A night sky with the Milky Way galaxy visible. In the foreground, there is a silhouette of a large tree on the left, a person sitting on a swing hanging from the tree, and a rustic wooden fence running across the bottom. The text is overlaid in the center.

Preserving the Night Sky  
and  
Reducing Light Pollution  
by  
Comal County Friends of the Night Sky

**Presentation For Educational Purposes Only**



- The Comal County Friends of the Night Sky was formed in March, 2020 by a group of concerned residents who first met and conducted meetings on Zoom. Now, we are able to meet in person.
- We are working on several initiatives to facilitate night sky friendly lighting in order to preserve and improve the stunning night sky of the Texas Hill Country and Comal County, TX.
  - Comal County Night Sky Friendly Business Program.
  - Comprehensive website filled with dark sky preservation resources.
  - Presentations, contests, and challenges to foster the adoption of night sky friendly lighting.
  - Working with Spring Branch and Bulverde to become International DarkSky Communities.
- We also work with the Hill Country Alliance, The Rotary Club of Canyon Lake, DarkSky Texas Chapter, and Dark Sky organizations from surrounding counties.
- The Comal County Friends of the Night Sky is a 501 (C) 3 non-profit organization.
- Please consider joining and contributing to the Comal County Friends of the Night Sky to help us continue our mission. We are 100% Volunteer

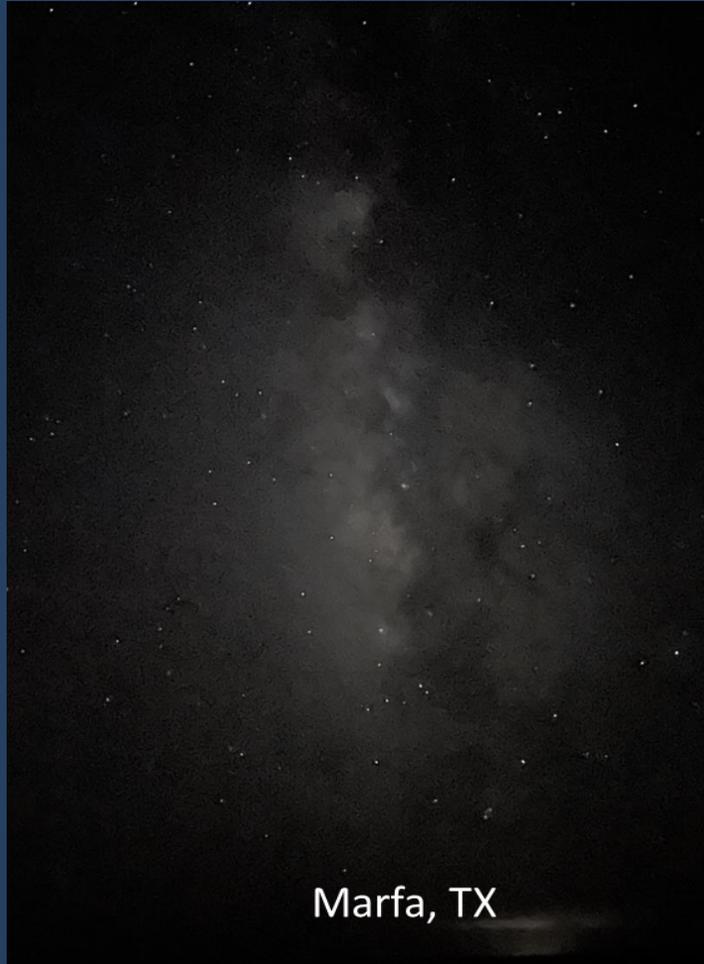
[www.comaldarksky.org](http://www.comaldarksky.org)

Follow us on Facebook – Comal County Friends of the Night Sky

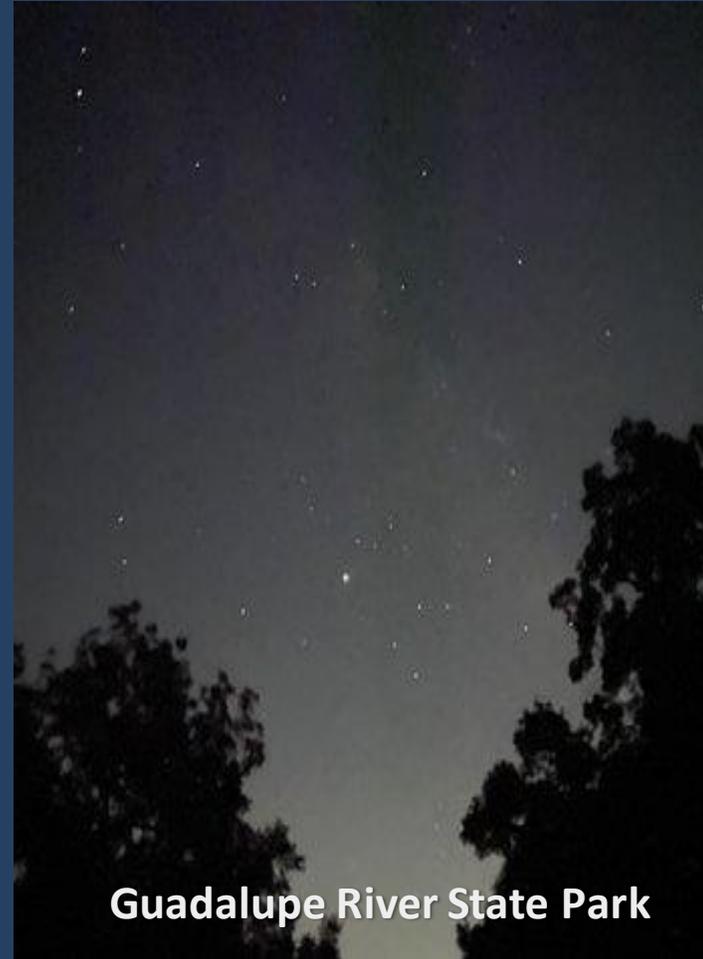
Email: [info@Comaldarksky.org](mailto:info@Comaldarksky.org)

# Are you one of the lucky ones?

Can you see the Milky Way from home?



Marfa, TX



Guadalupe River State Park

Photo Credit by SAAA

# LIGHT POLLUTION HURTS OUR PLANET

The inappropriate or excessive use of artificial light — known as light pollution — can have serious environmental consequences for humans, wildlife, and our climate.



## LIGHT POLLUTION DEVASTATES WILDLIFE.

Plants and animals depend on Earth's daily light and dark cycle to govern life-sustaining behaviors. Research shows that artificial light at night has adverse and even deadly effects on many species.



## LIGHT POLLUTION CAN MAKE YOU LESS SAFE.

There is no clear scientific evidence that increased outdoor lighting deters crime. Poor outdoor lighting can decrease personal safety by making victims and property more visible to criminals.



## LIGHT POLLUTION WASTES ENERGY AND MONEY.

As much as 50% of outdoor lighting is wasted, which increases greenhouse gas emissions, contributes to climate change, and renders us all more energy-dependent.



