

# The End of Night

[sites.lsa.umich.edu/darkskies](http://sites.lsa.umich.edu/darkskies)

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## **Michigan Dark Skies:**

UM Astronomy

UM Student Astronomical Society

University Lowbrow Astronomers

Scenic Michigan

Sierra Club Huron Valley Group

Washtenaw Safe Passage

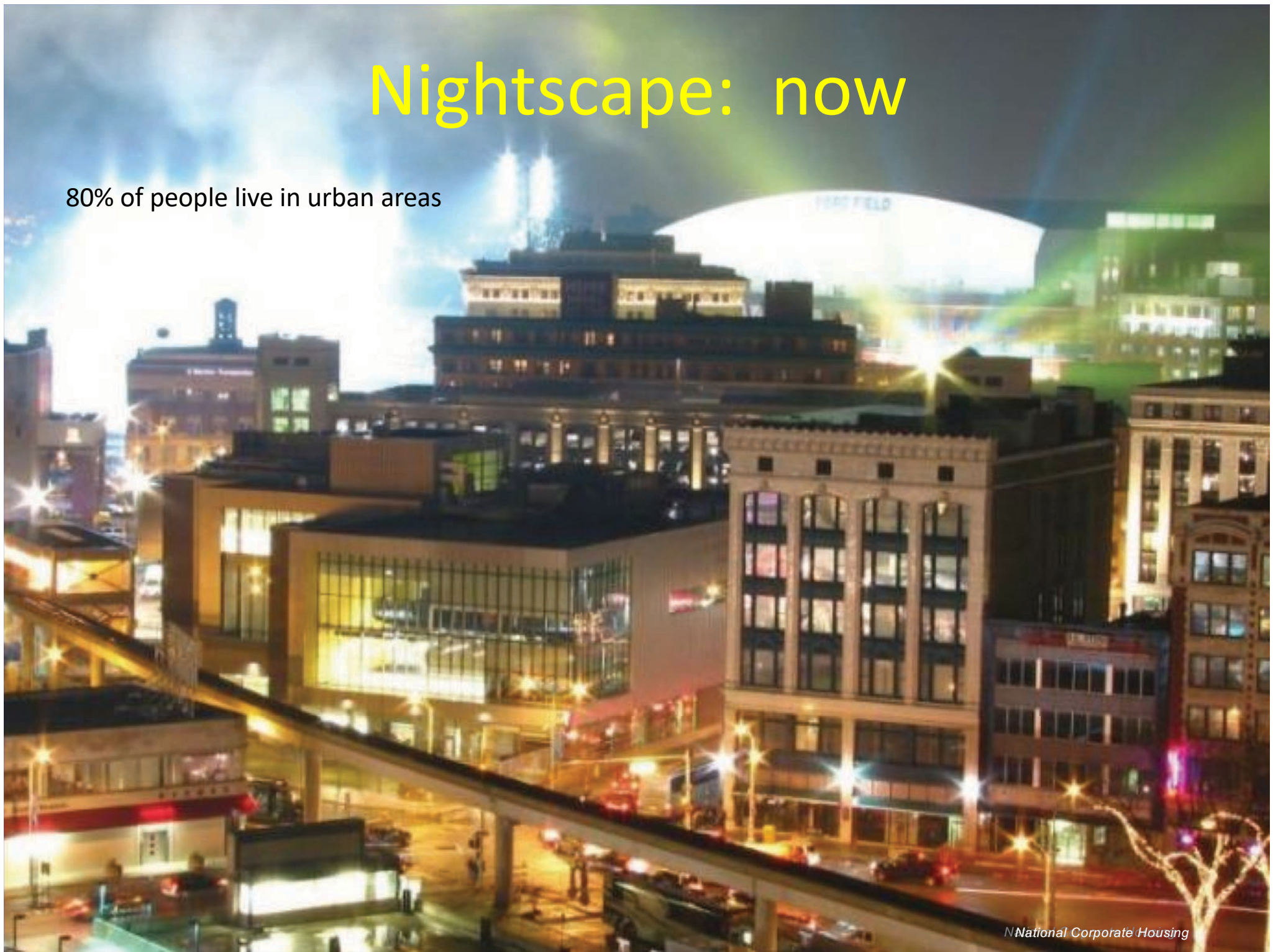
Detroit Audubon Safe Passage

Including materials from the International Dark Sky Association  
and the National Optical Astronomy Observatory / NSF

