

Better Lights for Starry Nights

Presented by: Matt B. Lara

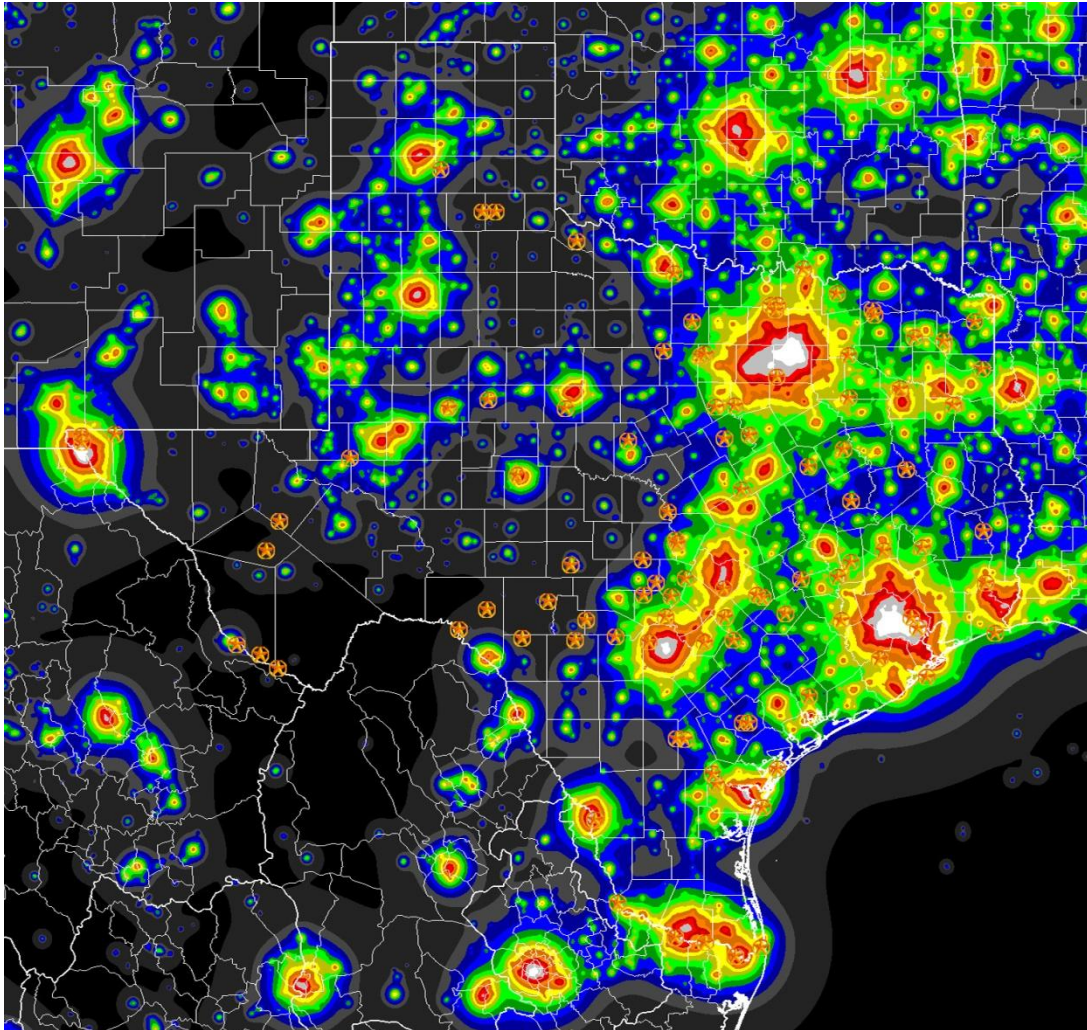


Llano, TX
June, 19th 2015





The Bortle Scale: A measure of light pollution



Color	Bortle* Class
	1
	2
	3
	4
	4.5
	5
	6,7
	8,9

WHY IS THIS IMPORTANT?

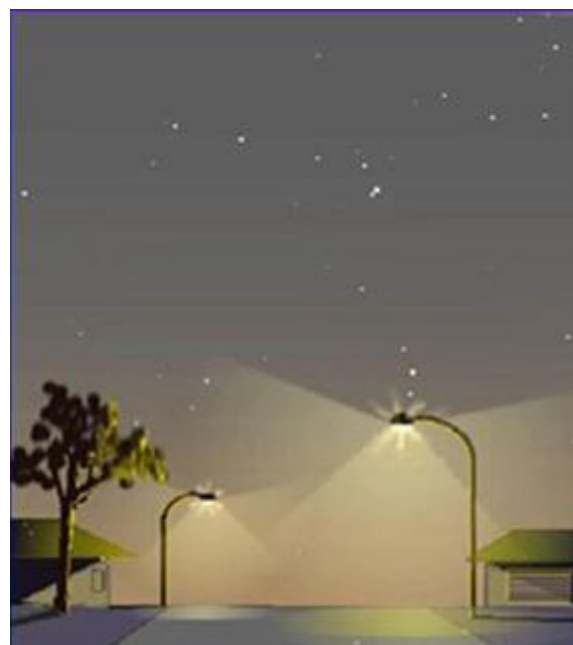
- **Wasted Energy/wasted money**
- **Safety**
- **Wildlife**
- **Health**
- **Sense of place**
- **The beauty of the heavens**



Energy: *Light in the wrong place, is light wasted*



VS.