## LIGHT POLLUTION MAY HARM YOUR HEALTH.

Studies suggest that artificial light at night negatively affects human health by increasing our risks for obesity, sleep disorders, depression, diabetes, breast cancer, and more.



## LIGHT POLLUTION ROBS US OF OUR HERITAGE.

Our ancestors experienced a night sky that inspired science, religion, philosophy, art, and literature. Now, millions of children across the globe will never know the wonder of the Milky Way.



# LIGHT POLLUTION

---

What is light pollution? Any adverse effect of artificial light at night.

It comes in 3 forms: Skyglow, Glare, and Light Trespass.

# SKYGLOW

---

Skyglow is the dome of brightness on the horizon that obscures our view of the night sky.

Skyglow is caused by misdirected light scattering through our atmosphere.

Here we can see the skyglow of Tucson to the right of the image, and dark skies revealing the milky way to the left.





# GLARE

---

Have you ever been driving down a lonely road at night, only to be blinded by oncoming high beams that someone forgot to turn off? You have experienced glare! Glare is when light enters our eyes at shallow angles, causing pain and restriction of the pupil, reducing visual acuity.



# LIGHT TRESPASS

Light that is cast where it's not wanted or needed.

Trespassing:  
This is not fair  
to your neighbors

It is better to  
direct your lights away  
from your neighbors



But I feel more secure at night  
with security lights!

Typical security lights aren't so secure  
Because of...GLARE!

**GLARE!**

**IT'S HARD TO SEE THE HIDING TRESPASSER**



**MYTH  
MORE LIGHT IS SAFER**

---



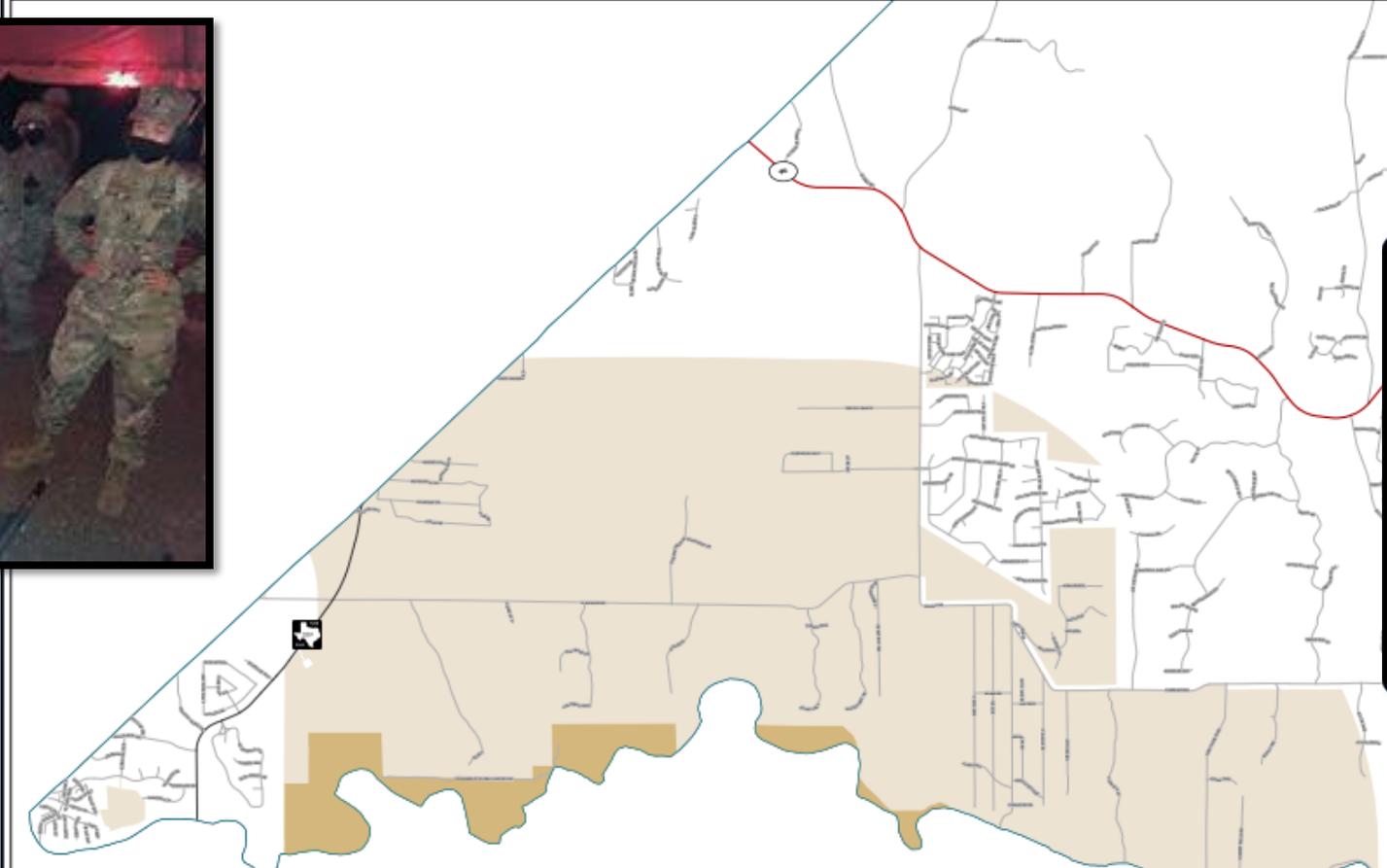
**REALITY  
WELL DESIGNED  
LIGHTING IS SAFER**

A night sky with the Milky Way galaxy visible, silhouettes of trees and a fence, and a person on a swing.

# Comal County has places we need to protect from Light Pollution.

- Our Beautiful Cities and Wild Open Spaces
- JBSA-Camp Bullis (Bexar County)
- Guadalupe River State Park and Honey Creek Natural Area
- Bracken Cave Preserve
- Canyon Lake

# Camp Bullis Dark Skies Zone Affected Area



**Legend**

- Dark Skies Zone
- Camp Bullis
- Comal County
- Road Classification**
- Farm to Market Road
- Highway
- Street

**Entering Camp Bullis**  
**Dark Skies Zone**

Permit required for all New Outdoor Lighting

Call (830) 608-2090 or visit [www.cceo.org](http://www.cceo.org) for information

By Order of Comal County Commissioners Court

N

1 Mi

COMAL COUNTY ENGINEER'S OFFICE  
1000 S. 10th Street  
New Braunfels, TX 78130  
Tel: (830) 608-2090  
Fax: (830) 608-2091  
www.cceo.org

This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries.

