

Consumer Guide to

**Night Sky Friendly
Lighting**

Night Sky Program

New Mexico Heritage Preservation Alliance

www.nmheritage.org

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Introduction

A hundred years ago, the night sky was filled with stars that inspired wonder and awe in all who saw them. Maybe you have had a similar experience - watching a meteor shower or glimpsing a “falling star” - that reminded you of how priceless a resource our starry sky is. The continuity of the night sky is inspiring - it is one of the few constants in the human experience. When you look at the natural landscape of the earth, there are very few places that look the same as they did five hundred years ago. When you look at the night sky, you are looking at the same sky your great-great-grandfather did. Unfortunately the night sky most of us see now is a lot less dark than it used to be. Too much and inefficient outdoor lighting has caused an epidemic of light pollution that blots out the stars and threatens our nighttime environment. The dark skies of our ancestors are disappearing and the problem is only getting worse. Soon there will be few people left who even remember what a pristine night sky looks like.

The good news about light pollution is that it is easy to fix - the biggest problem is lack of awareness. Once people are aware and willing to help, there are easy and responsible alternatives. It is one of the few environmental issues where the damage done by humans can be undone. It is difficult to reverse the effects of pollution and impossible to revive an extinct animal, but if everyone were to follow the night-sky friendly guidelines, the problem would evaporate overnight. And don't think that one person can't make a difference - researchers have found that a single street lamp can affect the view of the night sky for an observer up to 200 km or approximately 124 miles away. So get educated and get involved! This is growing threat to our environment and our quality of life that has some very simple solutions.

Light Pollution and Its Consequences

Light pollution, is caused by misdirected, unshielded, excessive, or unnecessary night lighting. There are numerous negative effects including sky-glow, glare, light trespass, disrupted eco-systems and energy waste. Very few areas of the world are exempt from the harmful consequences of light pollution and it is growing rapidly. While nighttime lighting is often essential, too much and the wrong kind causes many problems.

Sky-glow is the brightened sky over towns and cities. It is prevalent in urban areas and it destroys our view of the universe. This type of light pollution causes problems for astronomers, and over two-thirds of Americans can no longer see the Milky Way from their homes.

Glare is a common problem caused by unshielded or overly bright lights. Glare creates deep shadows for people to hide in and interferes with the vision of drivers and pedestrians. Blinding streetlights are annoying and can be dangerous.

Light trespass is intrusive lighting that trespasses on our property. Light that spills beyond our neighbors property into our yard and windows can be more than a common annoyance. Light trespass can have harmful effects on health. People need darkness to sleep - too much artificial light can disrupt nocturnal patterns and affect the immune system.

Cultural and natural resources are also damaged by light pollution. The night sky has inspired artists, poets and musicians for hundreds of years - think of Van Gogh, Robert Frost and Mozart. It has played a part in numerous religions over the centuries as well as cultural myths and lore. But for most of us, the dark skies of our ancestors have disappeared. Stars that a century ago glowed brightly in the sky have now

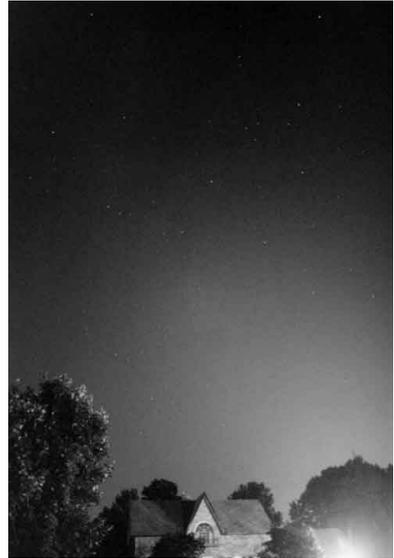
all but disappeared. Excessive artificial light disrupts plant and animal life and can be dangerous for many birds. The night sky is truly the world's largest National Park. Would you carelessly throw your trash out the window at Yosemite or Yellowstone? Let's take responsibility for our environment and make choices that sustain our beautiful night skies.

Energy waste and the economic costs of light pollution are staggering. It is estimated that Americans spend over two billion dollars a year on unused or unneeded light. Wasted light does nothing to promote safety. Negative consequences of producing electricity include air pollution and acid rain. By eliminating wasteful use of light we can reduce our electricity needs and air pollution.