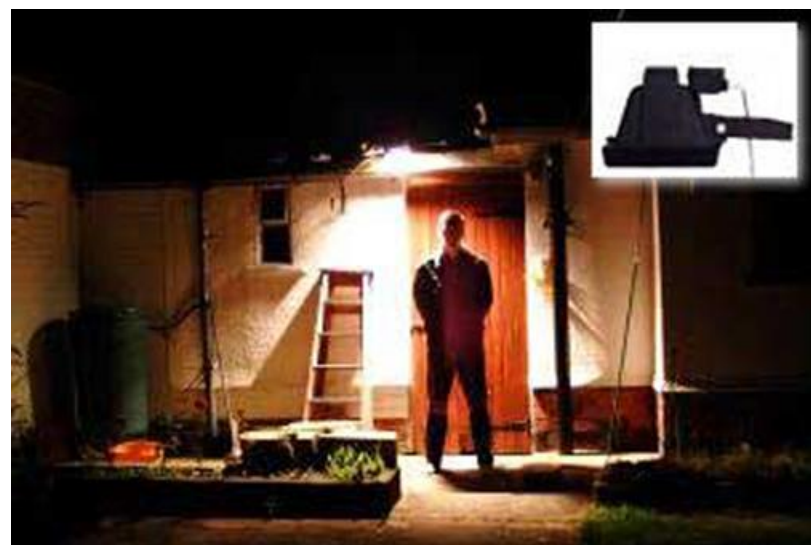


- Better directed light means less wattage needed
- Wasted outdoor lighting, that shines directly upward, is estimated at 17,400 gigawatt-hours a year.
- At an average of \$.10 per kilo watt-hour the cost of that wasted energy is \$1.74 billion a year.

Safety: *Poor lighting can give a false sense of security*

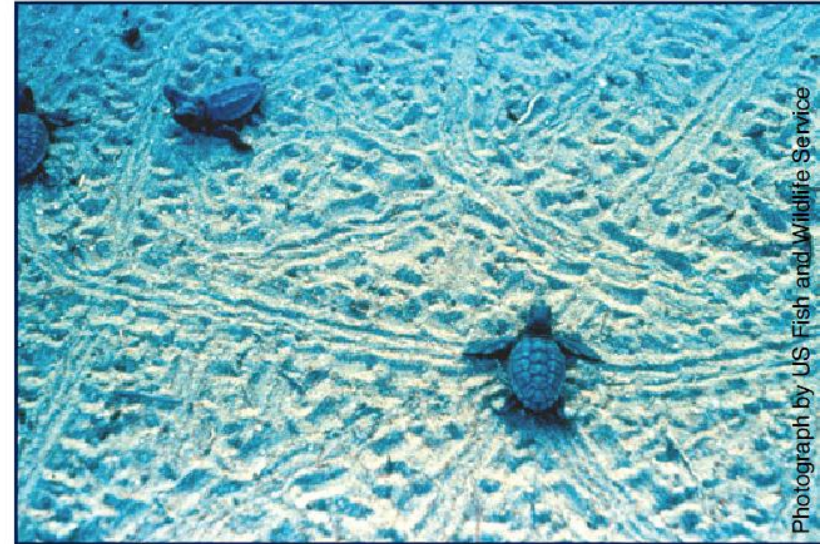


VS.



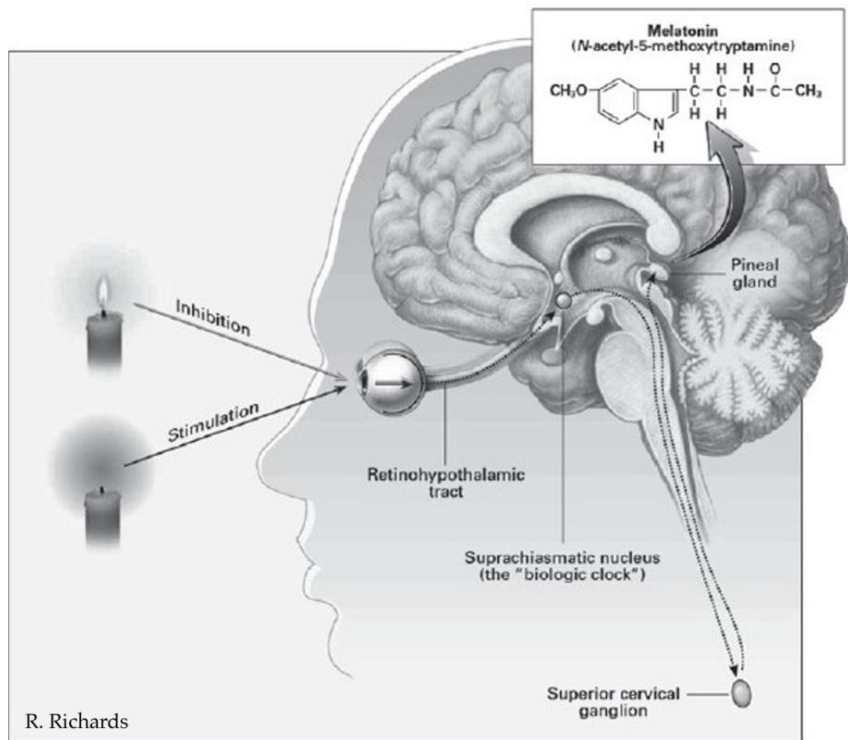
- “If lots of light gave good security, then our cities would be the safest in the world”
- High-glare lighting can make for dangerous driving conditions (think about high-beams vs. low-beams)

