

Get to Know Your Night Sky

What can you see on a starry night? Many of us seldom experience a night sky like the one above the Colorado Plateau. Use this key to sharpen your observation skills and rate your night sky. The 9 steps of the Bortle Dark-Sky Scale are presented along with stargazing tips and features of the starry sky.

TIP Under dark skies you can often see more by using the “averted vision” technique. Because the eye’s rod cells (that operate under low light) are found away from the center of focus, by looking askew just a few degrees faint objects will pop into view. Your eye is almost blind in the center of your vision at night!

TIP Under full moonlight you can often detect some color in the landscape, indicating that the eye’s cone cells have enough light to be active.

9 less than 300 stars visible

Sky appears nearly completely washed out, and has a unsightly glow. Dark adaptation of eyesight is not possible, the ground is brightly illuminated, and the Milky Way is invisible. Only the bright major constellations are identifiable. For instance, some of the “keystone” stars of Hercules, or the five stars of Delphinus are lost in the glare and skyglow.

8 about 500 stars visible

Constellations are visible but may be missing key stars. Sky background has a uniform washed out glow with “light domes” reaching 60 degrees above the horizon. Stars such as the tip of Sagitta or the “ice cream cone” of Bootes are not visible. If clouds are present, they are brilliantly lit.

7 about 1000 stars visible

Brighter constellations are easily seen in full, yet sky background has grayish or yellow color. Milky Way may be just barely visible near the zenith (straight up). Clouds are much brighter than the background sky. Some dark adaptation is possible, revealing texture in the ground.

