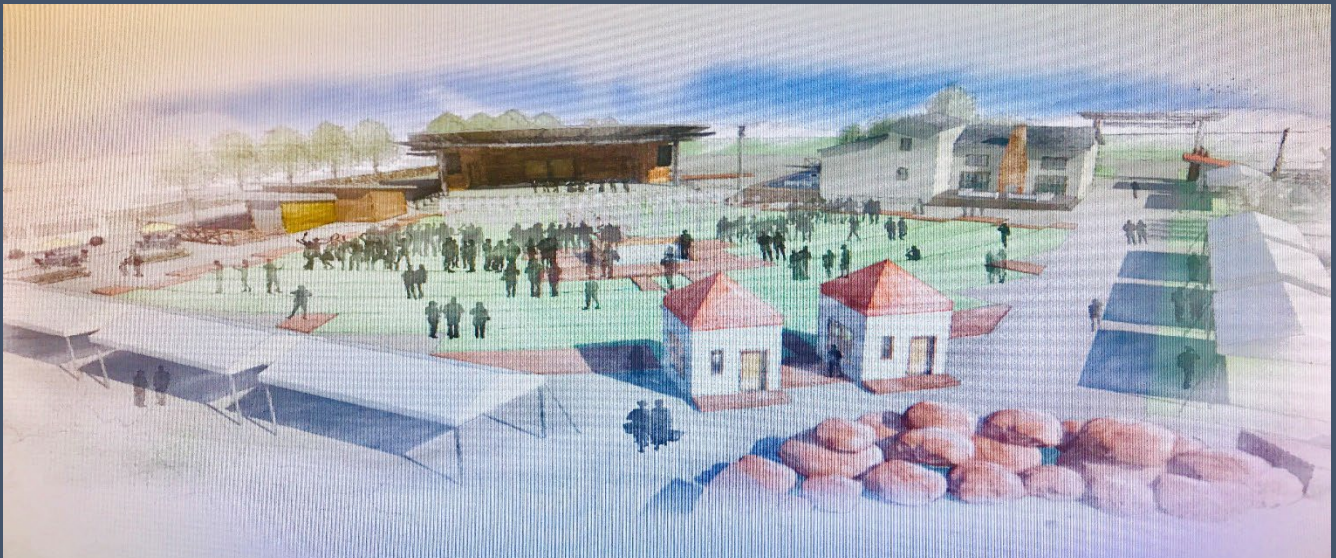




# Night Sky Tool Kit

Developed by  
University Of Utah  
Night Sky Intern  
**Alpha Lambert**  
2023



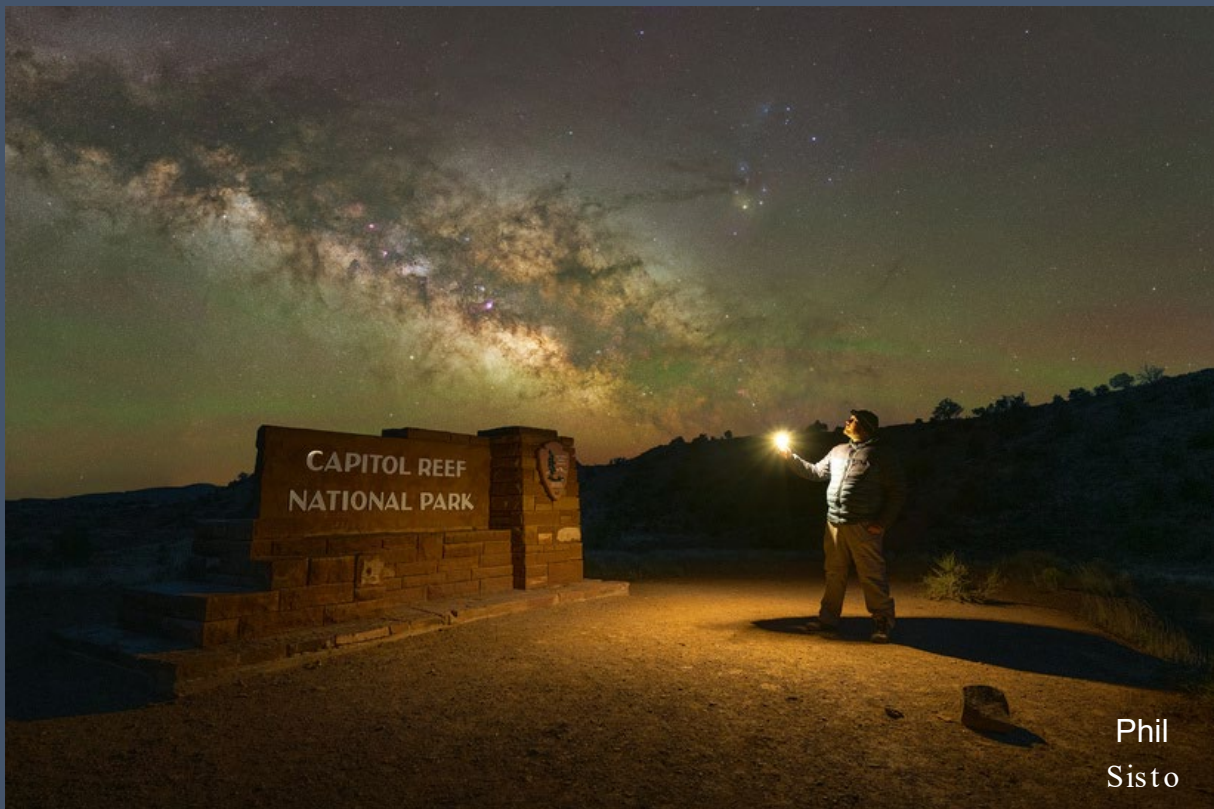
# Night Sky Tool Kit's Purpose

1. Introduce guests on the Colorado Plateau to Night Sky Stewardship
2. Provide a brief introduction on light pollution and its impacts on animals, birds, pollinators and mammals
3. Discuss local night sky supporters and activities
4. Set forth a “Beginners Guide in Astronomy”
5. Review telescope offerings for those wanting to learn more
6. Offer a few tips in astrophotography
7. Discuss local points of interest for night sky viewing
8. Share ideas for those interested in implementing lighting ideas when they return home
9. Provide dark sky resources



# Dark Skies and Humans

Darkness is very important to the health and wellbeing of humans and has been for thousands of years.



Phil  
Sisto

# Color Temperature

Our photoreceptors are much more sensitive to blue light rather than warmer light.

Choosing a warmer light, particularly during the evening, will help you fall asleep and promote the production of melatonin.

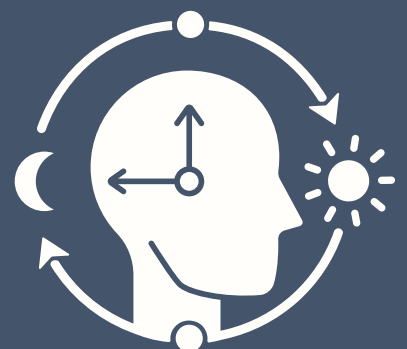


# Circadian Rhythm

We all have an internal biological clock known as our circadian rhythm. This is a sleep-wake pattern affected by the natural day/night cycle.

Our circadian rhythm is influenced by photoreceptors in our eyes that are sensitive to blue wavelengths of light. Artificial light can disrupt this natural cycle.

Artificial light at night can also disrupt production of melatonin, which is needed to help us get a good nights sleep, boost our immune system, and lower cholesterol.





# Light pollution and its effects on animals

The rhythm of night and day is in every living thing's DNA. Light pollution has disrupted this cycle, negatively affecting various animals throughout the world.

When an area is lit up at night, it makes the night appear as day. This can confuse nocturnal animals (animals who are active at night) such as various species of birds, turtles, moths, bats, and many more.



# Birds

Nocturnal birds such as owls rely on the darkness for hunting, protection for their young, reproduction, and less competition with other birds of prey. Owls have nighttime adaptations that makes them keen hunters during the night. When exposed to a bright light, they can easily become disoriented during flight.

Songbirds also rely on the darkness for migration during the fall and winter. Birds use celestial patterns in the sky to get from one place to another, a process that takes place every year. However, when flying over an over-lit city, they can become disoriented and often collide with buildings. Approximately 365 million birds die per year due to collisions.