Wildlife: *Unnatural lighting impacts natural cycles and behaviors*



- Unnatural light at night can disrupt breeding and feeding
- Migratory patterns of birds and insects can be severely impacted
- Large scale impact on the greater ecosystem

Health: *It's awfully hard to sleep when somebody leaves the lights on!*



- Melatonin is a hormone that is released by darkness and inhibited by light
- It regulates the daily cycles of our mind and body- specifically: *sleep*.
- A lack of sleep can lead to:
 - Weight gain
 - Stress
 - Depression
 - Diabetes
- Shorter wavelengths of light (blue vs. red) have been shown to have a greater negative impact.

What if our grandchildren never got to see this?



Milky Way over Pedernales Falls State Park

Photo credit: Christopher V. Sherman

- Aside from its awe-inspiring beauty, the night sky constantly informs our sense of place and time of year.

The fundamentals of light pollution

- Urban sky glow
- Glare
- Light trespass
- Clutter



Sky Glow: *The “bubble” of light formed above a city/town*



- Wasted light going up instead of where it is needed
- Scatters off of particles in the atmosphere and creates a “bubble” of light above
- Wasted light = wasted energy = wasted money/resources, and not to mention, a wasted starry sky!

Glare: *Light that shines directly into one's eyes*



- It's light that actually makes it harder to see!
- Makes the shadows darker = less safe
- Especially a problem for the elderly and visually impaired
- Can make for hazardous driving conditions
- Both irritating and dangerous

