HOOP DREAMS
LIGHTNING BOY FOUNDATION HONORS THE PAST AND ENSURES THE FUTURE

GALE FORCES
CORONA GETS A LIFT FROM A PLANNED WIND FARM

ANIMAL INSTINCTS
AN EFFORT TO BOOST PRONGHORN POPULATIONS HITS ITS STRIDE

New Mexico

AUGUST 2023

CHOO CHOO!
The Rails Revives Clovis's Historic Train Depot

NIGHT SKIES

Explore our out-of-this-world Dark Sky places, elevate your photography skills, find a local astronomy club, and deepen your knowledge of Native star stories

HEAVENS ON EARTH

New Mexico's wide-open spaces, minimal light pollution, high altitudes, and beautiful climate mean we enjoy out-of-this-world night skies. Get to know our Dark Sky spots, deepen your knowledge of Native star stories, elevate your photography skills, and plan for this fall's spectacular solar eclipse.

BY JENNIFER C. OLSON

PHOTOGRAPHS BY WAYNE SUGGS

Saturn, Mars, and Jupiter rise over an apple orchard planted a century ago in the Sacramento Mountains near Cloudcroft.

▲ Stars reflect in the Chama River as it meanders to the Río Grande near Abiquiú.

Five years ago, during a Perseid meteor shower in August, my husband and I spent our first night at Cosmic Campground in the Gila National Forest. We'd planned the visit ever since DarkSky (formerly the International Dark-Sky Association) designated the primitive camping area 60 miles north of Silver City as the first Dark Sky Sanctuary in the United States.

Following the suggested etiquette, we brought red headlamps and arrived early enough to set up camp before sundown. When the sky darkened, we cozied up with blankets and settled into our camp chairs. Every way we turned, the sky glittered as we rotated our chairs to take advantage of the low horizon and the 360-degree views encircling us. Occasionally, we tilted our heads back to stare into the inky black universe, sprinkled with blazing flecks of light and cut with the Milky Way's luminous swath.

I've since synced the *New York Times*' Space and Astronomy Calendar to my own, downloaded an app that alerts me to expected "good" stargazing conditions in my home of Pinos Altos, and seen the birthplace of stars in Orion Nebula through a telescope. But that night at Cosmic Campground, we just let the heavens wow us.

"At Cosmic Campground, it doesn't matter if you've never looked at the night sky or spent your whole life looking up, there's something there for you," says astronomer Al Grauer. He and his wife, Annie, worked to certify the 3.5-acre campground as a remote, star-studded place worthy of attention and protection by DarkSky. "Whether you look with your naked eye or a telescope, the key is having a place to go to look at the sky, where the sky is natural."

In New Mexico, those places can be as easy to find as the Big Dipper. Our state claims nine of the 201 certified Dark Sky Places worldwide, including seven Dark Sky Parks and the first-ever Urban Night Sky Place (Valle de Oro National Wildlife Refuge, near Albuquerque). While 80 percent of people in the U.S. live in places where artificial light and murky air drown out most constellations, New Mexicans need only venture as far as our own backyards to see the Milky Way. "What we really have in New Mexico is altitude, climate, and a low population," Grauer explains.

But it's more than that. New Mexico celebrates the night skies like few other places. We see what others are only starting to understand. In 1999, New Mexico became one of the first states to enact legislation making night skies a priority for the health of our people, wildlife, and economy. And for millennia, the ancient people who first called these lands home have used the sky to plan their lives, track the seasons, align their buildings, dictate spiritual ceremonies, and portray cultural ideals.

"The natural night sky is not dark," Grauer says. "It's alive with its own lights."