Mexican Spotted Owls, local to Southern Utah

# Pollinators

Bats and moths are key pollinators here in the high desert of Utah. They pollinate flowers that bloom at night, such as the sacred datura, and that contributes to a healthy nocturnal ecosystem.

When artificial light becomes prominent in an area, it can distract insects and make it appear as if it is day. Though the reason is not well understood, moths are attracted to bright lights and can become disoriented.

The only flying mammal in the world, bats, are important to our ecosystems. Impacting pollination and insect control, bats rely on the darkness to get around. Light pollution disrupts navigation, roosting, and feeding, as well as cause confusion and disorientation.



National Park Service



National Park Service



# Mammals

Mammals also depend heavily on the darkness. Animals such as coyotes and foxes depend on the dark of night for hunting in stealth. Mountain lions also use the darkness for finding prey. With their incredibly large eyes that contain more rods than cones, they can discern details in much lower light than humans and other diurnal animals.

Other animals such as beavers, deer, and elk, are crepuscular, meaning that they are active in the hours around dawn and dusk. This transitional period between day and night allows for cooler temperatures, enough daylight to be able to see, and minimal sunlight. Many mammals prefer this time period for hunting and mating.



Gray Foxes and Mule  
Deer,

The Entrada Institute is co-host to the Annual Heritage Starfest and through its mission promotes greater night sky conservation through educational outreach, local lighting initiatives, and social infrastructure that brings people together in a common experience. Below are images of their newly designed Linton Rohr Observatory and Teasdale Park Solar Arch. Check out their schedule of events at: <https://entradainstitute.org>





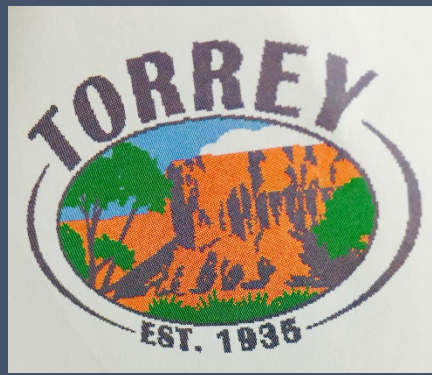
# LibraryTelescope

Inspired by the Library Telescope program, Entrada has acquired telescopes which can be checked utilized by the general public. They are great for beginning stargazing activities with your kids or star parties with the family. The program is intended to encourage budding astronomers and experiences that lead to night sky stewardship for another generation. We encourage you to look at resources and postings from this group at:

<https://Librarytelescope.org>



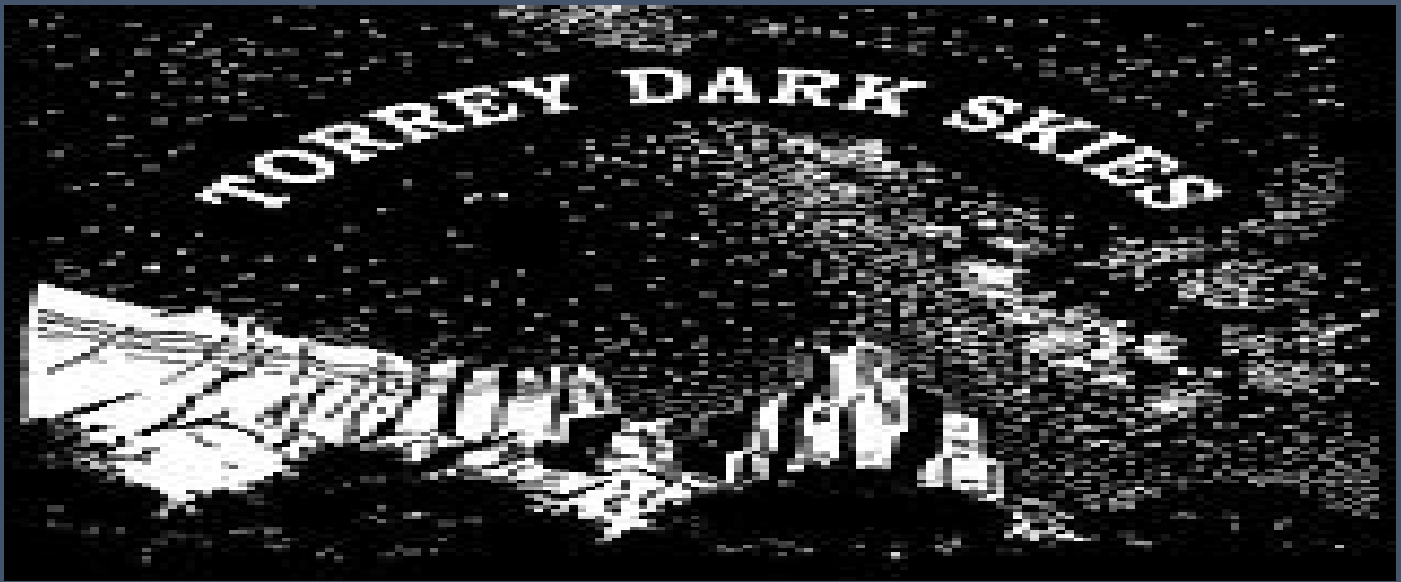




Torrey Town community members not only supported Capitol Reef National Park's International Dark Sky Designation but worked to become Utah's 1<sup>st</sup> recognized Dark Sky Community in 2018. Passing through, you'll notice dark-sky friendly lighting on local streets and continuing efforts by local businesses and households to join in the efforts.

For years local astronomers visited the area and <sup>Scott T. Smith</sup> promoted educational opportunities for visitors. In 2010, Kate Magargal along with a group of interested citizens put together the first "Heritage Starfest" with partners like Entrada Institute, Capitol Reef National Park and the Salt Lake Astronomical Society. The HSF happens during the new moon in September in both Capitol Reef National Park and Torrey. The Entrada Institute has also developed a new Spring Equinox Annual Event, which rolls out in 2024.





Torrey Dark Skies, a local non-profit organization, has also played a critical role in assisting Torrey Town in gaining and maintaining its status as an International Dark Sky Community.

Their mission includes “protection of the night skies for present and future generations.” You’ll see them out doing semi-annual monitoring and leading night sky educational efforts with local students and visitors.

You can learn more about them at:

<https://torreydarkskies.org>





## Sleeping Rainbow Adventures:

This local business helps visitors access the dark night sky around Capitol Reef National Park and Torrey. Sleeping Rainbow runs public stargazing tours on most Wednesdays and Fridays, as well as bonfires and star parties most Tuesdays and Saturdays. Visit their website to learn more about booking your stargazing experience at:

<https://wradventures.com>



# Best Local Places for Stargazing



## Capitol Reef National Park:

Making up almost 100 miles of the Waterpocket Fold, Capitol Reef has very little infrastructure or artificial light. It creates for a wild experience both day and night, making it a prime place for stargazing. Capitol Reef was designated an International Dark Sky Park back in 2015.

## Wayne County:

There are great pull offs along H24 and on Scenic ByWay Route 12. You can find rv parks, camping sites, KOA, hotel/motel accommodations, bed/breakfasts, and other rentals throughout the area to plan your next great adventure.



## Goblin Valley State Park:

Located in southeastern Utah, Goblin Valley has incredible scenery both during the day and at night. Its remote location makes it a perfect place to admire the stars, with park staff committing to upholding the quality of local night skies.



## Natural Bridges National Monument:

As another remote site in southern Utah, Natural Bridges makes a wonderful place to view the night sky. Sit under an incredible natural rock formation and take in the scenery.





# Beginner's Guide to Astronomy: Telescopes

OK, you want to buy a telescope. Where do you start?  
Think about what you are most interested in seeing.

Planets? Galaxies? Stars?

The Moon? Deep Sky Objects?

Where will you typically be observing from?

What is your budget?

These are all factors to take into account when  
purchasing a telescope.

Knowing where to begin can be tricky.

This guide is here to help!



## Aperture

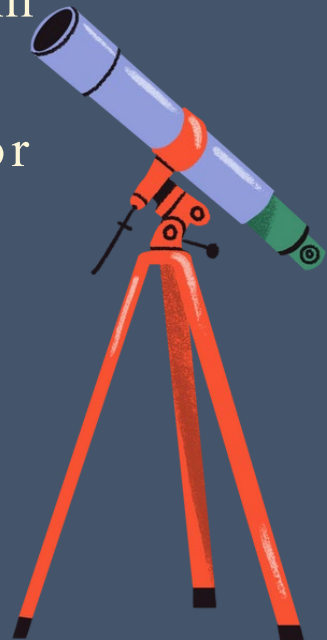
Aperture is the diameter of the telescope's light gathering lens or mirror. This number is typically expressed in millimeters (mm) or inches (in). Your telescope should have at least 2.8 in (70 mm) aperture, preferably more. A larger aperture helps you see fainter objects and more detail than a smaller one can.