**JBSA - Camp Bullis is a 27,000 acre critical training facility. All branches of the U.S. military train their medical personnel at night and under fire. This training is essential to the readiness of the United States military.**

Map: 1/15/2011 - Document Path: \\comalcounty\GIS\GISUsers\Map\Map\_Facilities\Legend\Facilities\_Map\_AffectedArea.aprx - Map Name: CampBullisDarkSkies - User Name: vld

# Honey Creek Natural Area

## Guadalupe River State Park



Photo credit by Sophia Mattos

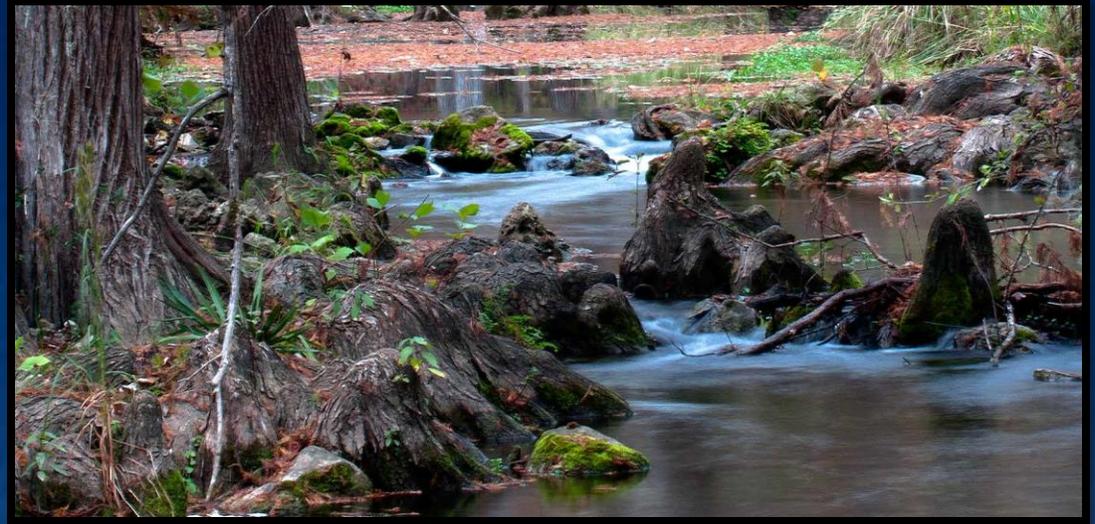


Photo credits by  
TPWD & SAAA





# Bracken Cave Preserve

Home of the world's largest bat colony of more than  
15 million Mexican free-tailed bats!

The Mexican Free-tailed Bat is the Texas State Flying  
Mammal.



Photo Credit by Roy Niswanger

# Canyon Lake and the Guadalupe River above and below the Dam provide prime outdoor enjoyment for residents and tourist alike.

Water Recreation , Nature, Star Gazing, Eating/Drinking, Camping



A night sky with the Milky Way galaxy visible. In the foreground, there are silhouettes of a large tree on the left, a person sitting on a swing hanging from the tree, and a rustic wooden fence running across the bottom. The text is overlaid on the sky.

# Impacts of Light Pollution on Ecology

Light pollution has negative consequences on wildlife, insects, trees, and all living things.

**Like humans, wildlife needs the darkness of night for their wellbeing but nocturnal animals and insects need darkness for their survival.**

**In the dark, they hunt, migrate, forage, mate, reproduce, and communicate.**



Nocturnal animals  
will search for  
food longer near  
artificial lighting  
rather than  
retiring  
to their den





Moths are the unsung  
heroes of plant  
pollination



**Light pollution disorients birds  
in their migrations at night**

**Scissor-tailed  
Flycatcher**



**Black Capped  
Vireo**



**Endangered Golden-Cheeked  
Warbler**



# TREES

Bud earlier, lose their leaves later, and have shorter life spans under artificial light.

The distribution of light on these trees has affected their natural cycles.

HONEYCOMB: ALEKSA\_\_CH / SHUTTERSTOCK.COM; BEE: BELENOVA,  
ART / SHUTTERSTOCK.COM; SOYBEANS: BEN TANKERSLEY / ALABAMA  
COOPERATIVE EXTENSION SYSTEM



A night sky with the Milky Way galaxy visible. In the foreground, there is a silhouette of a large tree on the left, a person sitting on a swing hanging from the tree, and a wooden fence running across the bottom. The text is overlaid on the sky.

# Impacts of Light Pollution

## Human Health

The addition of light into the night disrupts our circadian rhythm, the internal cycle syncing our biological clock with day and night.

# The American Medical Association (A.M.A.)

In 2016, the A.M.A. came out with a study recommending limiting exposure to blue light at night.

Frequent long-term exposure to blue light at night has been linked with increased risk for all types of cancer, insomnia, depression, obesity, and diabetes.

## How exposure to blue light affects your brain and body

BY DISRUPTING MELATONIN, SMARTPHONE LIGHT RUINS SLEEP SCHEDULES. THIS LEADS TO ALL KINDS OF HEALTH PROBLEMS:

The disruption to your sleep schedule might leave you distracted and impair your **MEMORY** the next day.



A poor night's sleep caused by smartphone light can make it **HARDER TO LEARN**.



Over the long term, not getting enough sleep can lead to **NEUROTOXIN** buildup that makes it even harder for you to get good sleep.



People whose melatonin levels are suppressed and whose body clocks are thrown off by light exposure are more prone to **DEPRESSION**.



By disrupting melatonin and sleep, smartphone light can also mess with the hormones that control hunger, potentially increasing **OBESITY RISK**.



There's a connection between light exposure at night and the disturbed sleep that come with it and an increased risk of breast and prostate **CANCERS**.



SOURCES: Nature Neuroscience; Harvard Health Publications; ACS, Sleep Med Rev, American Macular Degeneration Foundation; European Society of Cataract and Refractive Surgeons; JAMA Neurology

TECH INSIDER

Blue Light coming in through our windows and blue light from our phones are harmful to humans.

A night sky with the Milky Way galaxy, a silhouette of a person on a swing, and a wooden fence.

# Impacts of Light Pollution

## Energy Waste

**Light pollution is a waste of money and energy.  
About 35% of lighting worldwide is wasted, shooting  
straight up into the sky.**



**4.5 BILLION \$\$\$\$\$**

spent every year on unneeded lighting.

**21 MILLION TONS OF CO<sub>2</sub>**

burned by unnecessary lighting.



# HOW CAN WE REDUCE LIGHT POLLUTION

**IT'S EASY!**

Follow the  
Five Principles for  
Responsible Outdoor  
Lighting



# Dark Skies Start At Home and Business

1 – USEFUL - Does the Light Serve a Clear and Necessary Purpose?



