# Sensible Shoreland Lighting

## Preserving the beauty of the night

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## Preserving the beauty of the night

Counting the stars by candlelight
all are dim but one is bright
the spiral light of Venus
rising first and shining best,
from the northwest corner
of a brand new crescent moon
crickets and cicadas sing
a rare and different tune.

Robert Hunter

Many of us can remember sitting on a dock on a crystal clear summer night, the water as flat as glass, the inky black surface mirroring the sky, the great white Milky Way, a falling star tracing a path across the heavens.

Unfortunately, this precious part of our heritage, the outdoors with only the light of the moon and stars, is fading away. "Dusk to dawn" lights obscure our view of constellations, meteor showers, planets, and the landscape lit by the moon. Many children now see the wonders of the night sky only in pictures or at planetariums. The fading away of the night sky is an issue not only in cities, but also in the countryside and in developing waterfront communities.

As a 24-hour society concerned with safety, utility and security, the United States wastes as much as one billion dollars a year on lighting that provides neither safety nor security, but simply lights the night sky and creates an adverse effect on nocturnal creatures and migrating birds. But it doesn't have to be this way. Most glare and sky glow is unnecessary. The light that temporarily blinds us or obscures our view of the night sky comes mainly from poorly designed and inefficient lighting fixtures.

This booklet discusses the issue of light pollution, with a special focus on issues surrounding shoreland lighting. You will find information on new lighting technologies that can deliver adequate illumination, provide security, save money and reduce light pollution without competing with the beauty of the night.





## Shoreland Lighting: A Special Concern

The rising cost of waterfront property in Wisconsin provides ample evidence of the importance of the shoreland environment to the people that live along it. During the daytime this environment is heavily used for recreation. Artificial lighting allows us to engage in nighttime activities that would be impossible or unsafe under normal nighttime conditions. Whether it's boating, fishing or simply sitting on the porch to read, our enjoyment of the night is enhanced by the use of artificial light. At the same time, our rivers and lakes at night provide a quiet open dark space that gives us privacy and an opportunity to enjoy the heavens. Balancing the ability to see at night with the desire to preserve the beauty of the night is the goal of sensible shoreland lighting.


***Wasted lighting:***
*Light escaping into the night sky is shown in this satellite photo of the Midwest.*

**Our Adaptable Eyes**

We use artificial lighting to be able to see our way in darkness. While this seems like an obvious statement, it is not really as simple as that. Our eyes can adjust themselves to a wide range of light levels. However, shifting from the bright to dark operating range of the eye is not instantaneous. Our eyes can require 60 minutes or longer to fully adapt to darkness, which is why we squint when walking from darkness into bright light, or pause to let our eyes adjust when stepping out into the night. Once adapted, though, our eyes are sensitive enough to see a single candle 10 miles away.

## Sensible Lighting

Sensible lighting can minimize the three most serious problems along our shorelands:

**Glare:** The first principle of good lighting is to illuminate only what we wish to see. When we see a distant point of light across the water, when we are seeing light from the fixture itself rather than what the fixture is meant to illuminate, we are observing glare. Poorly-designed or poorly installed lighting causes glare that can severely hamper the vision of boaters, pedestrians, cyclists, and drivers, creating a hazard rather than increasing safety.

**Light Trespass:** Glare is also the most common cause of light trespass. Light trespass is a light fixture on one property that illuminates an adjacent or nearby property. Light trespass is not a legal concept, but rather a description of the nuisance effect of improperly aimed lights on someone else's property. We all have seen streetlights, commercial lights or residential lights spilling over onto adjacent property, causing illumination where it was not meant to be. Poorly designed outdoor lighting shines onto neighborhood properties and bedroom windows, invading privacy and creating an unattractive look to an area. Because the waterfront is unobstructed, water reflects glare from shoreland lights over the water to trespass on distant properties.

**Sky Glow:** Much of our exterior lighting shines directly upward, causing the sky above our cities to glow and washing out our view of the dark night sky. Billboard lights that shine upward, street lights that bounce light off pavement, and commercial and residential lighting open to the sky all contribute to sky glow. Today, only the most remote areas in our country are free from sky glow. We all have had the experience of traveling from an urban to a rural environment and marveling at the appearance of millions of stars in the night sky. Unfortunately, it's not uncommon for someone raised in a major city to see the Milky Way for the first time as an adult while vacationing in the countryside.