*D.Ma*

# Nightscape: now

80% of people live in urban areas



# Light Pollution

is wasted light that performs no function or task

Wasted Energy

A satellite photograph of Earth at night, showing the glowing lights of cities and urban areas. The image is taken from space, looking down at the continent of North America. The lights are concentrated in the eastern half of the continent, particularly around the Great Lakes and the Atlantic coast. The text labels are placed over the corresponding city areas.

Toronto

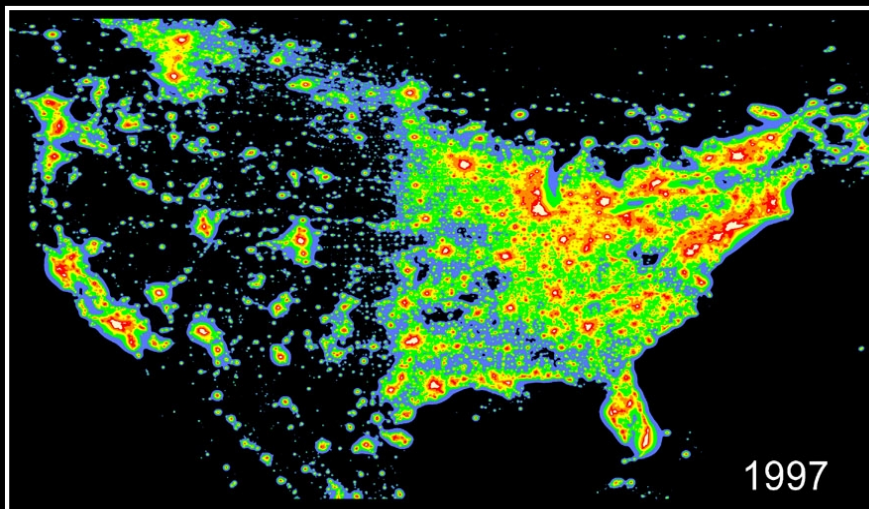
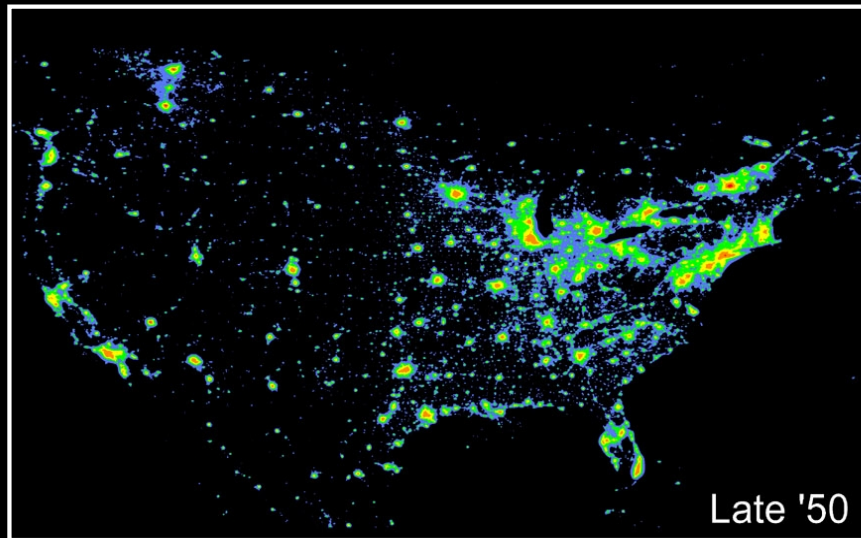
Detroit