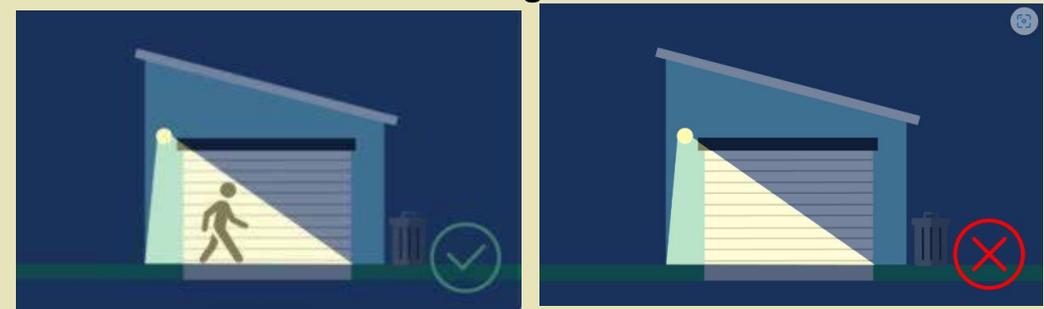
2 – TARGETED - Does the Light Fall Only Where it is Needed?



3 – LOW LIGHT LEVELS – Is the Amount of Light Right for Task?

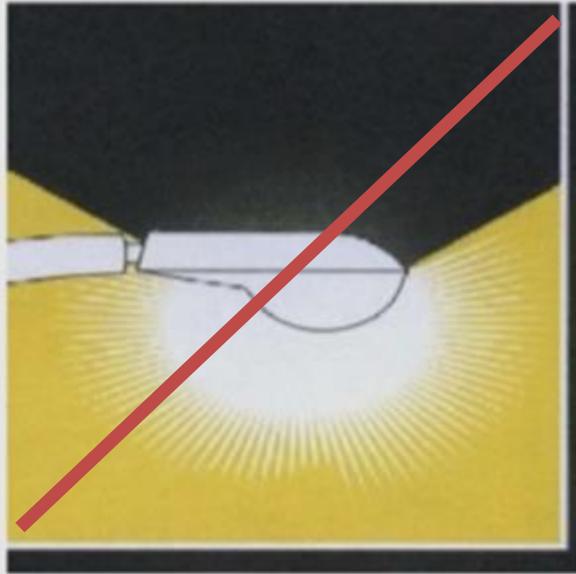


4 – CONTROLLED – Is the Light Connected to Activate?



5 – COLOR – Is the Light a Warm Color?



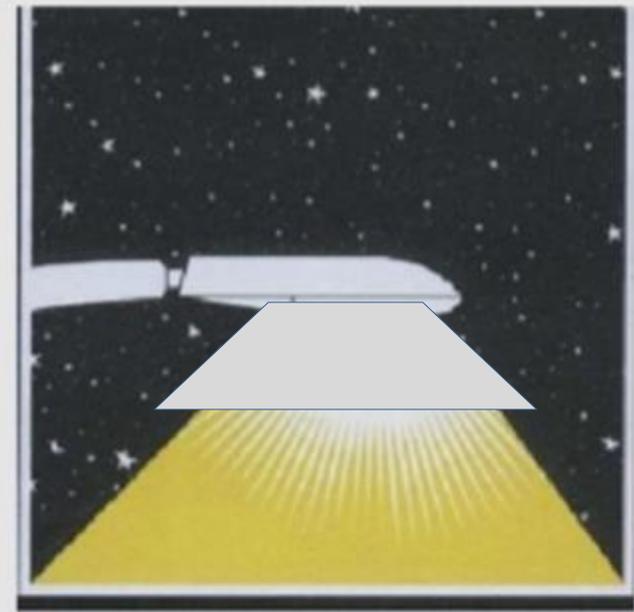


# PREVENT GLARE

AIM LIGHTS  
DOWNWARD

AND

USE SHIELDING



# Take a look at your Business to make it Dark Sky Friendly

## Car Repair Shop

Photo: Joyce Harman



One Unshielded Fixture  
Glare, Trespass, Blue/White



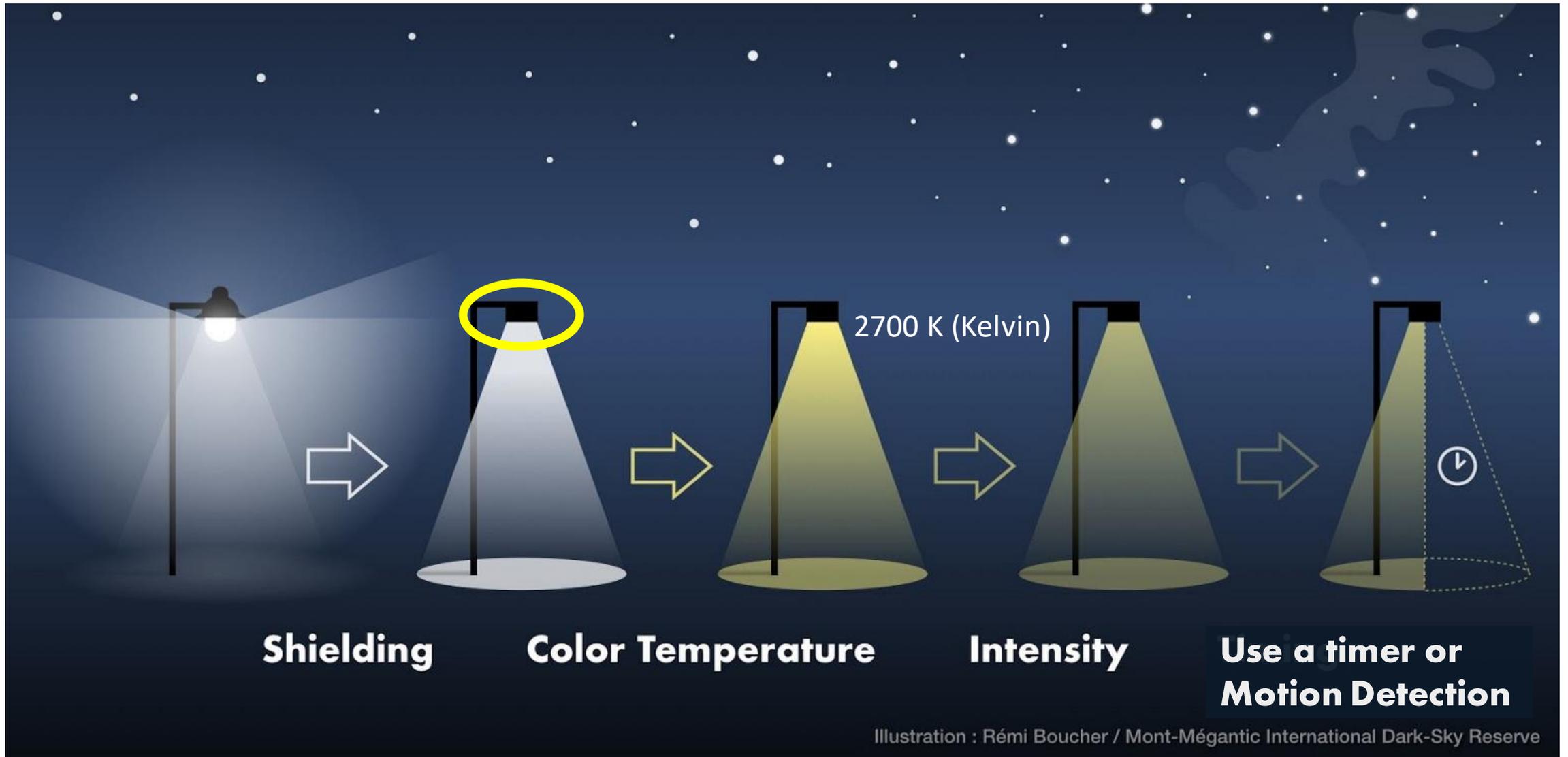
Two Shielded Fixtures  
Useful, Targeted, Warm