THE CLARITY OF A night sky is influenced by many factors. Weather, light and air pollution, geomagnetic activity, high-energy cosmic rays, planetary atmospheres, and gravity waves all contribute to what and how we see. A place's night-sky background darkness is rated on astronomers' Bortle scale, ranging from Class 1 (most natural skies on Earth) through Class 9 (inner-city skies). Our nine Dark Sky Places register no less than Class 2, meaning the summer Milky Way is easily visible to the naked eye. Even our urban areas, such as Albuquerque and Santa Fe, rate no worse than Class 6. The Milky Way is still faintly visible on many nights from a city.

Impressively, a 2019 study found Catron County, where Cosmic Campground lies, to be the place in the nation with the second-least impact from human-caused light. "The county at number one is in Alaska, where it is cloudy a lot," Grauer says. "Catron County has many more clear nights."

New Mexico has been an environmental leader when it comes to dark skies, passing the Night Sky Protection Act, enforcing municipal dark-sky ordinances that require shielded fixtures, and pursuing Dark Sky Place designations, which carry an obligation to conservation. But more needs to be done if the state is to remain a shining star sanctuary, especially when it comes to the statewide legislation.

With new light technology comes new challenges. For example, popular LED lighting is energy efficient, but its cooler light spectrum affects circadian rhythms and decreases the background darkness of the night sky. A better option might be for cities to require warmer spectra lights and focused illumination only when necessary, as opposed to all night long.

Safeguarding the night sky is also integral for the economy. New Mexico has long been home to professional observatories like Magdalena Ridge Observatory and installations like the Very Large Array, where 27 radio antennas in a Y-shaped configuration observe what we cannot see and search for extraterrestrial signals. With Spaceport America, New Mexico now also plays a role in commercial space flight.

The night skies attract visitors like moths to a flame. The Colorado Plateau, which includes parts of New Mexico, could see as much as $5.8 billion by 2029 in non-local tourist spending from dark-skies travelers, who reportedly spend three times more than day-trippers, according to the Colorado Plateau Dark Sky Cooperative.

Night Moves

FOLLOW THESE TIPS FOR A GREAT VIEW AFTER SUNDOWN.

As the Pajarito Environmental Education Center's (PEEC) planetarium manager, Elizabeth Watts leads stargazing and full moon hikes that teach people how to enjoy our skies after dark. "One of my goals is to encourage people to go out and see the actual night sky," she says.

Find someplace far from lights. Even moonlight can interfere with your view of the stars. Go out on a night when the moon isn't up or isn't full. "If the moon is up, look at it," Watts says. "People are amazed at the shadows cast by the full moon."

Give your eyes time to adjust. "It can take 20 to 40 minutes to fully adjust to the dark," she says. "If you feel like you need a light, use a dim red light. It doesn't destroy your night vision."

Get comfortable. Along with a planisphere (an analog star chart) and binoculars, Watts recommends a chair, a blanket, and dressing in layers.