Installing sensible shoreland lighting can be especially challenging because of the ability of water to both reflect light and provide an unobstructed view from far away. Anyone who has seen the moon rise over the water appreciates how reflective the water can be. Artificial light placed at the shoreland is free to carry across the water for long distances.

Waterfront lighting is often used to identify a pier or marina for boaters on the water after dark. Taverns and restaurants use neon signs to attract customers off the water. Dams and other structures use lights to warn of dangers to navigation. Mills, factories, ball fields and other facilities near the water also light the shoreland. While these uses of artificial lighting are legitimate, we must also take into consideration those people who can see those lights, but are not using them.


Photos courtesy of McDonald Observatory

***Shielding glare:***
*A comparison of the same street corner with an unshielded (above) and shielded street light shows how glare can be reduced by shielding lights.*

The most common shoreland lights are attached to homes, garages, piers and other structures on waterfront residential property. While we may notice the glare from an unshielded garage light across the lake, it's likely that we've never ventured across the lake at night to see how our own home lights the night. Let's start by making our own lighting sensible and unobtrusive, only then helping our neighbors "see the light."

## Tips for Shoreland Lighting

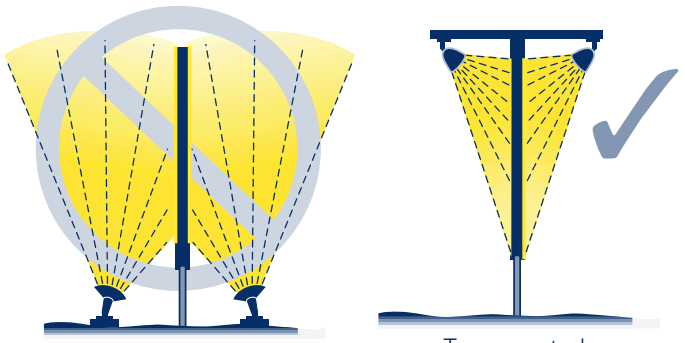
Sensible shoreland lighting does its intended job well, with minimum adverse impact on neighbors and the environment:

- Provide adequate light for the intended task, but don't over-light. A full moon can make an area seem quite bright, and some modern lighting systems illuminate areas 100 times brighter than the full moon. Choose lights that meet your needs without lighting the entire neighborhood. Look around for good examples of sensible lighting, or consult a lighting designer.
- Glare is both the most common lighting problem and one of the easiest to detect and fix. Glare can be eliminated by shielding light fixtures so the direct rays of light cannot reach our eye. Aim lighting fixtures away from the water and neighboring property. Maximize their effectiveness on areas you want to illuminate, and minimize the adverse impact on adjoining property. Proper fixture position is very important. Even well-shielded fixtures, when placed on tall poles near the property boundary can cast light onto neighboring properties.
- Use full cut-off lighting fixtures to minimize glare. Full cut-off means that no light is emitted above the horizontal. Full cut-off fixtures are more effective and actually increase safety since they produce very little of the glare that can dazzle the eye and reduce our ability to see into shadow.
- Retrofit existing fixtures with shields to reduce glare. In some cases small pieces of aluminum sheeting fitted to the fixture will suffice (never use an insulating material that might cause overheating). In other cases, low cost, full cutoff "sky caps" can replace dusk to dawn style lenses.
- Use fixtures with high-efficiency lamps, while still considering the color and quality of the light they produce. Highly efficient fixtures may cost more initially, but the payback time from energy efficiency and reduced maintenance is often very short.