**Unshielded Wall Packs  
cause light pollution  
and glare.**

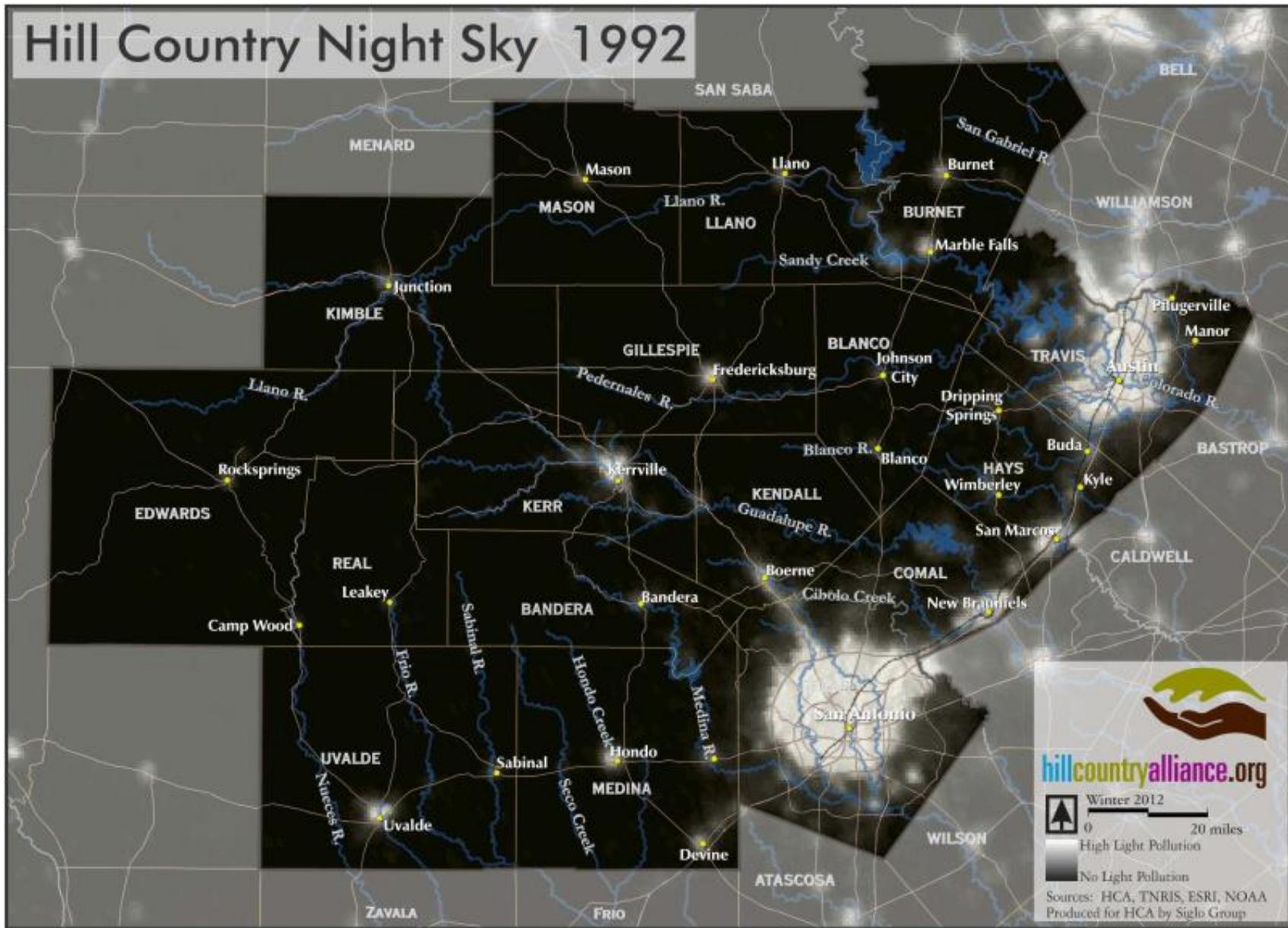


**Shields and  
shielded wall packs  
are available.**

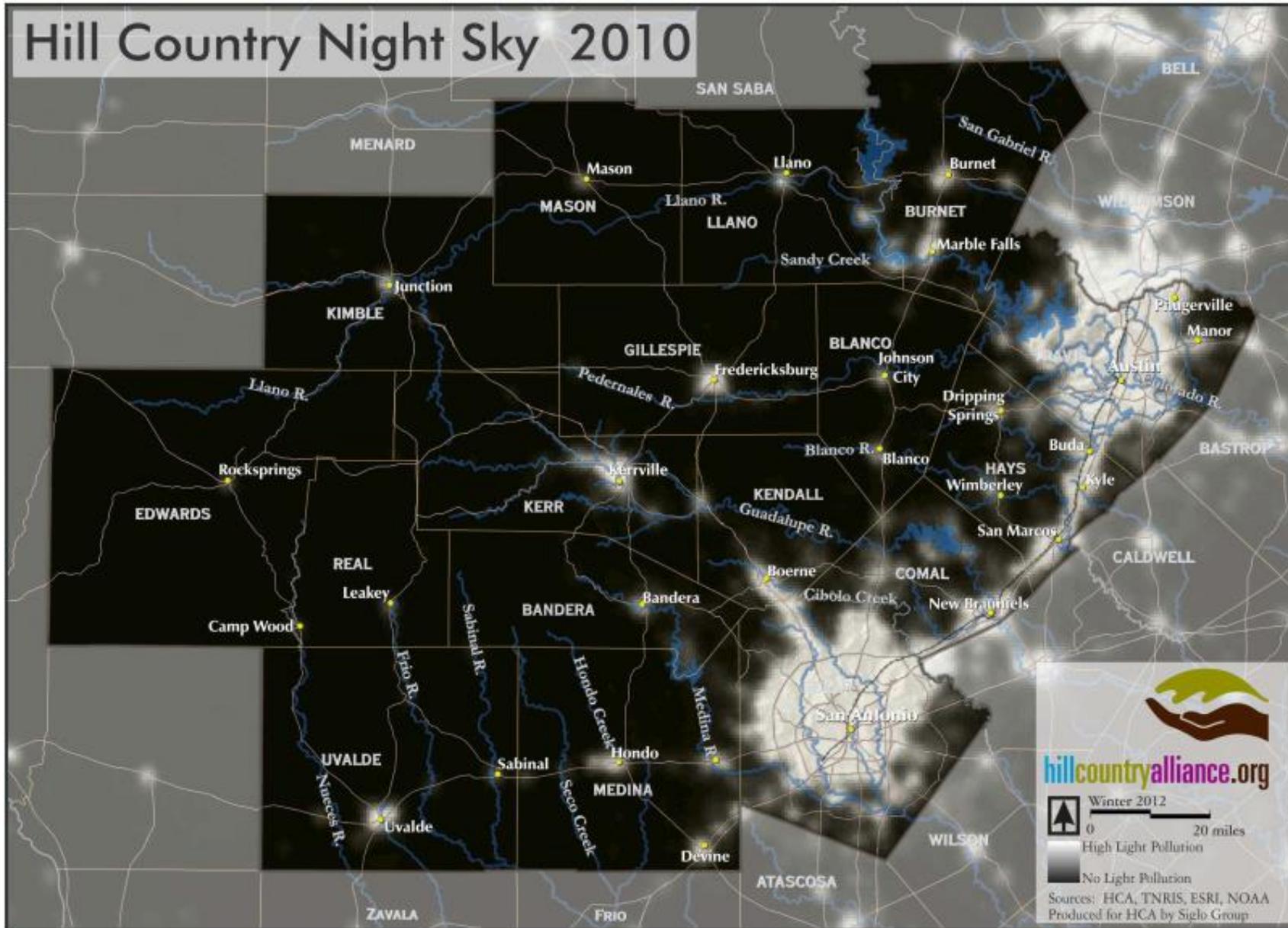