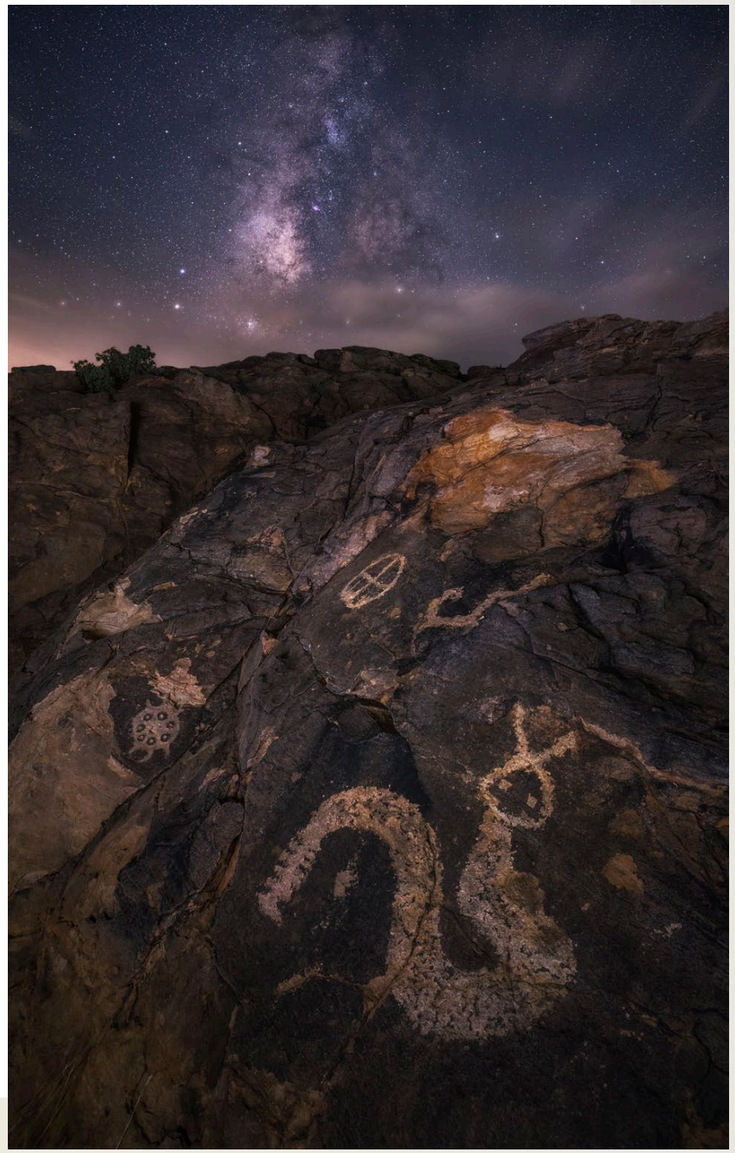
Seek out obvious star formations. "The Big Dipper is one you can see all times of year," Watts says. "It helps us find the direction north as well."

Make up your own tales. "Look up at the stars and find pictures like you might in the clouds and tell a story about what you see," Watts suggests. "Start by finding your initial in the sky."

Get oriented first. "The PEEC planetarium is great for orienting people and showing them where they might look for things in the actual sky," says Watts.

Illustrations by **Ryan Johnson**

◀ **From left:** Pueblo Bonito at Chaco Culture National Historical Park is lit by moonlight. Behind a southern New Mexico petroglyph, a light dome from a growing small town is visible.



"Having a place where people know what the real night sky is like is just as important as having the natural flora and fauna," Grauer says.

TO LEARN MORE about this awesome part of nature, I am heading to a midnight meeting. Navigating the brushy trail toward the Gene & Elizabeth Simon Observatory in City of Rocks State Park is proving difficult. The faint red glow from my headlamp isn't revealing hazards like cacti, so I try avoiding any dark silhouette that could be a clump of harmless grass or a sleeping snake.

Chiricahua Apache leader Joe Saenz later explains that his tribe respects nature's cycles and cautions against moving around at night partly out of regard for the Creator and partly for practical reasons: Danger can hide in the dark.

But at the moment, it's worth the risk for an astronomy crash course from two experienced guides. Former community college astronomy instructor Bill Nigg and Astronomical Society of Las Cruces member Mike Nuss volunteer as guides for the star parties here and at Rockhound State Park. This evening, Nigg is equipped with a laser pointer, while Nuss drives the observatory's computerized Dobsonian telescope.

"At Cosmic Campground, it doesn't matter if you've never looked at the night sky or spent your whole life looking up, there's something there for you."

—AL GRAUER, ASTRONOMER

"Think of Polaris," Nigg says, pointing to the North Star's place in the Little Dipper asterism, "as like the top of a merry-go-round." He says that in 13,000 years, Vega, the fifth-brightest star, will become the North Star. That's his segue to the Summer Triangle, of which Vega forms one vertex.

The appearance of certain beacons in the night sky have long been indicators of the seasons. Until the Western world developed a uniform calendar, people's livelihoods depended on their understanding of the night sky's movements.