Light Trespass: *Light that shines past the property is generated on*

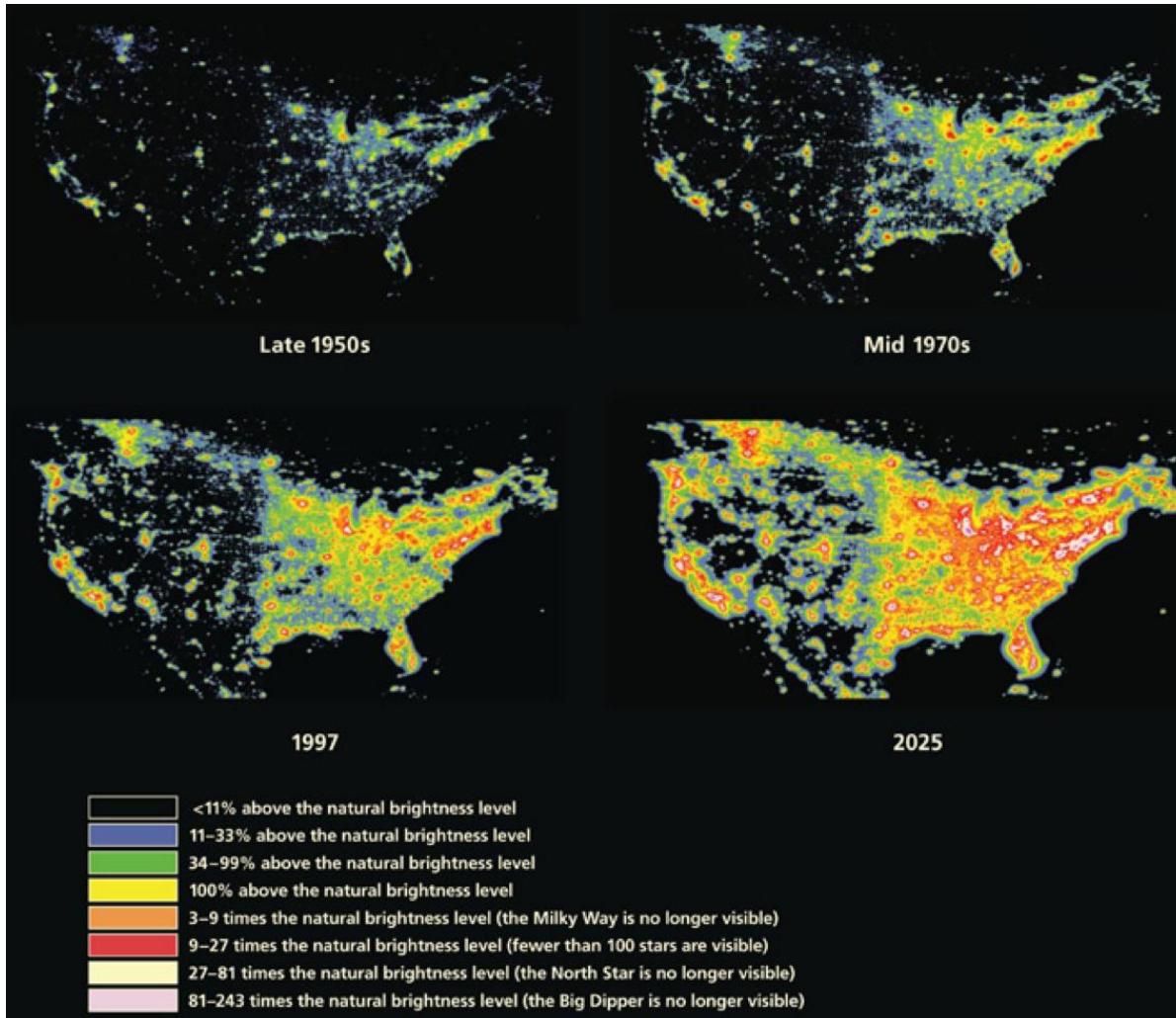


- Poorly aimed or shielded light that goes onto other peoples property
- It's about being a good neighbor
- In some ways, sky glow can also be thought of as light trespass. *I can see Johnson City, Marble Falls, and Austin very clearly from my roof*

Light Clutter: *Bright, confusing, and excessive grouping of lights*

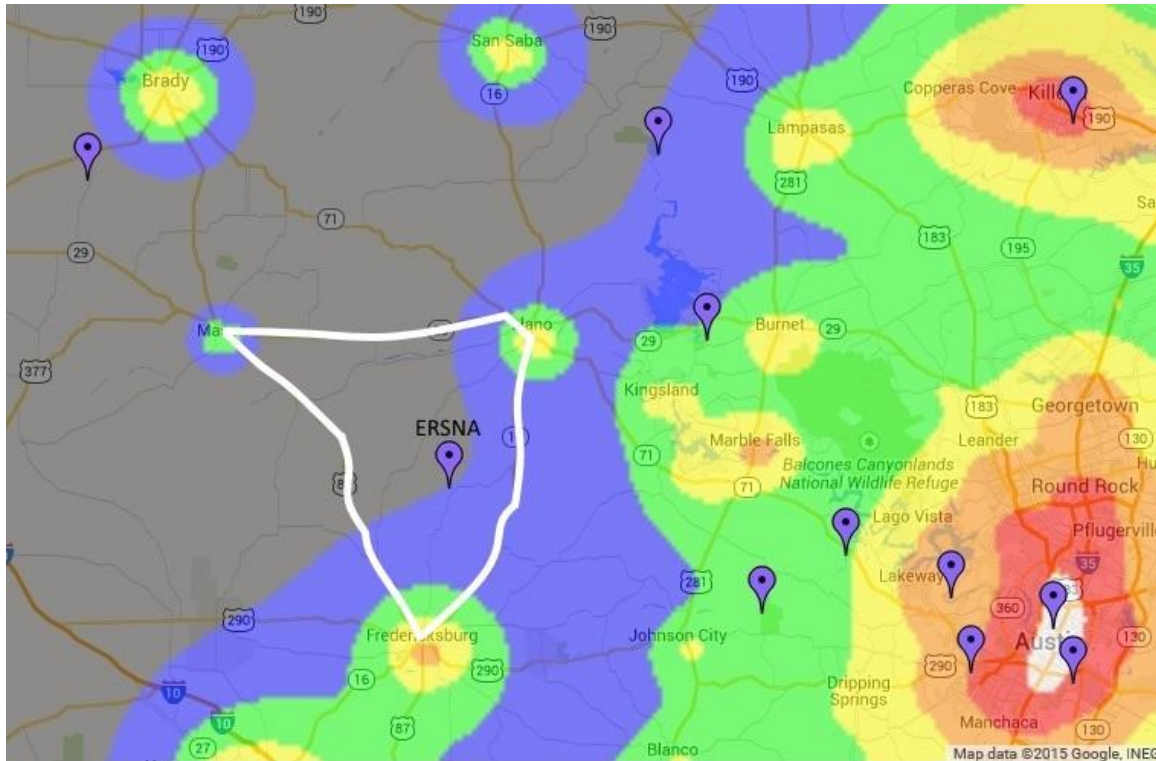


The Good News: *Light pollution is VERY reversible!*



- Water, air, and soil pollution can take generations and massive changes in our culture to reverse.
- With a handful of basic strategies we could turn the picture to the left in reverse.
- This can be done while maintaining good, safe, and functional levels of light.

The Hill Country is well on its way to making a change for the better.