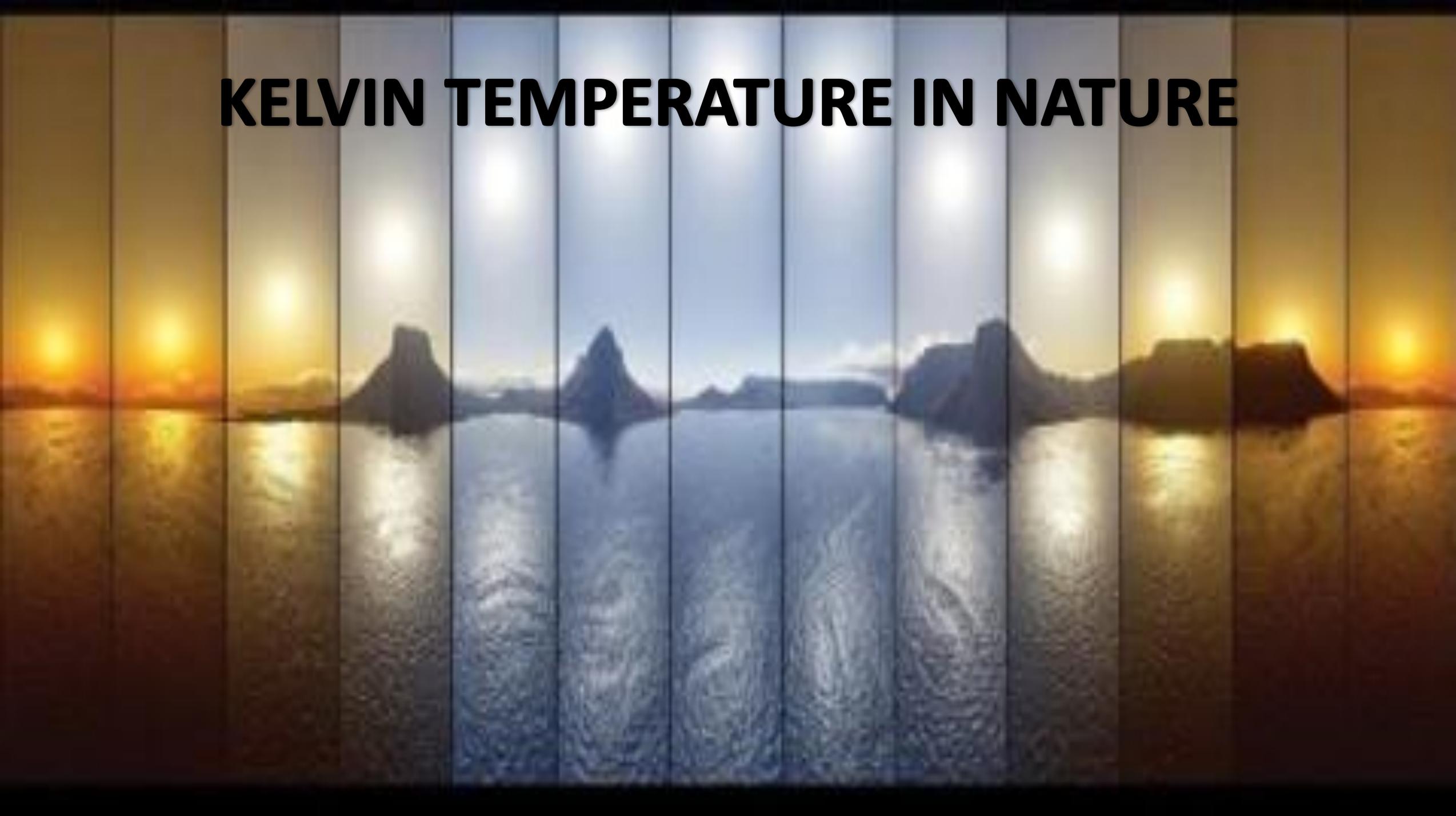
# Hill Country Night Sky 1992



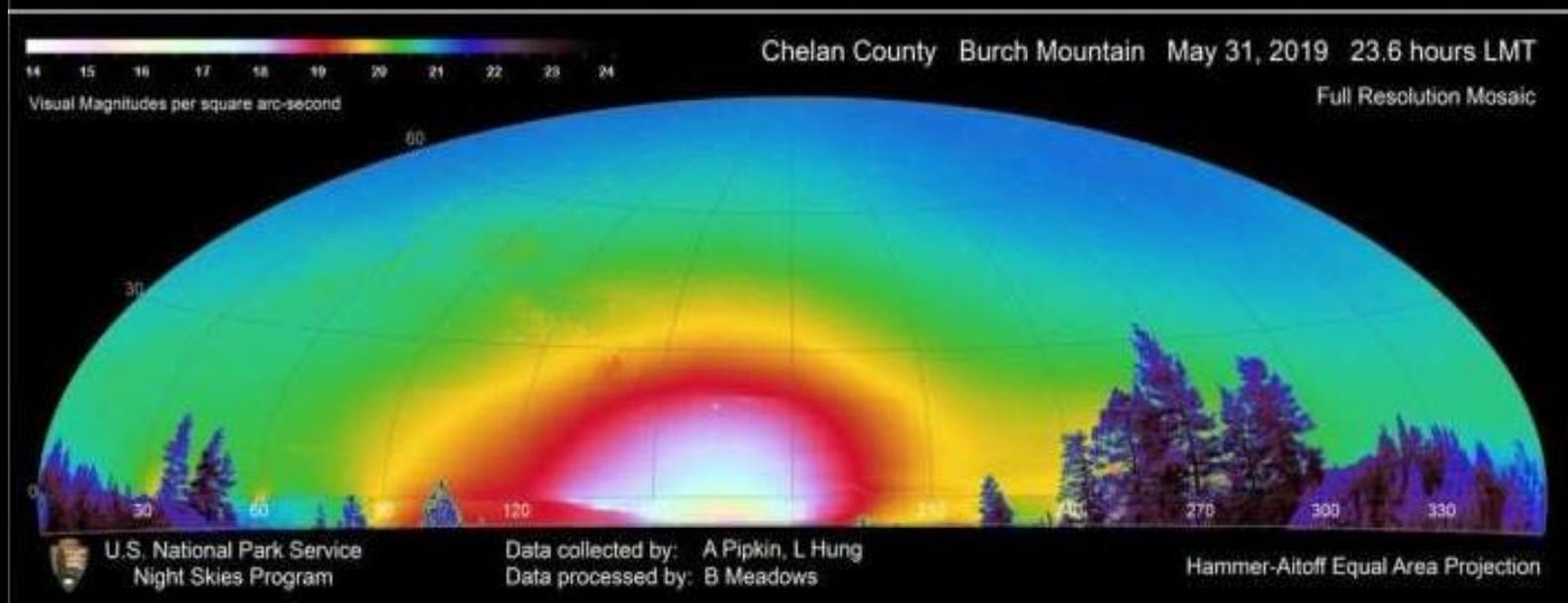
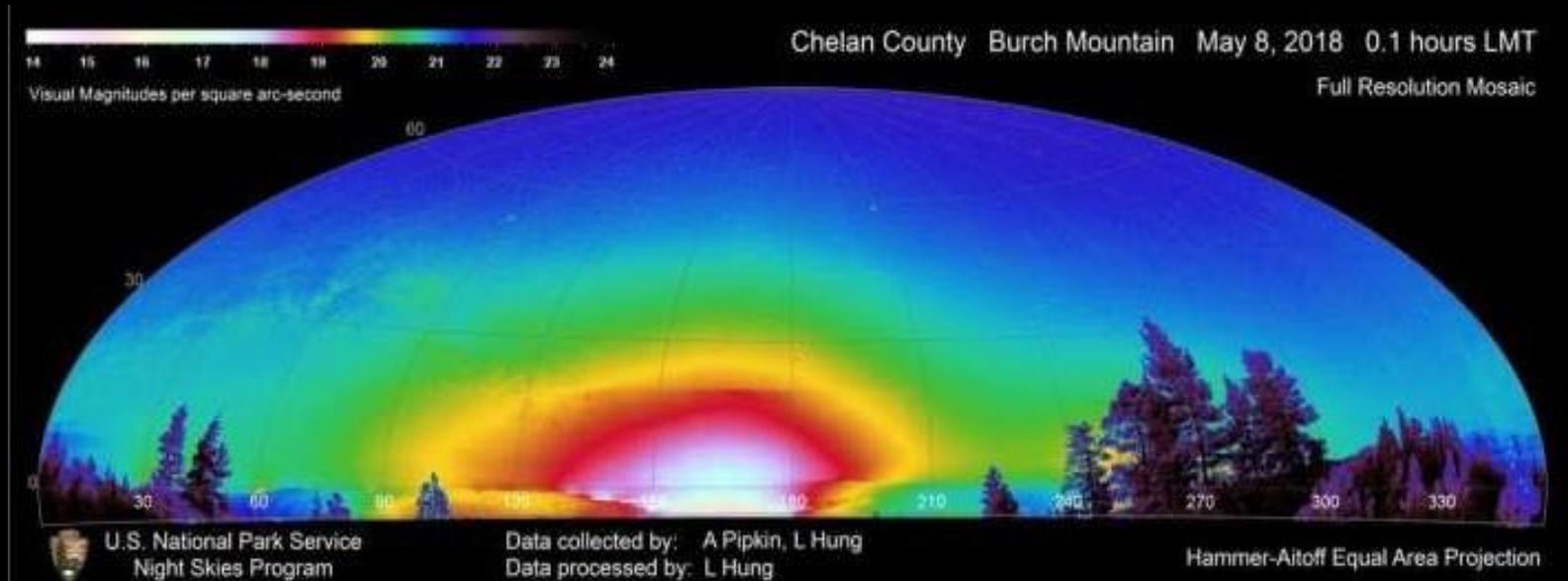