"My dad always said when Scorpius came up, you knew you could start hunting for rabbits," says Wanda Yazzie (Diné), an amateur astronomer who watches Scorpius rise behind the Sandías from her house in Placitas, and who clued me in to how her culture regards the sky.

Nigg suggests his colleague turn the Dobsonian toward Messier 101, the Pinwheel galaxy, where a supernova was discovered this year. When I peer into it, I see the spiral immediately. Nuss urges me to look closer. Do I see a bright star that looks bigger than the cloud's others? Yes. That is a star that went supernova almost 21 million years ago.

About 1,000 years ago, the people who lived in Chaco Canyon witnessed and documented a supernova that occurred much closer to Earth, says Nathan Hatfield, Chaco Culture National Historical Park's interpretive ranger. "There was a supernova in 1006 and one in 1054. We know they're in the canyon. We know the Chacoans are watching the sky. Logic tells us this pictograph could be a supernova that happened then."

Supernovas also create the elements in the periodic table. "As you gaze upon these glowing objects, contemplate the elements of chemistry assembled by the forces of physics—naturally," Nigg says. "Humans are calcium-framed, carbon-celled water bags."

We are basically stardust.

The traditional Navajo greeting, yá'át'ééh, acknowledges the universe and human participation in it. It's a reminder that we are related to the ancient energy that preceded our life. "In the Navajo way, we all know we're from the stars, from the universe," Yazzie says. "We've known it for millennia."

What the Native community discovered long ago can still be witnessed in the sky on any given evening in New Mexico. Today, these stellar skies continue to tell us stories about the cosmos and about ourselves in equal measure.

In winter, dark skies can be magnificent at El Malpais National Monument.

Come to the Dark Side

HERE'S WHERE YOU'LL FIND NEW MEXICO'S NINE DARK SKY PLACES.

Cosmic Campground

Alma

Forty miles from the nearest significant source of electric light, the 3.5-acre site was the first International Dark Sky Sanctuary in the U.S. and is still just one of 17 in the world. With tent and RV sites plus telescope pads, the primitive campground is within a half-hour drive from both the Catwalk National Recreation Area and the ghost town of Mogollon.

▶ *2016, 5,364 feet*

Capulín Volcano National Monument

Capulín

The site earned the International Dark Sky Park designation on its 100th anniversary. Interpretation and fees manager Geoff Goins draws on 30 years of night skies experience to run the monument's astronomy programs. Visitors often ask if they can stargaze from the high point of Capulín Volcano (8,182 feet). "It's always windy up there at night. The views are actually better down here than at the top," Goins answers.

▶ *2016, 6,200 feet*

Chaco Culture National Historical Park

Nageezi

Ancestral Puebloans lived in tune with the cosmos from this sacred canyon in the mid-800s. The archeoastronomy mecca was designed to align architecturally with sunrises and sunsets and includes a pictograph that likely documents a supernova. "Because of the integrity of the night sky in Chaco Canyon, what we see out there today is pretty close to what they saw 1,000 years ago," says interpretive ranger Nathan Hatfield.

▶ *2013, 6,200 feet*

Clayton Lake State Park and Dinosaur Trackways

Clayton

The fun-for-the-whole-family state park with a 170-acre lake was New Mexico's inaugural International Dark Sky Park, and park officials worked with the town of Clayton to make its lighting dark-sky-friendly too. "We offer other things in the park that attract people: dinosaur tracks, fishing, and camping," says park manager Mark Funk.

▶ *2010, 5,186 feet*

Fort Union National Monument

Fort Union

Set on the prairie, it offers some of the least obstructed night sky views. "We're honored to be a small park with that designation," says chief of interpretation Bill Barley. The Mora County monument's Night Wonders program educates visitors about nocturnal life.

▶ *2019, 6,760 feet*

Salinas Pueblo Missions National Monument

Mountainair

The monument's three sites normally close at 5 p.m. but hold regular night sky programs, with events planned for August 31 and September 15. "We have that amazing blend of the cultural and natural resources," says Alex Arnold, chief of interpretation and visitor service. "The Milky Way is visible up against the backdrop of the mission churches."