Chicago

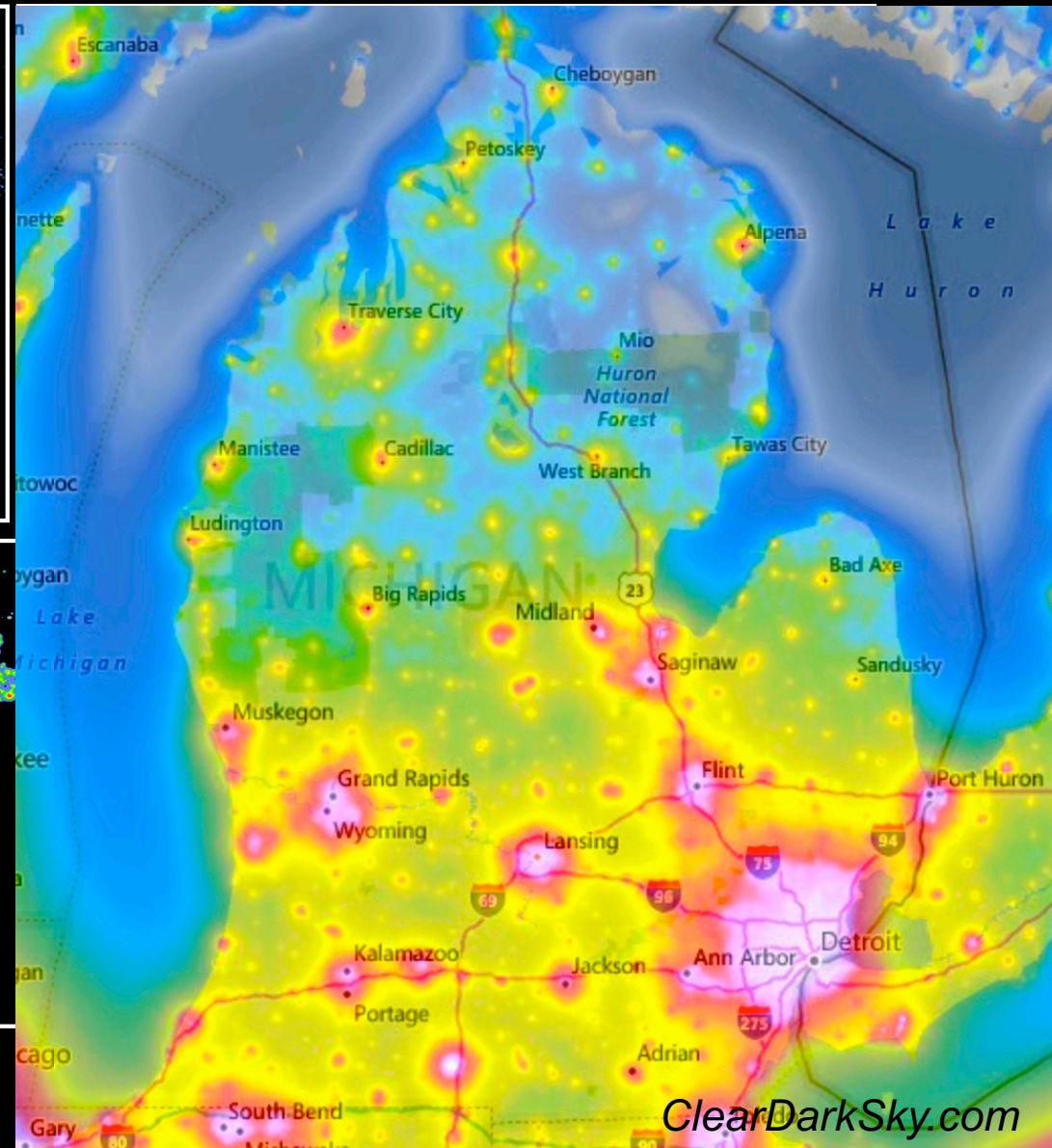
Indianapolis

# Light Pollution increasing at 6% / yr

(Hoelker et al. 2010)



Cinzano, Falchi, and Elvidge (2001)



# Impacts Biology and Human Health

- 24-hr circadian rhythm, and melatonin production, is disrupted by **artificial light at night (ALAN)**.