# Hill Country Night Sky 2010



# KELVIN TEMPERATURE IN NATURE



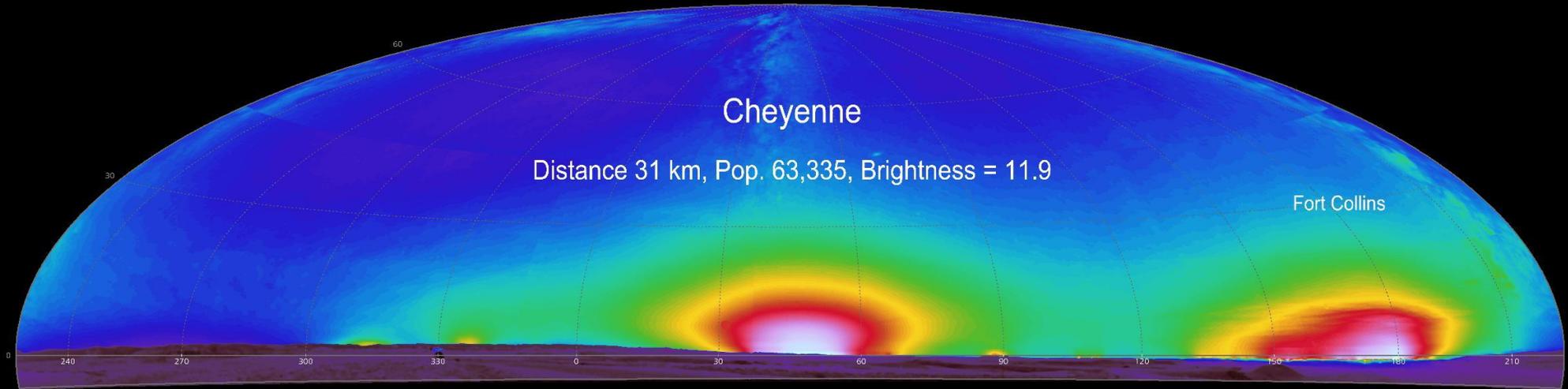
3,000 K LED's are harmful due to greater intensity and reflection off the ground.