▶ *2016, 6,500 feet*

Valle de Oro National Wildlife Refuge

Albuquerque

The former farmland seven miles south of Albuquerque was DarkSky's first Urban Night Sky Place and remains just one of six worldwide. Valle de Oro has constructed a fully dark-sky-compliant visitor center that serves as a model, demonstrating best practices for protecting the night sky from light pollution while preserving natural darkness near the city.

▶ *2019, 4,911 feet*

El Morro National Monument

Ramah

The monument's 200-foot-high sandstone bluff, known as Inscription Rock, holds evidence of human existence in the Southwest dating back at least 1,000 years. While spiral petroglyphs mark specific celestial events in other New Mexico locations, that doesn't seem to be true at El Morro, according to former ranger Derek Wallentinsen. "They could have marked places where somebody in charge of ceremonies or an important member of the tribe went out and used it to orient themselves to the sky," he says.

▶ *2019, 7,160 feet*

Valles Caldera National Preserve

Jemez Springs

Bordered by the Santa Fe National Forest, Bandelier National Monument, and the Pueblo of Santa Clara, which together account for 1.11 million acres of barely inhabited land, the 89,000-acre volcanic crater attracts nighttime visitors with astronomy programs and full moon hikes. Stargazing observation sites are marked at two of the six pullouts along NM 4, which receives little nighttime traffic.

▶ *2021, 8,000 feet*

Astronomer Peter Lipscomb with his 20-inch Newtonian reflector telescope.

Stargazer

PETER LIPSCOMB CONNECTS PEOPLE WITH THE HEAVENS.

After 22 years as a guide to New Mexico's night sky, Peter Lipscomb remains enchanted with what he calls the most ancient of all natural beauties. A self-taught astronomer and award-winning astrophotographer, he founded Astronomy Adventures in 2002 and hosts the 2.5-hour trip into the Galisteo Basin on the Sky Railway StarGazer Train. Lipscomb volunteered to host New Mexico State Parks' night sky programs 18 years ago and has held various roles since, including authoring Clayton Lake State Park and Dinosaur Trackways' Dark Sky Place application and, most recently, preparing City of Rocks State Park's application. The 62-year-old is forming a DarkSky New Mexico Chapter to spread appreciation for the night sky.

—AS TOLD TO JENNIFER C. OLSON

Observing a total solar eclipse when I was eight years old was the most impactful thing that happened to me. When I was standing in the shadow of the moon during the 2017 eclipse, I was eight years old again.