- Communities in the Hill Country are forming a barrier for light pollution
- The following towns have already adopted resolutions or ordinances to curb light pollution:
 - Dripping Springs
 - Blanco
 - Mason
 - Fredericksburg
 - Llano
- Enchanted Rock SNA was awarded *Gold Tier* night sky status by the International Dark Sky Association (IDA)

Good vs. Bad Lighting: *See the difference*



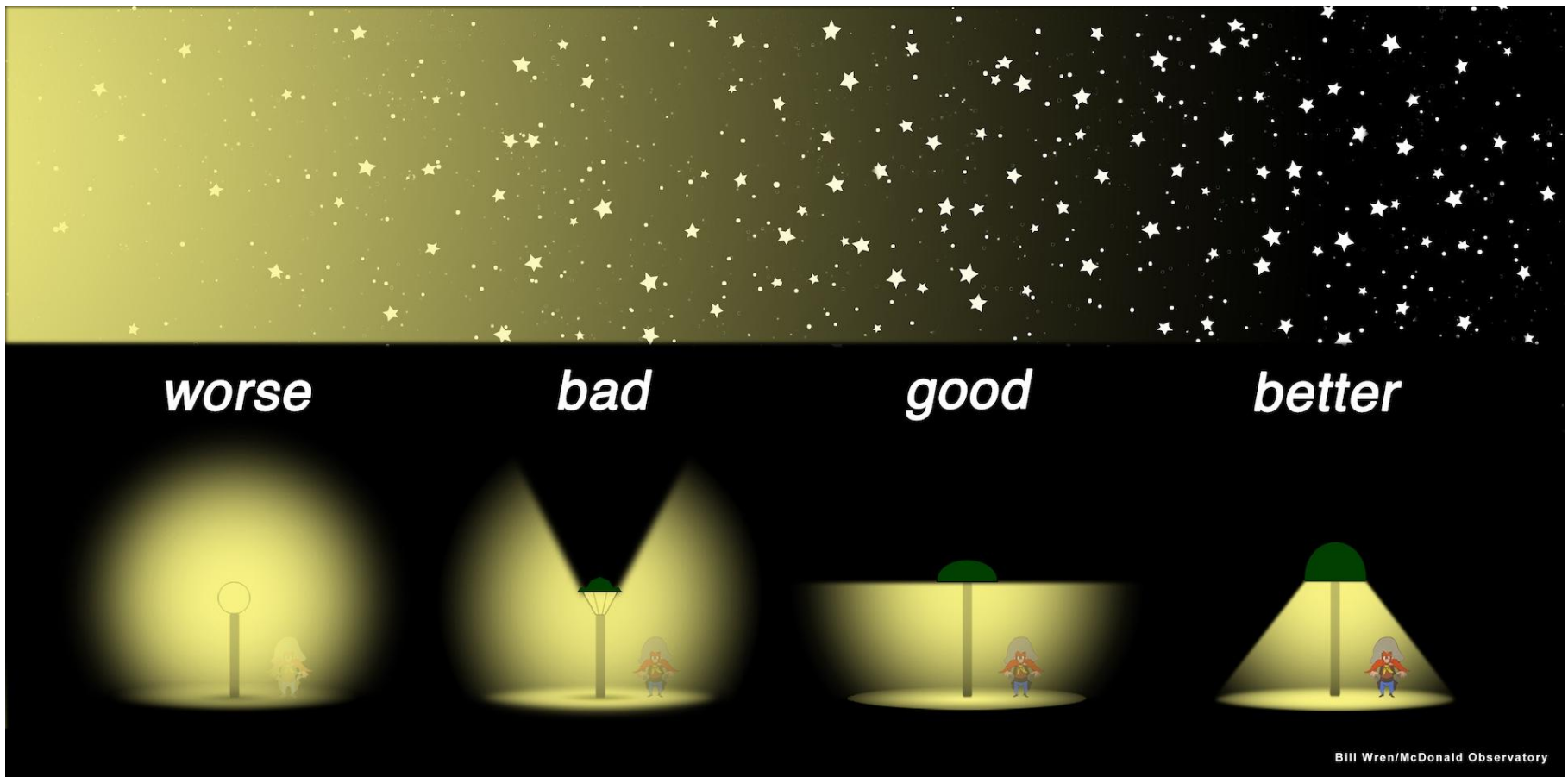
- There is a lot of glare, sky glow, and light clutter in this picture, but in the foreground is a tennis court with GOOD lighting
- See how its only going where it is needed?

Remember: *Only put the light where its needed*



- A “full cutoff” fixture does not produce any light above 90 degrees- this prevents sky glow
- A good fixture also minimizes glare and light trespass
- The color of the light should also be considered: Blue-hued light at night can have negative effects on people and animals

Remember: *Only put the light where its needed*

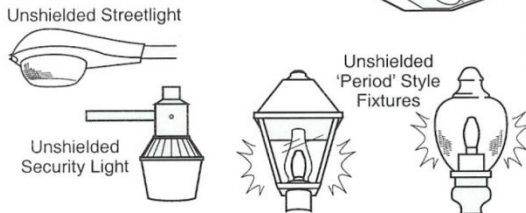
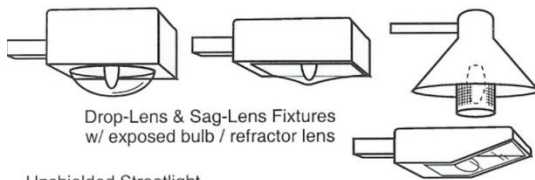
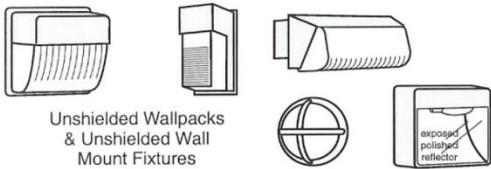