Ashurst Lake July 8, 2016



Soapstone Prairie Natural Area August 2, 2016



Visual Magnitudes per square arc-second



WARM



1,000

2,000

3,000

4,000

5,000

6,000

7,000

8,000

9,000



1,000

2,000

3,000

4,000

5,000

6,000

7,000

8,000

9,000

# WHERE TO FIND NIGHT SKY FRIENDLY LIGHTING?



For REPLACEMENT FIXTURES:  
See Outdoor Light Fixture Replacement  
Options at <https://comaldarksky.org>

## NIGHT SKY FRIENDLY LIGHT BULBS

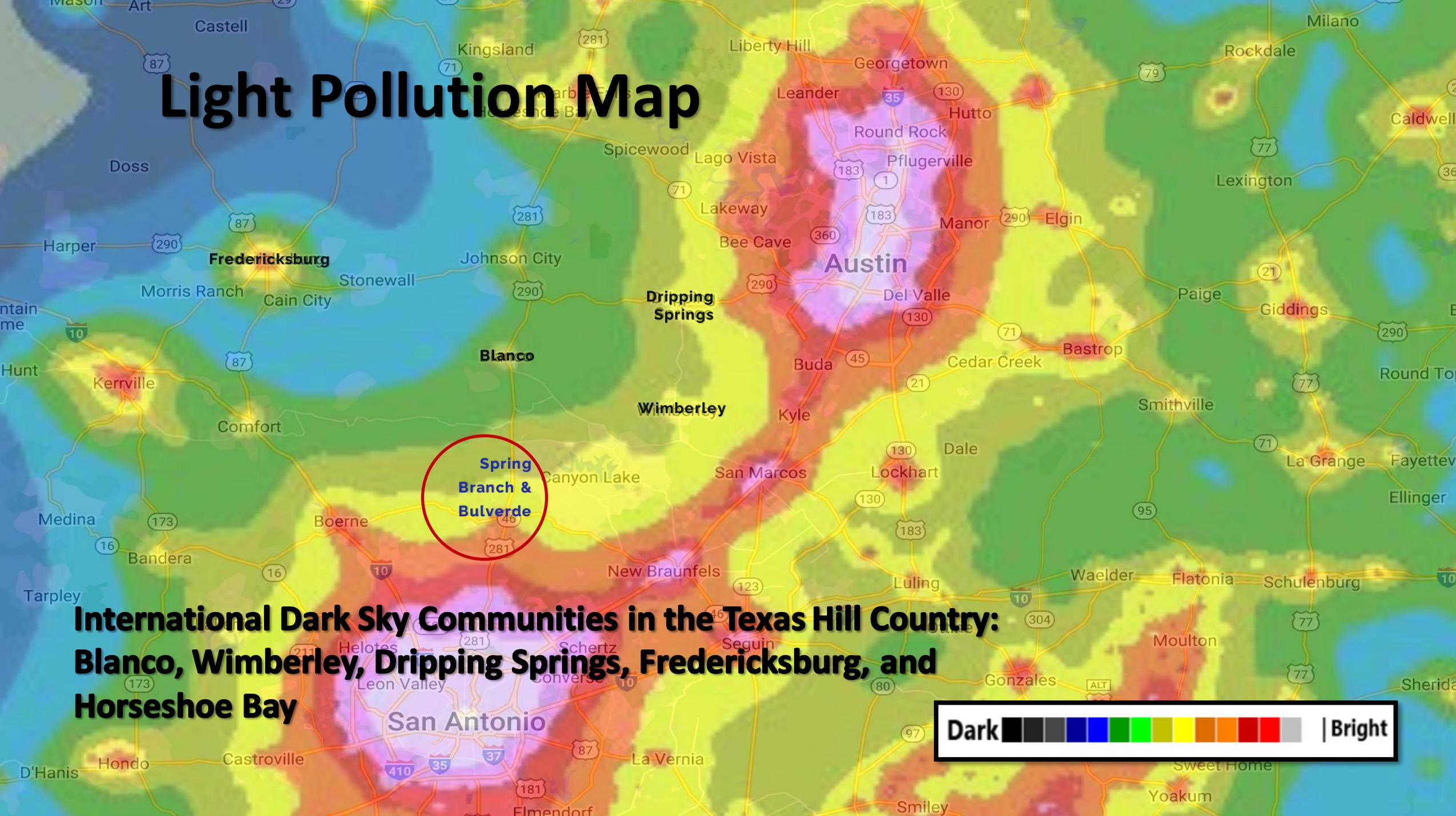
Look for the Lighting Facts

Lighting Facts	
Per Bulb	
Brightness	800 lumens
Estimated Yearly Energy Cost	\$1.32
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 <span style="display: inline-block; width: 100px; border-bottom: 1px solid black; position: relative; top: -5px;">▲</span> Cool	
2700 K	
Energy Used	11 watts

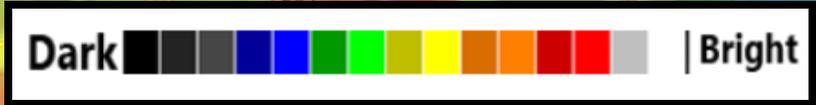
# What are the benefits of becoming certified as an International DarkSky Community?

Dark Sky Communities say they see not only the stars but also reduced energy consumption, lower electricity bills, healthier residents, improved environmental protection, increased ecotourism, and even safer streets.

# Light Pollution Map



**International Dark Sky Communities in the Texas Hill Country:  
Blanco, Wimberley, Dripping Springs, Fredericksburg, and  
Horseshoe Bay**



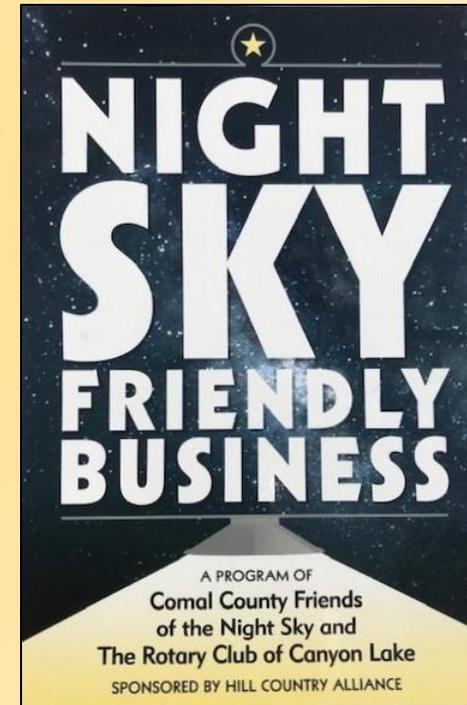
– Join and contribute to Comal County Friends of the Night Sky  
CCFNS is a 501© 3 non-profit organization and 100% volunteer

– Become a Join Comal County Friends of the Night Sky  
Friendly Business Program

– Check out our website for dark sky preservation resources  
[www.comaldarksky.org](http://www.comaldarksky.org)

– Schedule our Preserving the Night Sky Presentation for your HOA,  
POA, Church, Garden Group, School, FAA, etc.  
Email: [info@Comaldarksky.org](mailto:info@Comaldarksky.org)

– Follow us on Facebook – Comal County Friends of the Night Sky



[COMALDARKSKY.ORG](http://COMALDARKSKY.ORG)

JOIN Comal Country Friends of the Night Sky

We are here to help.



**THANK YOU**  
One Light at a Time