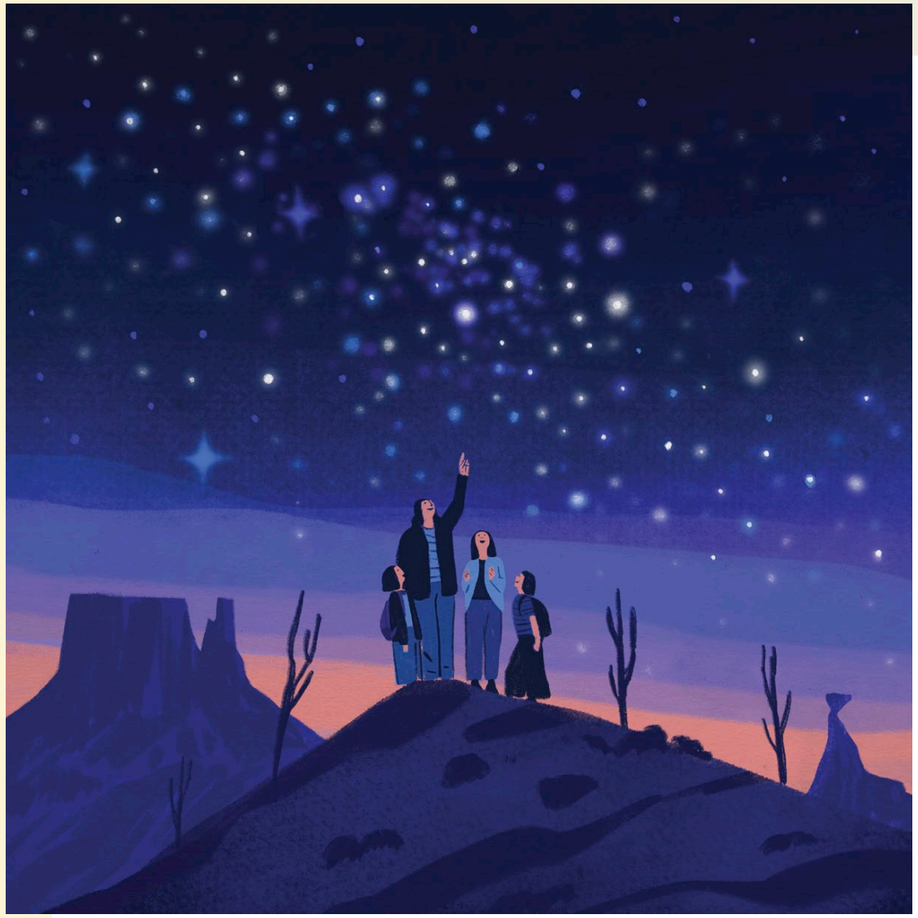
Some people, when they're really interested in astronomy, become astrophysicists. Outreach, education, and interpretation was how I was able to continue with astronomy. I'm spending time with others and sharing that sense of awe together.

When I came to New Mexico in 1996, my visiting family and friends would look up when the sun went down and go, "Wow!" Yeah, that's the sky we have in New Mexico. I asked myself if there was a way I could connect people with what seems to be an unapproachable, strange place. That's how Astronomy Adventures started.

I use a telescope called a reflector with a mirror that's half a meter in diameter. There's nothing about the design of a telescope that's about magnification. It's [about] aperture, or light-gathering ability. Think of those ancient photons as raindrops falling from a storm. The bigger the bucket you capture the rain in, the more you'll catch. The bigger the telescope's opening, the more photons you catch and the more distant objects you can see.

Spending time under the dark night sky—experiencing the timelessness, grandeur, majesty of our natural world, connecting to the time of our ancestors—is where I feel the most sense of fulfillment, serenity, wonder, and creativity. Seeing visitors' excitement reminds me of what a special thing we have. When people gain some understanding about the nighttime environment, they want to start protecting it, too.

Photograph by **Minesh Bacrania**



All Stars

INDIGENOUS STORIES HELP EXPLAIN THE UNKNOWN IN RELATABLE—AND SOMETIMES VERY SCIENTIFIC—WAYS.

"I've always admired the stars," says Wanda Yazzie (Diné), a member of the Albuquerque Astronomical Society. "It's just natural to look up and see what's out there."

Yazzie, the third oldest of 11 children, says her father would entertain them with night sky stories while growing up on Navajo Nation. "He'd talk about how the Holy Ones, when they were getting ready to build the sky, took great thoughtfulness to put all the stars in the sky," she recalls. "Trickster Coyote got a turn to put a star in the sky, but he took the entire rug and threw them all up. That's why there's chaos."

Beyond using what they saw to instill cultural values, New Mexico's Indigenous groups have passed down knowledge through these stories. "Making sense out of your world is necessary," Yazzie says. "In mainstream America, people don't know how to make sense of the world because they're stuck to their cellphones and laptops."

A member of the Albuquerque Astronomical Society on and off over the past 15 years, Yazzie enjoys learning and sharing in camaraderie with other astronomers. She feels grounded by skywatching, which keeps her in tune with the seasons, and sees her interest in astronomy as being inseparable from a love and care for the environment. "You love nature, so you love the sky," she says.

