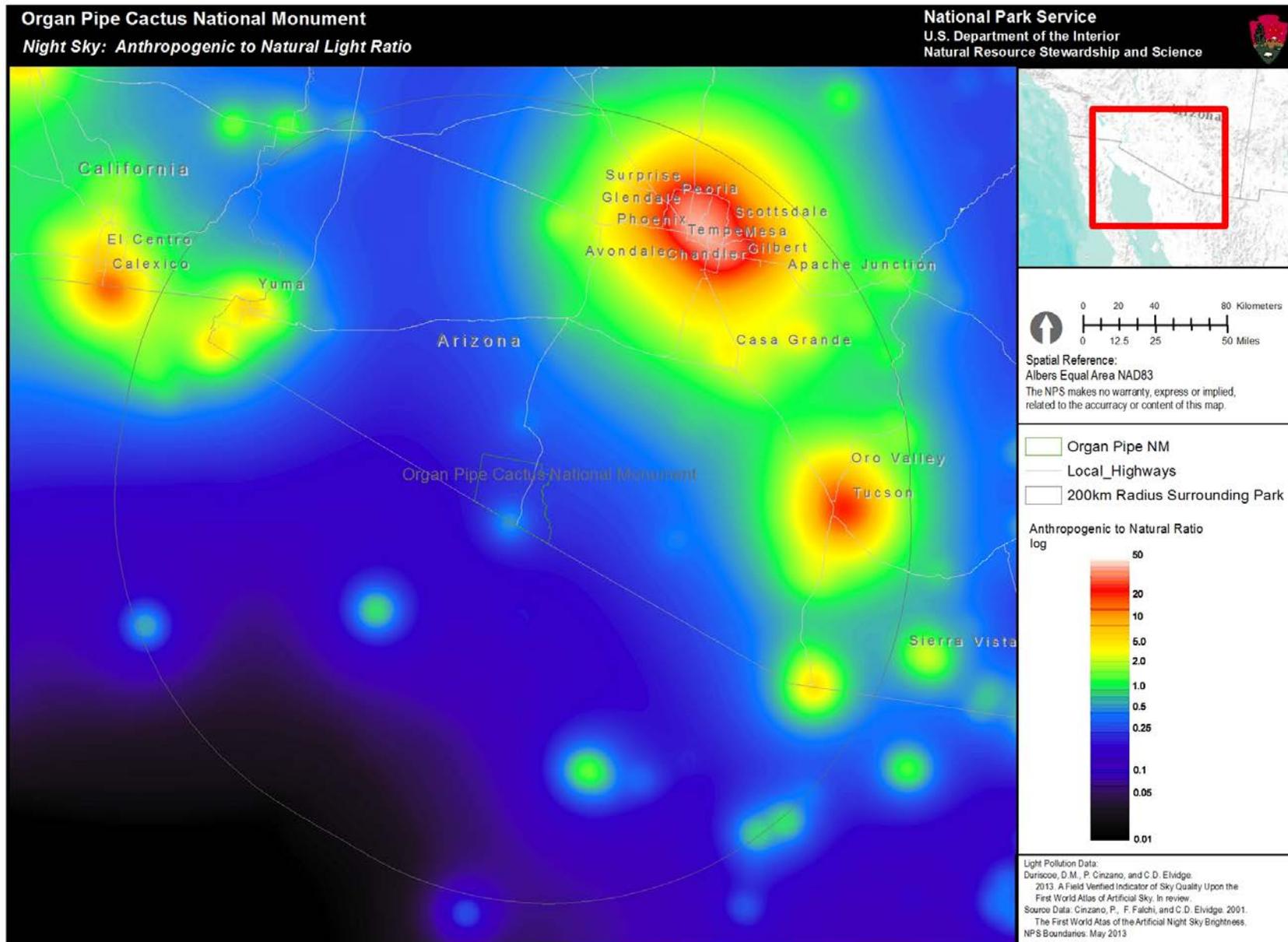


Figure 1. *Anthropogenic Light Ratios (ALRs) for the Contiguous US.* White and red represents more environmental influence from artificial lights while blues and black represent less artificial light.



Created by NPS Natural Sounds & Night Skies Division and NPS Inventory and Monitoring Program MAS Group on 20150827

Figure 2. Regional view of anthropogenic light near Organ Pipe Cactus NM. White and red represents more environmental influence from artificial lights while blue 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 National Park Name may be influenced by artificial light it still maintains more naturalness than surrounding areas and serves as a harbor of dark skies.