Quality lighting is the key. Let's put light to work for us rather than wasting it.



Night sky as seen without light pollution.



Photograph taken in same area with lights on. Sky glow and glare block out our view of the stars.

New Mexico Night Sky Protection Act

As a result of advocacy by New Mexico Heritage Preservation Alliance, on April 6, 1999, Governor Gary Johnson signed the Night Sky Protection Act into law, in an effort to regulate outdoor lighting to “preserve and enhance the state’s dark sky while promoting safety, conserving energy and preserving the environment for astronomy”. Since that time, there have been annual official “Dark Sky Appreciation Night”(s) in New Mexico, a reminder to citizens to turn out their lights, go outside and enjoy an unspoiled night sky. One of the first laws of its kind in the United States, the Night Sky Protection Act makes dark skies a priority in New Mexico for its history, culture, industry and economy. The text of the law is as follows:

74-12-1

Short Title

This act may be cited as the “Night Sky Protection Act”.

74-12-2

Purpose

The purpose of the Night Sky Protection Act is to regulate outdoor night lighting fixtures to preserve and enhance the state’s dark sky while promoting safety, conserving energy and preserving the environment for astronomy.

74-12-3

Definitions

As used in the Night Sky Protection Act:

A.

“outdoor lighting fixture” means an outdoor artificial illuminating device, whether permanent or portable, used for illumination or advertisement, including searchlights, spotlights and floodlights, whether for architectural lighting, parking lot lighting, billboards or street lighting; and

B.

“shielded” means a fixture that is shielded in such a manner that light rays emitted by the fixture, either directly from the lamp or indirectly from the fixture, are projected below a horizontal plane running through the lowest point on the fixture where light is emitted.

74-12-4

Shielding of Outdoor Light Fixtures

All outdoor lighting fixtures installed after January 1, 2000 shall be shielded, except incandescent fixtures of one hundred fifty watts or less and other sources of seventy watts or less.

74-12-5

Nonconforming Light Fixtures

A.

In addition to other exemptions provided in the Night Sky Protection Act, an outdoor lighting fixture not meeting these provisions shall be allowed, if the fixture is extinguished by an automatic shutoff device between the hours of 11:00 p.m. and sunrise.

B.

No outdoor recreational facility, whether public or private, shall be illuminated after 11:00 p.m. except for a national or international tournament or to conclude any recreational or sporting event or other activity conducted, which is in progress prior to 11:00 p.m. at a ballpark, outdoor amphitheater, arena or similar facility.

74-12-6

Use of mercury vapor lighting fixtures

No new mercury vapor lighting fixtures shall be sold or installed after January 1, 2000.

74-12-7

Exemptions

A.

The following are exempt from the requirements of the Night Sky Protection Act:

- 1) Outdoor lighting fixtures on advertisement signs on interstates and federal primary highways;
- 2) Outdoor lighting fixtures existing and legally installed prior to the effective date of the Night Sky Protection Act; however, when existing lighting fixtures become unrepairable, their replacements are subject to all the provisions of the Night Sky Protection Act;
- 3) Navigational lighting systems at airports and other lighting necessary for aircraft safety; and
- 4) Outdoor lighting fixtures that are necessary for worker safety at farms, ranches, dairies, feedlots or industrial, mining or oil and gas facilities.

B.

The provisions of the Night Sky Protection Act are cumulative and supplemental and shall not apply within any county or municipality that, by ordinance or resolution, has adopted provisions restricting light pollution that are equal to or more stringent than

the provisions of the Night Sky Protection Act.

74-12-8

Construction Industries Division; Duties

The construction industries division of the regulation and licensing department shall review the outdoor lighting provisions in the uniform building codes used in New Mexico and make recommendations for appropriate changes to comply with the provisions of the Night Sky Protection Act and shall permit and inspect, to the standards set forth in the Night Sky Protection Act, all construction of and on state-owned buildings that is subject to permit and inspection under the Construction Industries Licensing Act [Chapter 60, Article 13 NMSA 1978].

74-12-9

Costs of Replacement; Recovery

If public utilities are required pursuant to the provisions of the Night Sky Protection Act or by local government ordinances to accelerate replacement of lighting fixtures, the cost of such replacement shall be included in rates approved by the public regulation commission.