Taught to appreciate and respect Mother Earth and Father Sky, Yazzie remembers her mom asking her to come inside during a meteor shower. "You're not supposed to see it," she says. "It brings you bad energy. Father Sky is having a fight with another force."

"Cultural astronomy depends on observations," says Ray A. Williamson, author of *Living the Sky: The Cosmos of the American Indian* and a member of the Society for Cultural Astronomy in the American Southwest. "Forget models. Ask yourself, 'What can I see?'" With a clear view east, anyone could witness the annual solar cycle. By keeping their eyes open and passing the information their observations revealed to others in that society, Native people built their knowledge base over time. "It becomes mind-bending to try to figure out how to develop a calendar you can count on every day of the year," Williamson says. "The Western world took care of that in the days of Pope Gregory, by defining the month by this hodgepodge of days and setting it up so the equinoxes equal half a year."

That model of a mechanized universe became the basis for scientific exploration. But most of the groups native to New Mexico set their calendars against what they saw in the sky. "It was a science of comparing observations with the memories of, usually, elders in the tribe," Williamson says. Indigenous New Mexicans applied science—the same knowledge as Western science, embodied differently—to time ceremonies and activities like hunting, planting, and fishing.

"Navajo astronomy can best be understood within a much larger context of Navajo philosophy," Nancy C. Maryboy and David Begay write in *Sharing the Skies: Navajo Astronomy*. "Every human action is considered cosmic and affects the web of universal relationship. This is similar to tenets of quantum physics in regards to principles of non-locality."

The Navajos' understanding of these tenets worked its way into their language and culture. "The sun, Jóhonaa'éí, is everything," Begay says in a recorded presentation. "For example, when an elder sees a whirlwind, they'll say, 'It's the sun acting.'" This belief is supported by heliophysics, the study of the sun, planets, and space as a dynamic system, and is defined by a focus on the sun's turbulent magnetic activity and its effects.

Some of the most solid evidence of Ancestral Puebloans as skywatchers who developed precise understandings of celestial cycles exists in Chaco Culture National Historical Park, where Great Houses are oriented with the cardinal directions. Petroglyphs mark times of day and major lunar standstills while celebrating the duality of light and darkness.

Joe Saenz, chief of the Chiricahua Apache Nation, shares a creation story to illustrate why his people revere a balance in the duality of night and day, respecting securities and risks of each. "As two-leggeds, we rule the day and weren't supposed to be out doing stuff at nighttime," he says.

The Chiricahua Apache view having excess lighting as an act of arrogance and disregard for natural cycles. "Taking the night away is a disruption of the balance," says Bill Bradford, secretary of state and attorney general at Chiricahua Apache Nation.

The Albuquerque Astronomical Society hosts a Cosmic Carnival in the fall.

COURTESY OF THE ALBUQUERQUE ASTRONOMICAL SOCIETY

Scope It Out

WANT TO GET SERIOUS ABOUT YOUR VIEW OF THE NIGHT SKIES? THESE CLUBS CAN HELP ELEVATE YOUR GAZE.

Founded in 1951 by Pluto discoverer Clyde Tombaugh, the **Astronomical Society of Las Cruces** holds downtown moon-gazing events, monthly dark sky gatherings at their Walter Haas Observatory in Leasburg Dam State Park, and outreach and education programs that include star parties at Rockhound and City of Rocks state parks. *aslc-nm.org*

The **Albuquerque Astronomical Society** boasts a robust membership and regular constellation tours and trainings. General Nathan Twining Observatory, located south of Belén, gives members and their guests year-round access to a 16-inch reflector telescope, plus on-site loaner telescopes for use on one of 22 observing pads. Members can conduct astrophotography with a 14-inch imaging telescope, camera, and laptop equipped with the necessary software. Check out "How to Find Deep Sky Objects" with Sara Wofford on August 5. *taas.org*