The Nobel Prize in Physiology or Medicine 2017

Jeffrey C. Hall, Michael Rosbash, Michael W. Young

“for their discoveries of molecular mechanisms controlling the circadian rhythm”

- ALAN disrupts the ecosystem: birds, nocturnal pollinators, etc.



Yspi: 1 building, 1 night



- Building collisions are #1 cause of bird death
- Birds migrate at night
- Up to a billion birds killed annually

- ✓ Washtenaw Safe Passage
- ✓ Safe Passage Great Lakes, Detroit Audubon Society
- ✓ Fatal Light Awareness Program (FLAP), Toronto
- ✓ Chicago Lights Out Program



- Nocturnal pollinators
- Insects
- Bats
- Sea Turtles
- Fish, incl salmon
- ... and many more

# American Medical Association

## Report of the Council on Science and Public Health (2016)

*... some evidence supports a long-term increase in the risk for **cancer, diabetes, cardiovascular disease and obesity** from chronic sleep disruption or shiftwork and associated with exposure to brighter light sources in the evening or night.*

*... excessive blue wavelength. This feature further contributes to **disability glare**, i.e., visual impairment due to stray light, as blue wavelengths are associated with more scattering in the human eye, and sufficiently intense **blue spectrum damages retinas**.*

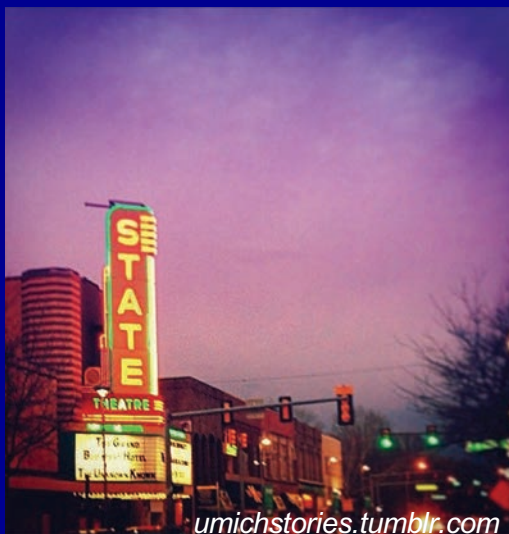
*It is well known that unshielded light sources cause pupillary constriction... This leads to worse vision than if the light never existed at all, defeating the purpose of the lighting fixture.*