Good vs. Bad lighting: *What do you look for?*

Examples of Acceptable / Unacceptable Lighting Fixtures

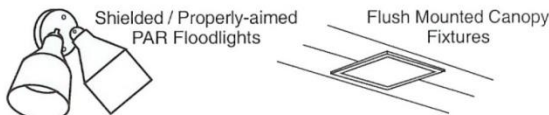
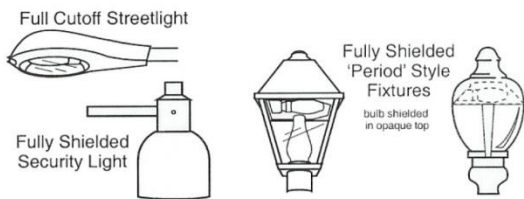
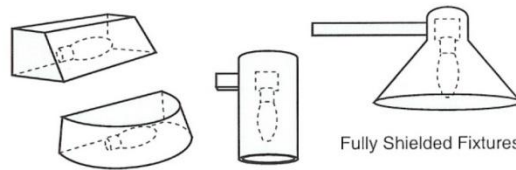
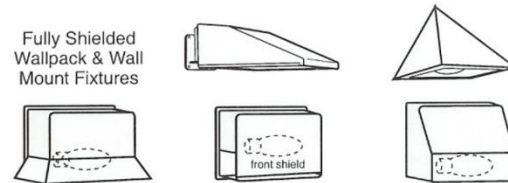
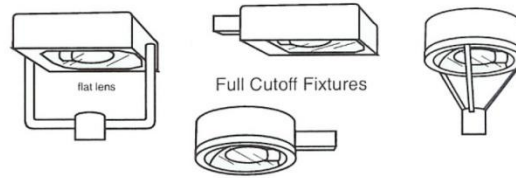
Unacceptable / Discouraged

Fixtures that produce glare and light trespass



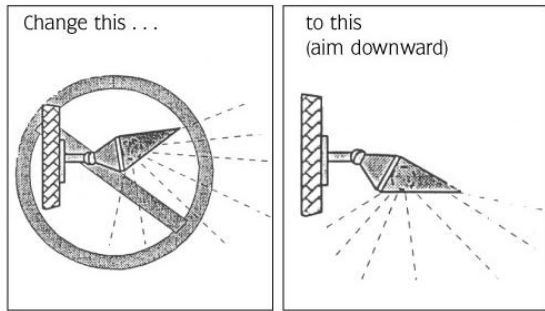
Acceptable

Fixtures that shield the light source to minimize glare and light trespass and to facilitate better vision at night

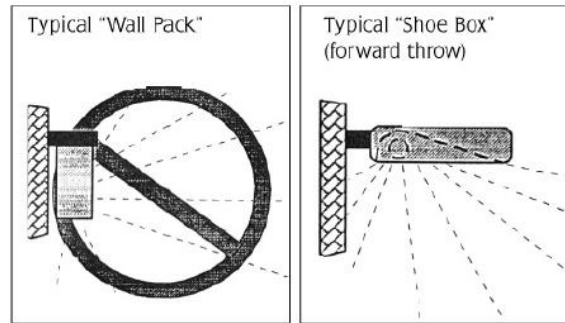


- Good light fixtures are readily available
- Look for fixtures that have the light in a shield that provides “full cutoff”
- Look around at night for examples of both.