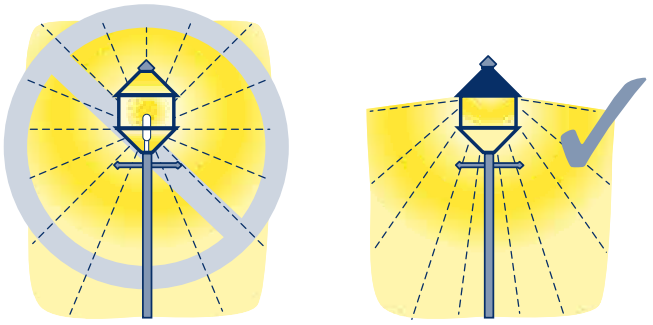


## Examples of Common Lighting Fixtures

**BILLBOARD FLOODLIGHTS**



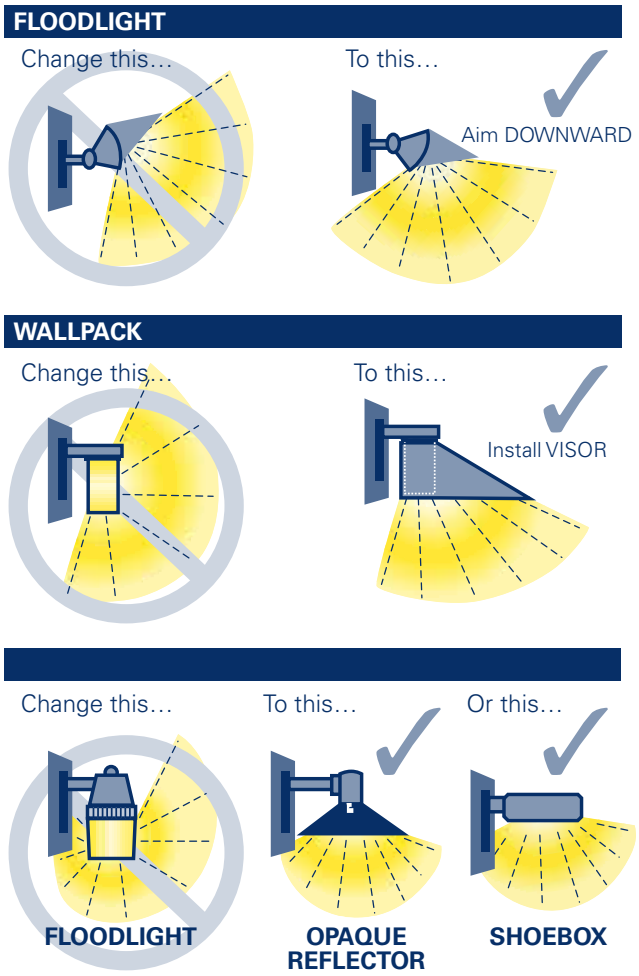

**POST-STYLE LAMP**




Artwork courtesy of the New England Light Pollution Advisory Group

- Avoid dusk to dawn security lights. A more effective approach to security lighting is a motion detector. A moving person will be more noticeable to neighbors and residents when they are suddenly illuminated. Motion detectors must be carefully installed so that moving branches and small animals do not activate the lights.
- When illuminating signs for advertising, position the lights above and in front of the sign, keeping the light aimed at the sign surface. Choose light intensity carefully, as very bright signs are actually harder to read.

## Modifying Existing Fixtures




Artwork courtesy of the New England Light Pollution Advisory Group

### Good Lighting Pays

Different kinds of lights provide different amounts of light using different amounts of electricity. Shopping around for an efficient lighting fixture can quickly pay for itself, even though the initial cost of the fixture itself may be relatively high. Here's an example. A typical 175 watt mercury vapor light produces about 8,000 lumens (a measure of light output). However, a more expensive 55 watt low pressure sodium light produces the same light output using 60% less electricity. At current average electricity rates, the more efficient light can pay for itself in a year or two in savings on your electrical bill.



## Lighting and Your Neighbors

Solving shoreland lighting problems always involves working with our neighbors. You may have spent some time working on this problem, others may not have thought about it at all. An easy first step to educating our neighbors and ourselves about a perceived lighting problem is to identify all the sources of glare along the shoreland. A shoreland lighting survey can inventory problem lights and provide a basis for discussion.

To conduct a shoreland lighting survey you will need to get out on the water at night, using a map to mark sources of light from both near and far shorelands. On a small lake this might mean circumnavigation, while on a large body of water noting the compass coordinates of a light or marking its relation to landmarks may be necessary. Then, during the daytime, try to identify the specific light fixture that was the cause of the glare, taking care not to attribute a light to the wrong property.

A shoreland lighting survey is an excellent project to undertake with your lake association or homeowners group. Making this a group project will make it easier for you to approach your neighbors about improving their lights. Use your lake association or neighborhood organization newsletter as a way to raise the issue and publicize the results of your survey. You'll be surprised how many people share your concern about night lighting.