6 about 1500 stars visible

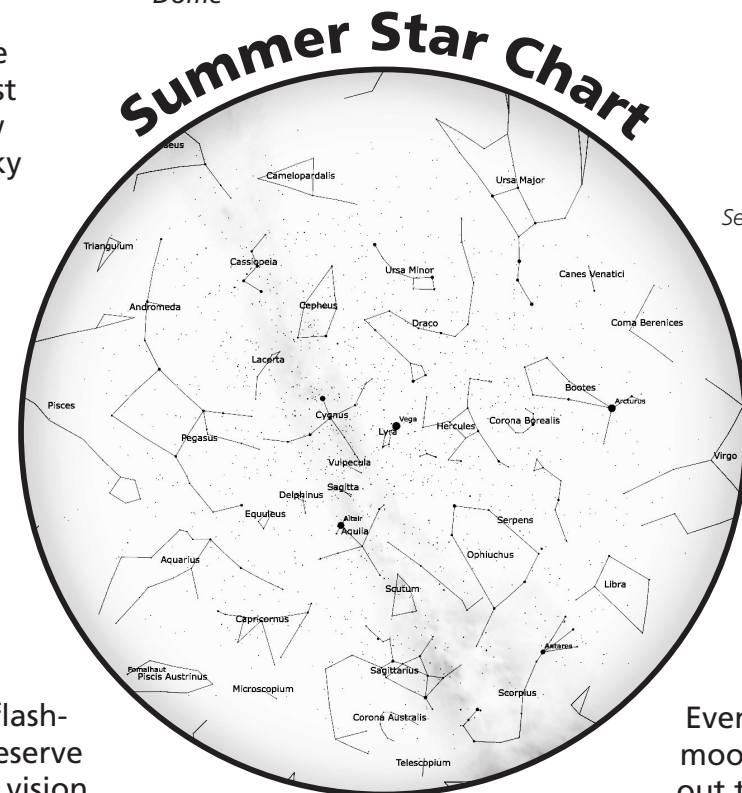
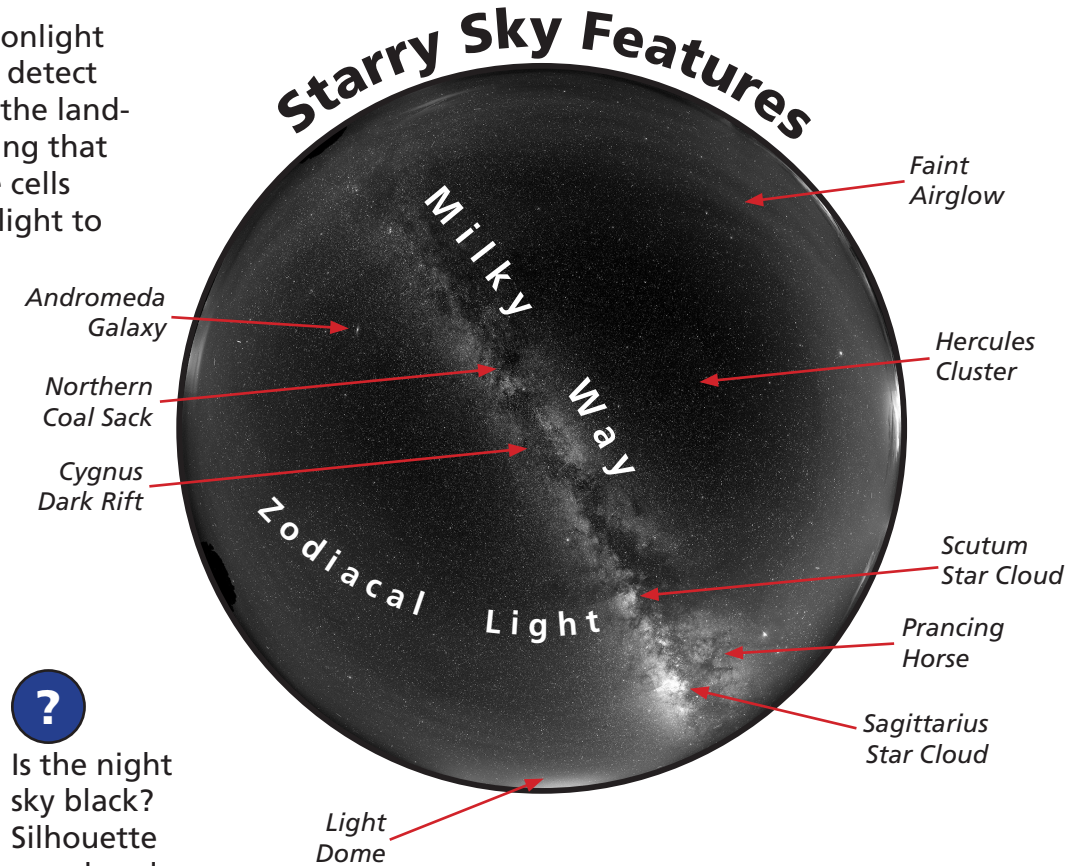
The Milky Way is only visible straight overhead in the summer. Other features of the night sky are washed out by light domes. If clouds are present overhead, they are illuminated. Ground texture may be seen with difficulty, and often shadows are cast by artificial light.

5 about 2000 stars visible

The Milky Way is faintly present, but is thin, broken by gaps, and is not visible near the horizon. Star clouds (bright knots of stars in the Milky Way) are seen, and contrast with dark areas of the Milky Way. The dark rift in Cygnus is visible overhead in summer, and the Zodiacal Light may be glimpsed, but is difficult to see amidst the light pollution. The Andromeda Galaxy is often visible.

? Is the night sky black? Silhouette your hand against the sky as a test to see how dark the sky really is.

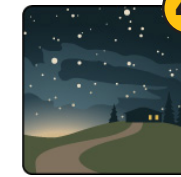
TIP Use a red flash-light to preserve your night vision. This also reduces insect attraction.



Star Chart for:
 April at 6am
 May at 4am
 June at 2am
 July at Midnight
 August at 10pm
 September at 8pm

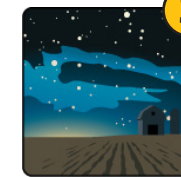
TIP Even a crescent moon can wash out the delicate features of the night sky. The best stargazing is during the “new” moon.

4 about 2500 stars visible



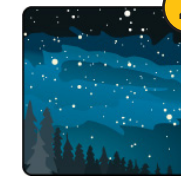
The Milky Way is evident from horizon to horizon, but it lacks fine detail. Clouds are slightly brighter than the background sky near the horizon, but appear darker at zenith. Light domes are brighter than the brightest parts of the Milky Way. The faint Zodiacal Light (from sunlight reflecting off solar system dust particles) is evident in the west after sunset, or in the east before dawn. Deep sky objects such as the Hercules Globular Cluster (M13) and Northern Coal Sack are visible.