Good vs. Bad lighting: *What do you look for?*

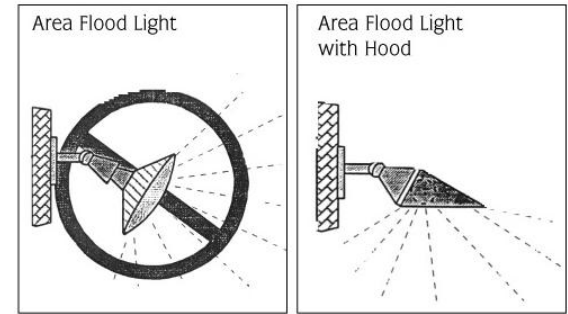


FLOOD LIGHT



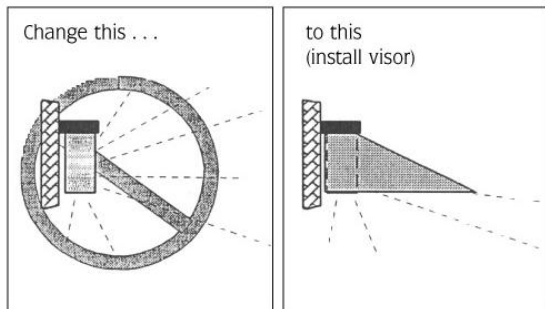
BAD

GOOD

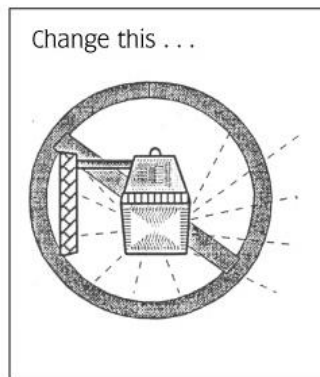


BAD

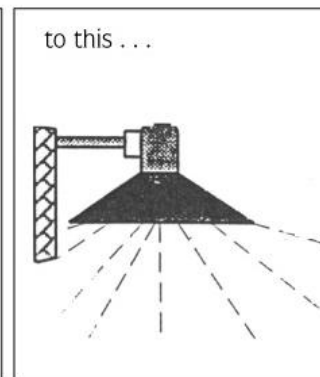
GOOD



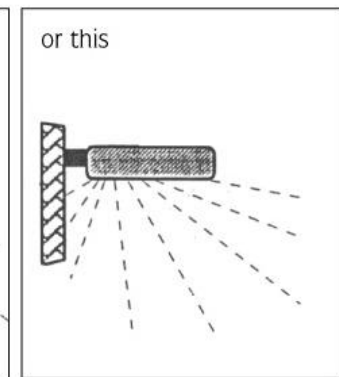
WALL PACK



YARD LIGHT



OPAQUE REFLECTOR



SHOE BOX

Good Lighting: *Where do you get it?*

Popular Categories



In-Stock Outdoor Lights



Outdoor Wall Lights



Outdoor Flush-Mount Ceiling Lights



Outdoor Pendant Lights



Landscape Lighting



Flood Lights & Security Lights



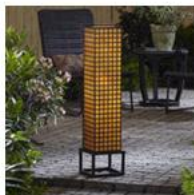
Deck Motion Lights



String Lights



Post Lights



Outdoor Lamps



Ceiling Fans



LED Outdoor Lighting



Dark Sky



Dusk to Dawn Lighting



Motion-Activated Lighting



Energy-Efficient

- Lowes and Home Depot both have a “Dark Sky” category on their websites and in their stores

- Biedermann’s Ace Hardware in Fredericksburg stocks dark sky fixtures

- Encourage your local retailer, and chances are they’ll start stocking them

- When possible, look for the IDA Dark Sky Friendly Fixture seal.



Good Lighting: *Not just about replacing fixtures*

- Timers and motion detectors can be used to limit the total time a light is on

- Shields can be added to existing fixtures



- Lights can be pointed down



- The type of bulb can be changed

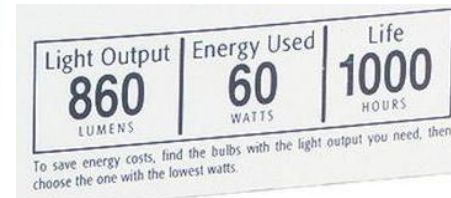


Good Lighting: *Picking a bulb*

- Lumens matter: Wattage is a measurement of power consumed by a light, not necessarily a measure of light output.
- Incandescent bulbs have an efficiency of appx. 10 lumens/watt, while LEDs can be as high as 100 lumens/watt.
- A well directed fixture needs less light. i.e. You may be able to get away with a 400 lumen bulb, where you once used 800 lumens



84 lumens/watt



14 lumens/watt

Good Lighting: *Picking a bulb- cont'd*



- The color of a bulb (color temperature) is measured in Kelvin (K),
- Remember: Warmer/redder colors are better at night. (color temp is often confusing because a cooler color temperature is actually a warmer color!)
- “Warm White” bulbs are usually 2700-3000K

Lighting Facts Per Bulb	
Brightness	800 lumens
Estimated Yearly Energy Cost	\$1.14
Based on 3 hrs/day, 11¢/kWh Cost depends on rates and use	
Life	22.8 years
Based on 3 hrs/day	
Light Appearance	
Warm Cool	
A horizontal scale from 'Warm' to 'Cool' with a triangle marker at 2700 K.	
Energy Used	9.5 watts

What can each of us do?

- Start with your own house
- Join the Night Sky Coop
- Talk to friends and neighbors
- Support Night Sky friendly businesses
- Work with community leaders

What we can do: *Start with your own home or business*

- Continue to research the topic:

<http://www.darksky.org>

<http://www.hillcountryalliance.org/HCA/NightSkies>

Keywords: Night Sky, Dark Sky, Light Pollution

- Join the HCA Night Sky Coop- They will list your name, business and/or ranch name by county