# 3 Types of Light Pollution:



## Glare

## Light Trespass

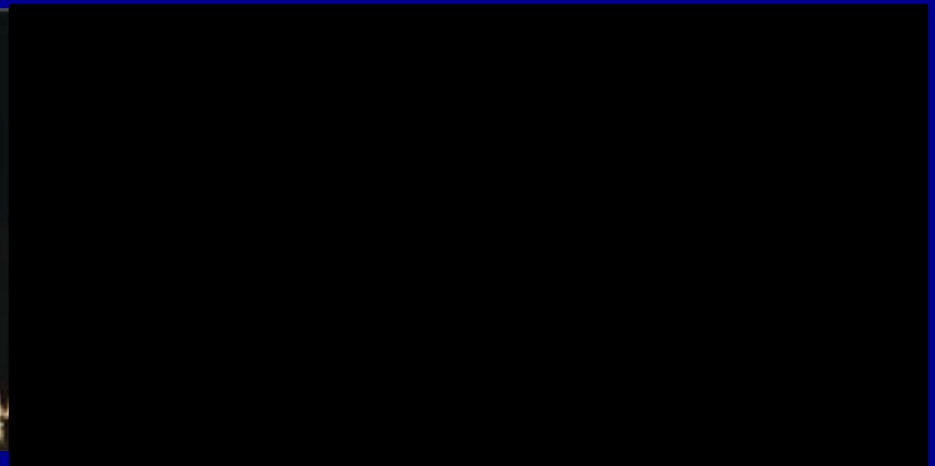
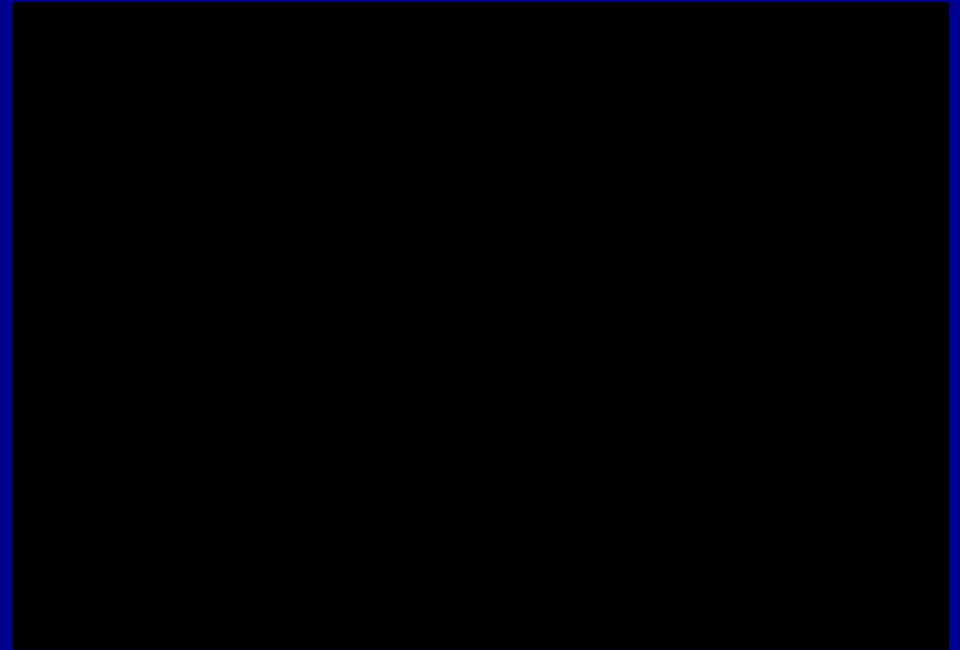


## Sky glow



More light ≠ more safe

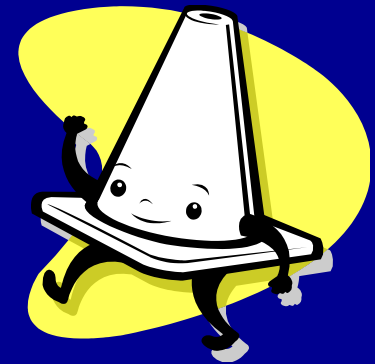
# Glare reduces visibility



# Safety

More light is not necessarily safer

- Overillumination causes shadows
- Glare reduces visibility
- Night vision compromised
- Targets illuminated



# 6 MI State Parks are Dark Sky Preserves

+



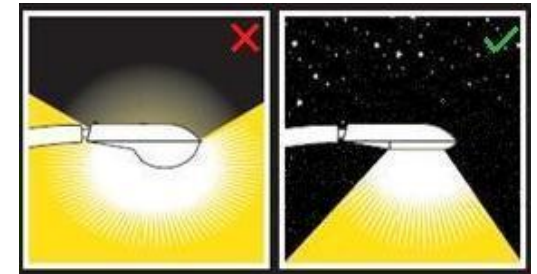
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T K Lawless Park (Jan 15, 2020)



# Draft Ann Arbor Lighting Ordinance

1. **Warm colors** (CCT < 3000 K)
2. **No light trespass** at property line
3. Fixtures **fully shielded**
4. **Curfew**
5. **Brightness limits** on façade, canopy, and parking lot lighting
6. [Amortization]



Sponsored by A2 Energy Commission

Supported by A2 Student Advisory Council and Environmental Commission



Addressing light pollution is consistent with U-M and A2 sustainability initiatives.



We seek SA endorsement of efforts to revise UM Design Guidelines to be dark-sky compliant:

- Protect health and safety
- Protect the environment
- Promote sustainability
- Reduce carbon emissions
- Reduce costs

Thank you!

CSG considering a Resolution



# Easy Solutions!

## Light only:

- What is needed
- No more than needed
- When needed
- No bluer than needed



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