74-12-10

Violations; Penalty

Any person, firm or corporation violating the provisions of the Night Sky Protection Act shall be punished as follows:

A.

For a first offense, the offender may be issued a warning;

B.

For a second offense or offense that continues for thirty days from the date of the warning, twenty-five dollars (\$25.00) minus the replacement cost for each offending fixture.

74-12-11

Enforcement

In the exercise of any of the powers and duties conferred by law, a governing body of a political subdivision of the state may enforce the provisions of the Night Sky Protection Act.

While the law is not as stringent as many had hoped for, it provides a framework that supports education and advocacy efforts. More than anything, it has brought the issue of light pollution to the attention of the general public and made it a part of the public consciousness. Most building professionals now realize that responsible lighting must be a part of their work and hopefully in time the law can be strengthened and accepted as a win-win situation for all involved.

Local Ordinances

In addition to the state law, many concerned municipalities have passed local ordinances that place further restrictions on the use of outdoor lighting. Many cities in New Mexico, including Albuquerque, Las Cruces, Santa Fe, and Taos now benefit from local ordinances or more detailed zoning codes. There are often more resources available on a local level for enforcement and community support as well. Community activists have initiated most local ordinances and you can work for the same in your community. Usually it is only one or two people with a little general support who get ordinances passed. One person can make all the difference. The Night Sky Program at New Mexico Heritage Preservation Alliance can provide you with sample ordinances, recommended practices and information.

Solutions

Night Sky Friendly Lighting

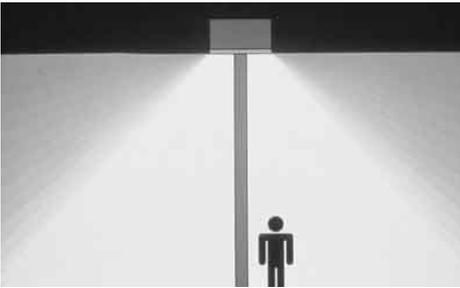
Is:

- ▣ *Shielded*
- ▣ *Properly Aimed*
- ▣ *Off by 11:00 PM or*
- ▣ *On a Motion Sensor*

Uses:

- ▣ *Wattage that Matches Need*
- ▣ *Energy Efficient Sources*

All lights should be fully shielded or cutoff. This means no light is emitted above a horizontal plane and no light trespasses into places where it is not needed.



Light is shining down where it is needed and not spilling up into the night sky.

Add a shield to existing spotlights and floodlights. Light shields will direct the light toward the ground. Shielded light fixtures use energy more effectively and efficiently, reduce hazardous and annoying glare, prevent unwanted light trespass onto neighboring properties and lessen sky glow, which obliterates our view of the stars.



*Change this dusk
to dawn fixture to...*



Shielded Lights

Point lights downward. Installation and positioning are very important. Place fixtures under overhangs when possible. Any fixture positioned too high can splash light far beyond the boundaries of the targeted area. The perfect scenario is uniformity of light over the illuminated area while minimizing the light trespass.



*Change this upward
pointed light to ...*



*one that is pointed
downward.*

Turn off the light when you are done. All outside continuous lighting should be turned off by 11:00 PM. If you attach a motion sensor, average use ends up at less than an hour's worth of light per night. This can save over \$212 per year.

Match the light to your needs. Check your site at night to evaluate how much, if any, lighting is needed. If you need to purchase fixtures, you can save money by using a lower wattage. A forty or forty-five watt porch light is sufficient to see at night and actually prevents human eyes from being blinded by glare. Limit floodlights to wattages of 60 or less.

Lighting Modification and Installation

Evaluate First

1. *Does it need to be lit?*
2. *For what purpose?*
3. *To what lighting level?*
4. *Do any of the fixtures emit light above the horizontal plane?*
5. *Is light trespass an issue?*
6. *Is glare an issue?*

Lighting Defined

You have choices. Which light source you choose is important because some types may be more effectively filtered out at the telescope than others. If you are purchasing a new light, low-pressure sodium (LPS) is the preferred source, as its nearly monochromatic yellow light can be easily filtered out. Different lamps have specific qualities, better color rendition, for example. Once you know what your needs are, you can choose the best light for the job. If you are correcting existing lighting, there are a variety of shields available.