What we can do: *Talk to friends and neighbors*

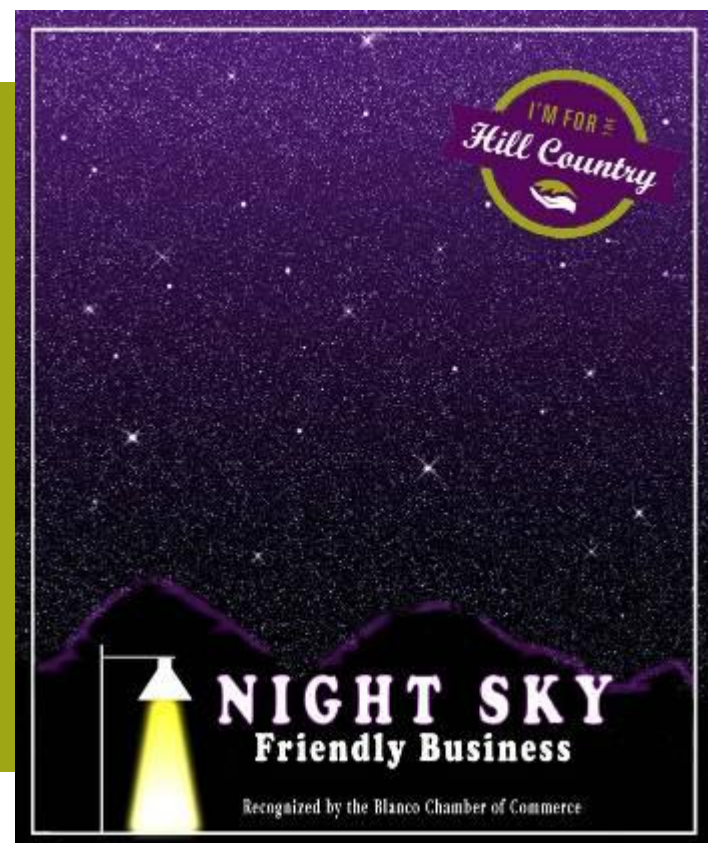
- The IDA has good advice and form letters for talking to neighbors about light pollution
- IDA and HCA both have printable material for educating others
- Get involved: Go to a star party!

What we can do: *Talk to the city and your power provider*

- Pedernales Electric Coop has a dark sky resolution
- CTEC will pass a resolution in July and is already replacing broken fixtures with full-cutoff fixtures
- Llano recently passed a lighting resolution, and there is presently a push to get a lighting ordinance in Llano. Let the city know if this is something you'd like to see!

What we can do: *Support night-sky friendly businesses*

- The HCA Night Sky Friendly Business program is a voluntary Chamber of Commerce sponsored program to help recognize night-sky friendly businesses in the community



What we can do: *Check out Scenic Texas*



SCENIC HILL COUNTRY

Mission Statement:

The mission of Scenic Hill Country is to foster partnerships between municipalities, professionals, landowners, and other stakeholders to promote regulations and land development choices that enhance and protect the unique scenic vistas of the Texas Hill Country.

Purpose:

To preserve, protect, and enhance the Hill Country's scenic vistas by educating the region on the values and principles of the Scenic City Program. We will promote the Scenic City Program by helping municipalities achieve Scenic City status; providing workshops and training sessions to interested cities; and providing additional planning, legal, and other professional services to communities in furtherance of the Scenic City Program. We may also promote the Dark Skies Initiative and assist municipalities by improving their lighting regulations. The Scenic Hill Country Chapter will also promote the Scenic Roadways Program.

Geographic Scope:

We will initially focus on Bandera, Blanco, Burnet, Gillespie, Hays, Kendall, Kerr, Kimble, Llano, Mason, Travis, and Williamson counties, with possible future expansion within the Hill Country as needs arise.

<http://www.scenictexas.org/scenic-hill-country>

Acknowledgements and Q&A



- Thanks to Wayne Gosnell, Cindy Luongo Cassidy, Ken Kattner, and Bill Wren (McDonald Observatory) for slide material and guidance
- Thank to Tex Toler, Vance Naumann, and Doug Cochran for all their great work in the Llano area
- Thanks to Texas Parks and Wildlife, and Enchanted Rock SNA
- The International Dark Sky Association and the Texas Chapter of the IDA
- Thanks to Chris Sherman for the stunning Pedernales Falls Picture.
<http://cvsherman.com>
- Questions?

Enchanted Rock Star Party Details



Join the Hill Country Astronomers (HCA) for a special night of stargazing at one of the few International Dark Sky Association recognized parks. As the sun sets, the Moon, Venus, and Jupiter will be aligned, and the moon will cast a shadow across Jupiter's face, also known as a Shadow Transit. The sun sets at 8:40 pm and participants will need to be in attendance by 8:00 pm as we will have a minimal amount of parking after the sun sets. Please refrain from bringing "white light" flashlights as they will disrupt "night vision". Bring lights equipped with a red filter.

This special night of stargazing with the Hill Country Astronomers (HCA) will see the moon, venus, and Jupiter lined up at sunset. The moon will also cast a shadow across Jupiter's face known as a Shadow Transit. The sun will set at 8:40 pm and the park will be open to day use visitors until 10:30 pm for the event. Get to the park by 8:00 pm as we will have limited parking as the sun goes down. Bring lights with red filters and make an astronomer happy as white lights will disrupt your night vision while you looking at the twinkling stars above.

Cost: \$7 per person age 13 and over covers park entry fees. Free for those 12 and under. (Bring cash or check to pay your entry fee as the office will be closed after 4:30 pm. Self-Pay envelopes will be available at the headquarters building)

What to bring: A folding chair, a flashlight with a red filter, BYOT (Bring your own telescope....if you like), water.

No Reservations required