## Mounts

All telescopes need a steady mount to support it. Many telescopes come with a tripod or mount that you can attach with a few screws. Mounts for bigger telescopes will often come with rings or plates for a sturdier attachment.

## Price

You should choose a telescope that will fit to your budget, interests, and lifestyle. Many telescopes cost \$400 or more, though some can be as low as \$250. Remember that the best telescope for you will be the one that you use the most.





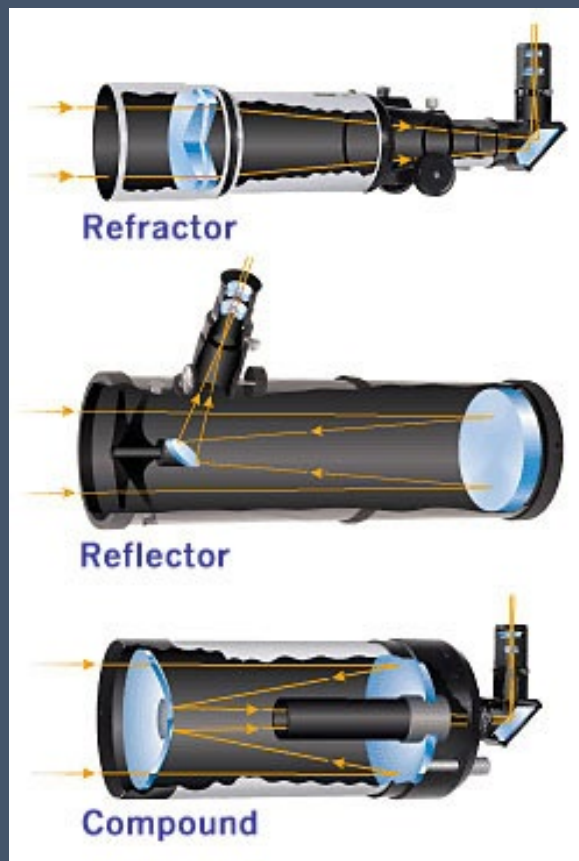
## Different Types of Telescopes

You'll likely come across three different types of telescopes: refractors, reflectors, and compounds.

Refractors have a lens at the front of the tube.

Reflectors gather light using a mirror at the rear of the main tube. You will likely need to adjust the optical alignment every so often. This type is typically called a dobsonian.

Compound telescopes use a combination of lenses and mirrors. This type is typically called a Schmidt-Cassegrain.



## Using Your Telescope

No matter what type of telescope you purchase, there will be a learning curve. Use it as much as you can. Get used to the focus knob, learning to align, and using any software that comes with the telescope. Each telescope will be slightly different, so make sure to thoroughly read the manual before you begin the set up and observation process.

You're ready to start observing!

Try things out, practice as much as you can, and share your new knowledge with friends!



# Tips for Astrophotography

Before you go:

- Look for dark skies and avoid light pollution
  - Check the weather forecast
  - Wear warm clothes

What to bring:

- A red light flashlight
- A DSLR camera or mirrorless camera that has manual control over shutter speed, aperture, and ISO
  - A tripod for steadying your camera
    - Extra batteries
    - Memory cards
- Water, snacks, and other essentials (especially if you are traveling far)



# What We Can Do

Animals rely heavily on darkness, whether they be nocturnal, diurnal, or crepuscular. With the increase in light pollution around the globe, we have disrupted natural cycles in the animal kingdom. What can we do to fix it?

Luckily, light pollution is the easiest form of pollution to fix. Starting in your home, you can upgrade to LED lightbulbs, install motion sensors, or simply turn off a light when it is not being used.

When it comes to your local community, spreading awareness of the issue of light pollution is key. Many people may not even realize there is an issue. Understanding and sharing why light pollution is an issue to solve brings us one step closer to helping our environment and seeing a darker night sky.