3 about 3500 stars visible



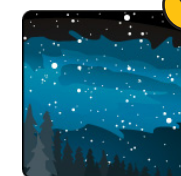
The Milky Way appears complex and broad, extending perhaps 30 degrees wide and reaching the horizon. Some light pollution may be evident along the horizon. The Zodiacal Light is easily seen. Many star clusters and nebulae are visible with the naked eye and the Sagittarius and Scutum Star Clouds are striking, as is the dark rift in Cygnus. The bright planet Venus casts an obvious shadow.

2 about 4500 stars visible



Sky is almost completely natural, with no light domes extending above 5 degrees and none brighter than the Milky Way. Airglow is often visible circling the sky near the horizon. The Zodiacal Light extends across the entire sky as a band. The dark “prancing horse” is easily visible between Sagittarius and Scorpius. The Milky Way has the appearance of marble, with many dark veins and knots of bright stars.

1 over 5000 stars visible



Stargazers can spend a lifetime in search of Bortle Class 1 skies. The Milky Way is very broad, convoluted, intricate, and looks almost three-dimensional. There is no evidence of artificial light, and the sky is free from air pollution. Many deep sky objects such as the M81 galaxy or the Helix Nebula are visible with the naked eye. The Zodiacal Light is striking. A stargazer’s Nirvana.

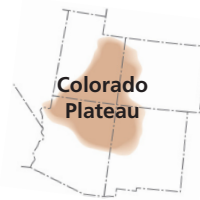
? Did you know it can take 10 to 20 minutes to dark-adapt your eyes under moderately dark skies (Bortle Class 4-6)? Under the darkest skies, Bortle Class 1, it can take as long as 60 to 120 minutes to fully dark-adapt. Exposure to white or blue light quickly bleaches the chemical rhodopsin in the eye’s retina, reducing sensitivity and requiring more time to gain back your night vision.

? Who is Bortle? The Bortle Dark-Sky Scale is a qualitative index developed by comet hunting astronomer John Bortle, and published in Sky & Telescope Magazine in 2001. (www.skyandtelescope.com)

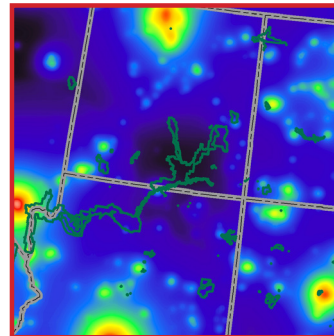
Sometimes You Need Less Light to See

When we have difficulty seeing at night, we instinctively desire more light. But more light doesn't necessarily mean better visibility. No where else is this more true than in our remote public lands, where the scattered light from distant streetlamps and porchlights washes out the delicate features of a starry sky.