If you are talking individually to a neighbor about a lighting problem, a careful explanation may be all that's needed. Keep in mind that your neighbor probably has concerns about their safety and security and feels that their bright light is a good solution to their concerns. Above all, be tactful and courteous. Understand some of the facts about different lighting fixtures, energy savings, and the differences between a good security light and a light that is just very bright. Most people like to be helpful and cooperative when approached in a friendly and cooperative manner.

## Local Regulations to Improve Lighting

Municipalities in a number of states have enacted lighting control ordinances. These measures prohibit inefficient, low-quality lighting. Lake and homeowner associations or municipalities interested in regulating shoreland lighting can take example from the following section of the Oneida County, Wisconsin zoning code, which focuses on pier lighting:

**Oneida County – Regulation of Lighting**

The purpose of this section is to minimize light pollution of the shore land environment without significantly inhibiting safety and security. This section applies to all lighting on berthing structures or designed to illuminate those structures associated with berths.

Light fixtures which do not conform to these provisions may be allowed with a conditional use permit upon a showing of special circumstances affecting safety, security, or general public interest. Non-conforming lighting in existence on the effective date of this section must be brought into compliance within five (5) years.

1. Flashing and rotating lights are prohibited.
2. Lighting inside a boathouse and intended to illuminate its interior is permitted.
3. Lighting on exteriors of berthing structures shall be fitted with opaque shields to prevent direct visibility of the lamp to persons on public waters or adjacent lands more than 50 feet beyond the berthing structure.
4. Lighting not mounted on a berthing structure but designed to illuminate a berthing structure or its immediate vicinity shall comply with subparagraph 3 above.
5. Lighting installed on, or intended to illuminate, seasonally-used berthing structures shall be turned off when not required for safety or security.
6. Public marinas may install illuminated signs with opaque shaded or shielded lighting that provide information pertaining to applicable federal state or municipal rules and regulations relating to electrical, fueling, waste and sewage disposal or other safety and environmental matters. Such sign illumination shall not be visible off the berth structure.

See the International Dark Sky Association web site for a comprehensive list of state/local ordinances (http://www.darksky.org).



## Why Sensible Lighting Matters

Eliminating glare and light pollution saves money while reducing our impact upon our neighbors and creatures of the night. The stars above us are a priceless heritage, not only for scientific knowledge, but also for our identity as human beings. David Crawford, Executive Director of the International Dark Sky Association says: "Light pollution is not a matter of life and death. Yet it is important nonetheless, profoundly so. We human beings lose something of ourselves when we can no longer look up and see our place in the universe. It is like never again hearing the laughter of children; we give up part of what we are."

### Sources of Sensible Lighting Equipment:

*(Reference to commercial products or businesses in this publication do not constitute an endorsement by the University of Wisconsin–Extension.)*

This is a selective list. Other local sources may be available.

**Dock and Marina Lighting**

Charles Industries, Ltd.
5600 Apollo Dr.
Rolling Meadows, Illinois, 60008
(847-806-6300)
http://www.charlesindustries.com/ma_doclite.html

Marina Power and Lighting, Inc.
332 McLaws Circle Ste.111
Williamsburg, VA 23185
(757-723-8006)
http://www.marinapower.com

**Residential and Commercial Lighting**

Hubbell Lighting
2000 Electric Way
Christiansburg, VA 24073
(703-382-6111)

Kim Lighting
P.O. Box 1275
City of Industry, CA 91749
(818-968-5666)

Luminaire Technologies, Inc.
212 West Main St.
Gibsonville, NC 27249
(910-449-6310)

Thomas Outdoor Lighting
2661 Alvarado St.
San Leandro, CA 94577

Ruud Lighting
9201 Washington Ave.
Racine, WI 53406
(414-886-1900)

**Sources of Additional Information**

*The Model Wisconsin Exterior Lighting Code*
UW-Extension – David S. Liebl
432 N. Lake Street, Rm.311
Madison, WI 53706
(608-265-2360)
liebl@epd.engr.wisc.edu

International Dark-Sky Association (IDA)
http://www.darksky.org

The Illuminating Engineering Society of North America
http://www.iesna.org/

The New England Light Pollution Advisory Group (NELPAG)
http://cfa-www.harvard.edu/cfa/ps/nelpag.html