# Lighting Basics: What You Can Do at Home

## Intentional Lighting:

- Direct light only where needed
- Turn off lights when they are not being used
- Close blinds at night to keep the outdoors dark
- Install motion sensors

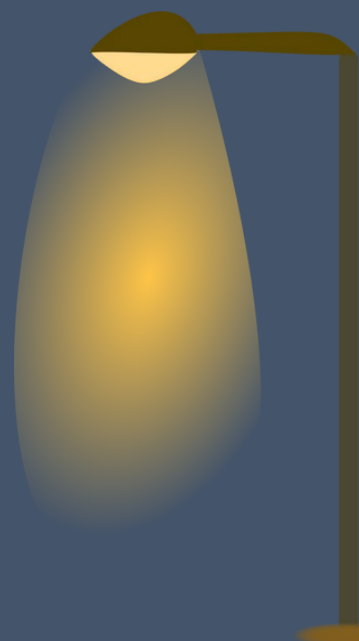
## Color Matters:

- Use lighting that emits a warmer color, such as amber or red

Visit [darksky.org](https://darksky.org) to learn more about dark sky friendly lighting and its importance

## Become a Night Sky Steward:

- Encourage your community to implement dark sky friendly lighting
- Advocate for the importance of darkness for human and ecological health





# Dark Sky Resources

Becoming a night sky steward is easier than ever, with more organizations advocating for preserving our skies.

The following resources are helpful if you are curious about learning why we protect dark skies or want to make a difference in your community!



**DarkSky**

Dark Sky International (formerly the International Dark Sky Association) works to protect the night skies for present and future generations.

DarkSky designates dark sky places that have gone above and beyond bringing communities together to incorporate night-sky-friendly lighting.

They have resources on how to implement effective lighting into your own homes and businesses.



The National Park Service recognizes that the night sky is an important park feature that contributes to a healthy ecosystem. It helps animals and plants thrive.

At Dark Sky Designated Parks, you can see impeccable night skies while sitting in unique landscapes. Many parks also have night sky specific ranger programs, including Capitol Reef National Park.



## Clear Sky Chart

Clear Sky Chart offers an interactive light pollution map that measures where the brightest and darkest places are in the world.

They also monitor various dark sky sites and give readings for cloud cover, transparency, darkness, smoke, wind, and humidity, which can all impact how dark the night sky is.



The Clark Planetarium provides an educational space experience for visitors. Located in downtown Salt Lake City, it's an easy trek to experience science, beauty, and the importance of astronomy.

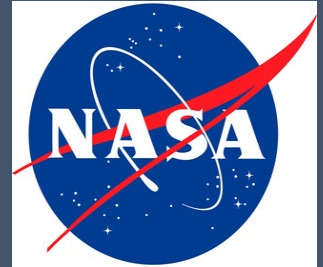
Clark Planetarium also has rotating exhibits and interactive stations for kids and works remotely on education with groups like the Entrada Institute.



The University of Utah's Dark Sky Studies minor is the first university program of its kind – focused completely on the impacts of light pollution. Students in the Dark Sky minor study the harmful effects of artificial light in hopes to preserve our night skies. The Entrada Institute and Capital Reef National Park partner with the University of Utah on a summer internship program.



NASA provides skywatching highlights for each month. These include what planets and constellations will be visible, when the darkest nights will be, and moon phases. NASA also keeps you updated on what is happening in terms of telescopes, trips throughout space, and development in projects.



Sky maps provides monthly maps of the night sky for your convenience. It labels various deep sky objects, planets, and constellations.

It also houses links to other dark sky books and information.

For more community engagement, search for a local astronomical society to become involved with. Many cities will have star parties, telescope trainings, and get together to discuss our beautiful night skies.



We thank you for making the past 25+ Years Celebrating the Colorado Plateau a success! The Entrada Institute remains dedicated to preserving and celebrating the natural, historical, and cultural heritage of the Colorado Plateau and its dark sky.



**ART | HUMANITIES | MUSIC | SCIENCE**

The Entrada Institute has a full schedule of events for 2023.

Unless otherwise indicated, Sunset Series and Artist -in-Residence events begin at 7:00 pm.

185 West Main St. Torrey, Utah 84775

<https://entradainstitute.org/give>