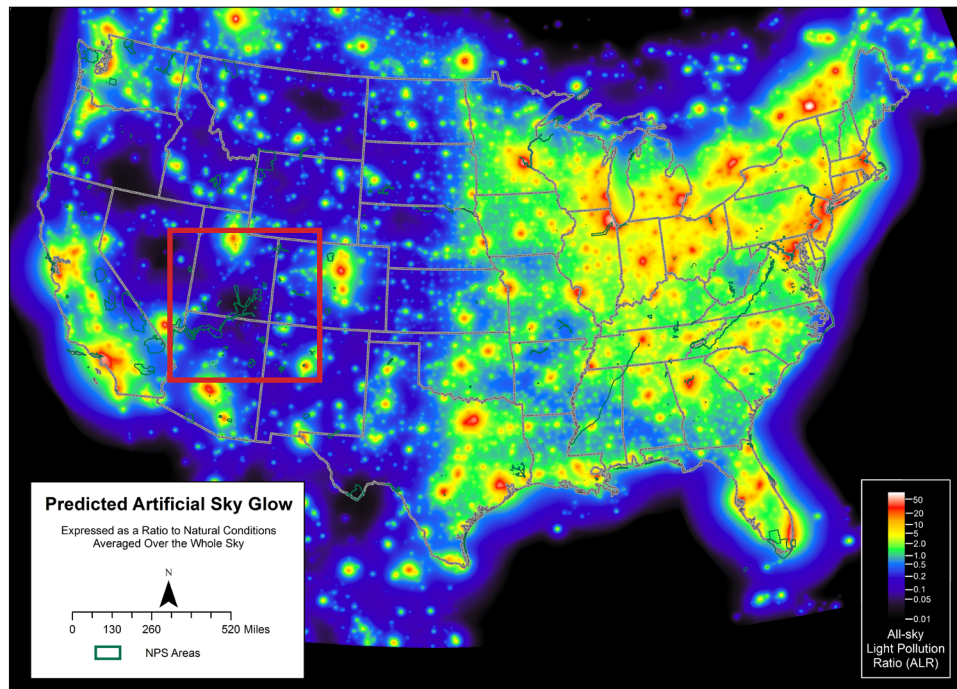
Society needs light at night to be productive and safe. However, our use of outdoor lighting has increased exponentially, and much of that light is aimed into the night creating sky glow; what some people refer to as "light pollution." The result has been an erosion of the beauty of the night. Many people, from avid astronomers to casual stargazers and campers, find value in experiencing a natural night sky. For nocturnal species, having a dark nighttime environment can be a matter of survival. The increase in glare and sky glow has been one of the most obvious environmental changes across generations.



Inset at Right: One of the few remaining "dark holes" in the 48 states is centered on the Colorado Plateau. National Park Service lands are depicted with a green outline.



Below: A map of artificial sky glow for the 48 states shows how light spreads from cities, reaching far into rural areas. 2013 model by the National Park Service.



Above: Arches National Park at Night. Skyglow from a nearby town illuminates the sandstone cliff faces and diminishes the view of stars. Photo by Tyler Nordgren.

Our Window to the Cosmos

A clear and starry sky provides us a view into the cosmos. This perspective of seeing beyond our planet is a deeply human experience and has changed the course of human history. It is difficult to imagine a more compelling view; and that faint starlight has inspired countless works of art, literature, and science. The night sky is bound to many religious themes and has provided us our first compass, our first clocks, and our first calendars.



Across places such as the Colorado Plateau, people are traveling in order to once again experience a starry night sky. In many parks and public lands, stargazing has become incredibly popular. Astronomy festivals and weekly ranger programs provide outstanding opportunities to reconnect with the cosmos, share the constellations as our parents did with us, and remind ourselves how inspirational a natural night sky can.



Above: Astronomy and stargazing festivals are becoming popular across the country, and provide economic benefit to surrounding communities. Poster by Tyler Nordgren.

Left: Thousands of people travel to Bryce Canyon for the Bryce Canyon Astronomy Festival, held annually in early summer.

Simple Solutions for Better Outdoor Lighting

Keeping the stars bright can be achieved through some surprisingly simple steps. Homeowners, businesses, and cities can each participate in making outdoor lighting more sustainable. Such lighting not only keeps the night sky beautiful and protects nocturnal wildlife, but is also more energy efficient and can actually improve visibility at night.

- Use timers or motion sensors to activate lights only when they are needed
- Direct light downward by using fully shielded light fixtures
- Use the right amount of light; more light is not always better
- Use amber or "warm-white" light, avoid "cool-white" or blue light



Above: This shielded light in a national park directs light downward and keeps the light out of the sky, where it can wash out the view of the stars and Milky Way.

Vision for a Dark Sky Cooperative

America's first Dark Sky Cooperative will perpetuate starry night skies through voluntary actions across the Colorado Plateau. This innovative concept will link communities, tribes, businesses, state agencies, federal agencies, and citizens in a collaborative effort to celebrate the view of the cosmos, minimize the adverse impacts of outdoor lighting, and retain natural starry skies for future generations.

Protecting starry skies will also enhance tourism economies, protect cultural and tribal connections with the night sky, retain the pioneer heritage and charm of small towns, reduce carbon emissions, and save money.

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