Low-Pressure Sodium (LPS) lamps: most energy efficient light source available. LPS has a monochromatic yellow light and it is a good choice if wildlife safety is an issue. It emits light at a wavelength where the human eye is most efficient. It is good for residential street lighting, parking areas, and outdoor security where color rendition is not an issue.

Incandescent Bulbs and Quartz Halogen: low efficiency. Acceptable if shielded and used for low wattage applications. Consider occupancy sensor activation. Should not be used for most outdoor lighting applications. Glare can be a problem with quartz halogen.

High-Pressure Sodium (HPS) lights: energy efficient. Usually of a higher wattage and are good for major roadways, parking lots and other commercial streetlights or sports parks.

Metal Halide (MH): is a white light source used where true color rendering is important. Often too high in wattage and result in harsh, overlit environment.

Fluorescent lights: emit a great deal of ultraviolet light that is useless for illumination but damaging to the detectors used by astronomical observatories. Rarely used in outdoor lighting. If used outdoors, wattages should be under 45.

Mercury lamps (MV): Since 2000, it has been illegal to sell or install mercury vapor lamps in New Mexico. Not an economic or ecologically aware light source by today's standards.

There are many things we can do to reduce light pollution. Technology exists to do so in an economic fashion. Lighting manufacturers have responded to the crisis of light pollution and there are numerous night sky friendly lights available. For specific products, please see the sponsors at the end of the booklet or check <http://www.nmheritage.org> for an updated listing of night sky friendly products.

Service Station and Parking Area Lighting

Many gasoline pump islands are being illuminated at three to four times the illumination level used a few years ago. This is not needed for safety, security or visibility. This excessive level of lighting causes blinding glare for oncoming drivers and pedestrians and light trespass onto neighboring properties.

Appropriate lighting for service stations and parking areas should be no more than ten times the illumination level of the surrounding area. Glare can be reduced by using fixtures that are completely recessed up into the pumping island canopy. Lighting fixtures serving parking areas should be using fully cut off fixtures. Preferred light sources are High Pressure Sodium (HPS) and Metal Halide (MH) in the appropriate wattage.



An example of good gas station lighting.

How to Talk to Others About Light Pollution

Once you have fixed your house and your property to be “night-sky friendly”, it is time to spread the word to others. Remember that the biggest problem with light pollution is *lack of awareness*. Before you approach your neighbor or your local car lot, be sure you are well prepared.

- Bring copies of Night Sky Program literature with you.
- Make a visit to your local hardware or home store and know what night-sky friendly fixtures are available and their cost.
- See if there is a local ordinance in place in your community and what it specifically requires.
- Identify the enforcement authority if there is one.
- Most importantly, be positive and receptive to your neighbor’s point of view. They may have security concerns or financial issues or they just might not be familiar with the issue of light pollution.

Calmly explain to them your concerns and suggest some possible alternatives. If they are willing, take them on a tour of the neighborhood one night and point out the differences between “good” and “bad” lights - there is nothing more convincing than a personal experience. Always remember that *change does not happen overnight*. You may have to speak to them several times and it may take the involvement of the community to produce the response you desire.

One of the most common arguments against responsible lighting is the issue of security. People wrongly assume that the brighter the light, the safer they are. The problem with many security lighting systems is that while it may make us feel safer, it does not actually make us any safer. Most 175-watt dusk-to-dawn security lights are counterproductive to good vision and can in fact prevent us from seeing criminals and other dangers. No lighting system can ensure security but poor lighting is not the answer.

Resources and Sponsors

This booklet is brought to you by the Night Sky Program of the New Mexico Heritage Preservation Alliance. For more information about the organization and the Night Sky Program and other resources please visit www.nmheritage.org or call **505.989.3696**.

The International Dark Sky Association (IDA) is based in Tucson, Arizona and is a leading resource for a variety of issues concerning dark skies. They can be contacted at www.darksky.org or **520.293.3198**.

The Construction Industries Division (CID) of the State of New Mexico is responsible for the enforcement of the Night Sky Protection Act. They can be contacted at **505.476.4700**.

The following contributors have made this booklet possible:

International Dark Sky Association, Tucson

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New Mexico Heritage Preservation Alliance, Santa Fe

McCune Charitable Foundation, Santa Fe

New Mexico State Parks



Photo by David Miller

*An unobstructed view of the beautiful night sky.
A truly cherished part of our cultural heritage.*



New Mexico Heritage Preservation Alliance

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