

**Compilation of Public Comments on the Draft SAB Report on the Environment**

**Panel ROE Advisory**

Tom Miller  
Designated Federal Officer  
EPA Science Advisory Board  
U.S. Environmental Protection Agency (1400F)  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460

February 21, 2008

Dear EPA Science Advisory Board,

I would like to talk with you briefly about the problem of light pollution in our Federal Class 1 Areas. The EPA in its October 1979, *Protecting Visibility: An EPA Report to Congress* first mentioned the problem of increased night sky brightness. Subsequent documents such as the *1982 Air Quality Criteria for Particulate Matter and Sulfur Oxides Volume III* and the *1995 Air Quality Criteria for Particulate Matter II of III* review draft also included this language. Unfortunately, it appears that the increased night sky brightness was attributed more to particulate matter than artificial lighting. As national particulate matter levels have declined, the night sky brightness has continued to increase.

Based on 1997 numbers, we have found that over half of the 149 Class 1 Federal Areas analyzed have moderate to severe light pollution problems. One-quarter of these areas have a night sky brightness so severe you can no longer see the Milky Way. Current forecasts by the National Park Service show there will be no place left in the lower 48 states with an unpolluted night sky by 2025.

Currently, the light pollution credit in the LEED Rating System is optional and the Energy Star Program Residential Outdoor Lighting Fixture standards do nothing to discourage shining lights into the sky. Increases in lighting efficiency have historically led to more light shining into the sky and increased night sky brightness. Although bound by the Clean Air Act's "no man-made impairment" by 2064, current programs and regulations within the EPA have not led to an improvement in the night sky brightness.

Programs such as the proposed Missouri Night Sky Protection Act offer us the ability to recognize the emission of man-made light into the skies of our protected areas is a problem and must be reduced. By treating man-made light as a nighttime visibility impairment we can work toward understanding how it can be managed. Armed with that knowledge, we can develop regulations that reduce that amount of lighting emitted into the nighttime sky above our Class 1 Federal Areas while promoting safety, conserving energy, and preserving the environment.

**Listed Below is my recommended changes:**

Page 2-51 (ROESAB2007-2.PDF) - Section INDICATOR: Regional Haze  
Indicator Limitations

- These data represent visibility in a sampling of selected National Parks and Wilderness Areas and are not representative of other rural or urban areas.

Add this between lines 8 and 9:

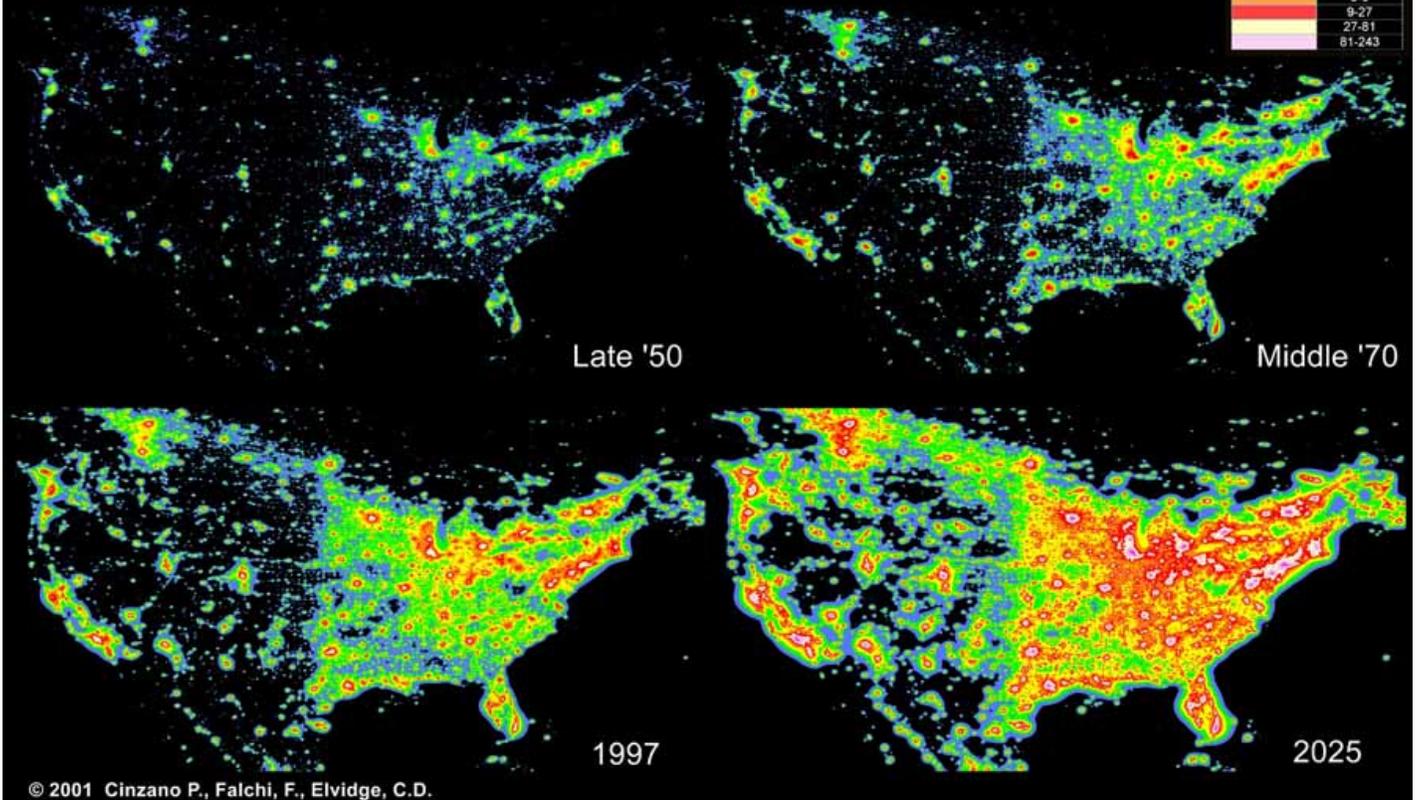
- Visibility Impairment is measured and tracked using the deciview metric. The deciview metric is only valid during daylight hours. Light Pollution cannot be measured or tracked using the deciview metric so nighttime visibility impairments, principally atmospheric discoloration, remain unmonitored. Over 30 years of data on the brightness of the night sky above Federal Class 1 Areas by the Defense Meteorological Satellite Program (DMSP) indicates worsening conditions.

# Artificial Night Sky Brightness due to Light Pollution in North America

## A preliminary picture of the growth from 1950 to 2025

Artificial night sky brightness at zenith, at sea level, for standard clean atmosphere as fraction of the average natural night sky brightness

<11%
11%-33%
33%-100%
1-3
3-9
9-27
27-81
81-243



Reference: <http://www.yosemite.org/naturenotes/NALightPollution.htm>

Report on Class 1 Areas: <http://www.trianglealumni.org/mcrol/class1.html>

Sincerely,

Robert Wagner  
9005 N Chatham Avenue  
Kansas City, MO 64154  
Missouri Night Sky Protection Act Homepage:  
<http://missourinspa.googlepages.com/>

February 13, 2008

To: Dr. Deborah Swackhamer – Chair  
EPA Science Advisory Board

Re: **Include Light at Night as an EPA Health Trend**

Dear Dr. Swackhamer:

I would respectfully encourage the Science Advisory Board at its February 28 meeting to amend the Review by the SAB Panel of EPA's 2007 Report on the Environment by adding a paragraph on the emerging issue of Light at Night (LAN) as a health issue.

Simply Google **"Light at Night" health** to see just some of the references, ranging from NIEHS reports to research studies.

Light at Night will be eventually recognized as an environmental health issue. Even a simple acknowledgement in the SAB Panel Report that LAN is an emerging trend in health that should be included in the EPA 2007 report would go a long way in establishing LAN as a credible health consideration among state and municipal governments.

I respectfully ask for your consideration and support for SAB recommending that LAN be recognized in the EPA's 2007 Report on the Environment.

Submitted by:



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860 668 4000

2/12/2008

Mr. Thomas Miller  
EPA Science Advisory Board

Thank you for the opportunity for comment. The EPA is pursuing a laudable goal in its Report on the Environment< summarizing the key elements of ecosystem health, environmental condition, and human health. However, I point out one facet of the environment that is only briefly mentioned and deserves much more attention< that of light pollution. If not incorporated in the 2007 report, it should be critically examined by the EPA SAB for inclusion in successive reports.

Light is mentioned on page 32, <sup>3</sup>Physical attributes of ecological systems include air temperature, light, rainfall, and sea level.<sup>2</sup> However, no further mention is made nor is the connection made between altered light regimes and artificial lighting. Even briefly giving an example on this page would be a worthwhile; something to the effect of <sup>3</sup>For example, artificial light at night can alter habitat necessary for nocturnal wildlife.<sup>2</sup> I present several reasons below why this issue should be taken more seriously by the EPA and adopted as an Indicator:

EUR From space, the illuminated cities of the world are perhaps the first human caused environmental change one would notice. The atmosphere around cities is often lit up 2-3 orders of magnitude brighter than natural night conditions.

EUR Visible spectrum light is often dismissed as a potential pollutant or human environmental change, however it shares many characteristics of other key indicators that are accepted. Carbon dioxide is a naturally occurring molecule, yet changes to its concentration are considered alarming.

Ultraviolet radiation, like visible light, is part of the electromagnetic spectrum, but is of concern linked to ozone depletion. And, although temperature varies spatially, seasonally, and daily throughout the world, the retention of infrared radiation is currently the hottest topic in environmental news. Despite the fact that visible light is altered by human invention several fold across broad areas of the country, it receives no attention from the EPA.

EUR The Fatal Light Awareness Program estimates millions of migrating birds are killed each year due to disorientation by artificial lights. Many of these are listed species.

EUR There is a growing body of science indicating that artificial light affects a multitude of species. A sampling of these studies has been collected in Ecological Consequences of Artificial Night Lighting, by Rich and Longcore. This is particularly important considering half of terrestrial species are nocturnal and depend on darkness as a physical attribute of habitat.

EUR The visibility of stars is not only a scientific resource, but is important to many Americans. Natural night skies can be interpreted as an Air Quality Related Value under the 1977 Clean Air Act Amendments. Light pollution hinders nighttime visibility via scattered light which results in a loss in contrast. This is similar to how daytime visibility is affected by aerosols- a physical process addressed in the Clean Air Act.

EUR Artificial light at night can influence human circadian rhythms just as diminished light during the day can. Recent studies have linked altered photonic environments to breast cancer.

EUR The fraction of artificial light that causes light pollution represents a significant waste of energy, amounting to roughly 1% of total US electrical consumption.

Measurement of the brightness of the night sky is suitable as an Indicator given your criteria. It has been measured from satellites and observatories for decades, and more recently by portable ground based instruments. Methods have been peer reviewed and published, are in use by government agencies (namely NOAA, National Park Service, and NASA sponsored observatories), used by citizens and NGOs, and there is now adequate data to show trend over time. These measurements are transferable and standardized, and there is renewed interest in computer modeling of this environmental change. The EPA's lack of involvement in developing measurement standards should not hinder its acceptance by that agency for the purpose of understanding key elements of our changing planet.

Further information can be found at [www.darksky.org](http://www.darksky.org), or [www2.nature.nps.gov/air/lightscapes](http://www2.nature.nps.gov/air/lightscapes). There are a number of public individuals, scientists, and organizations interested in engaging the EPA and scientific leaders on this topic.

Sincerely,

/S/

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International Dark-sky Association