The **Magdalena Astronomical Society**'s annual Enchanted Skies Star Party includes tours of the Very Large Array and the Magdalena Ridge Observatory, presentations, and stargazing events. This year's event will be at the Top of the World subdivision in Pie Town, October 15–20. *nmmag.us/enchantedskies*

The **Rio Rancho Astronomical Society** holds monthly events and periodic trips to archeoastronomy sites. The group's three research-grade telescopes are housed in a permanent facility that includes an outdoor planetarium and interactive sundial. The overnight White Ridge Stargaze will be October 14 at White Ridge Bike Trails in San Ysidro. *rrastro.org*

It's free to join **Alamogordo's Amateur Astronomers Group**, which holds family-friendly visual observation and astrophotography events at Oliver Lee Memorial State Park. *facebook.com/AmateurAstronomersGroup*

In northwest New Mexico, the beautiful hoodoos of the Bisti/De-Na-Zin Wilderness add visual interest for any night skies photograph.

Shooting Star

WAYNE SUGGS OFFERS A GALAXY OF ADVICE FOR NIGHT-SKY SHOOTERS.

Wayne Suggs has honed his expertise in night-sky photography over 48 years, including eight as a workshop instructor. "When I was 14, I set up my Nikon FM in the forest and used flashes and would just not advance the film," says Suggs, who serves as a judge for *New Mexico Magazine*'s annual photography contest. "When the digital age came about, and I learned I could do pinpoint stars, I immediately switched to digital." Here are the Las Cruces photographer's tips for heavenly images.

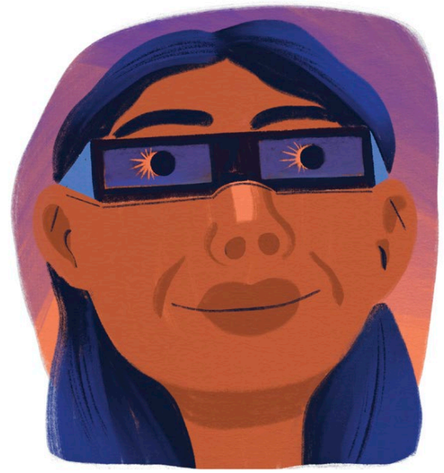
Let the foreground be the star. "For me, the sky is playing second fiddle," Suggs says. "New Mexico has some of the most beautiful landscapes in the world. To be able to include those landscapes along with our night skies is icing on the cake."

Scout your locations. Where you shoot depends on what's going on in the celestial sky—the position of the Milky Way for example—and how you want to capture it. Suggs scouts potential sites with GPS to determine when to return with his camera. "There's so much to explore in New Mexico and so many photographs that have never been taken."

Create star trails. "The earth is revolving on its axis, and the stars are not. It appears, when you're taking a photo, that the stars move," Suggs says. "If your camera is pointing at the North Star, you could get this point that everything would revolve around." Leave the shutter open to get enough light to hit the "film." The length of your exposure dictates the length of the trails in your photograph.

Capture pinpoint stars. "With a full-frame digital camera and a very fast lens, you're able to take such a quick exposure that you get pinpoint stars," Suggs says.

Be prepared. In night-sky photography, better equipment pays off. "But there's nothing wrong with using a phone or less expensive camera," Suggs says. More importantly, be prepared with two headlamps, extra batteries, clothing layers, and provisions.



Sun Shade

HERE'S HOW TO SEE THE ANNULAR SOLAR ECLIPSE.

Before assuming astronomy is one outdoor activity that doesn't require sunscreen, consider solar watching: a way to observe the sun during daytime, along with other parts of the lunar cycle not conducive to stargazing. A timely opportunity is during the annular solar eclipse (when the moon passes between the Earth and sun) that crosses New Mexico on Saturday, October 14, reaching a maximum of 90 percent in Albuquerque at 10:35 a.m. NASA eclipse ambassador Derek Wallentinsen shares how to have fun while safely observing an eclipse.

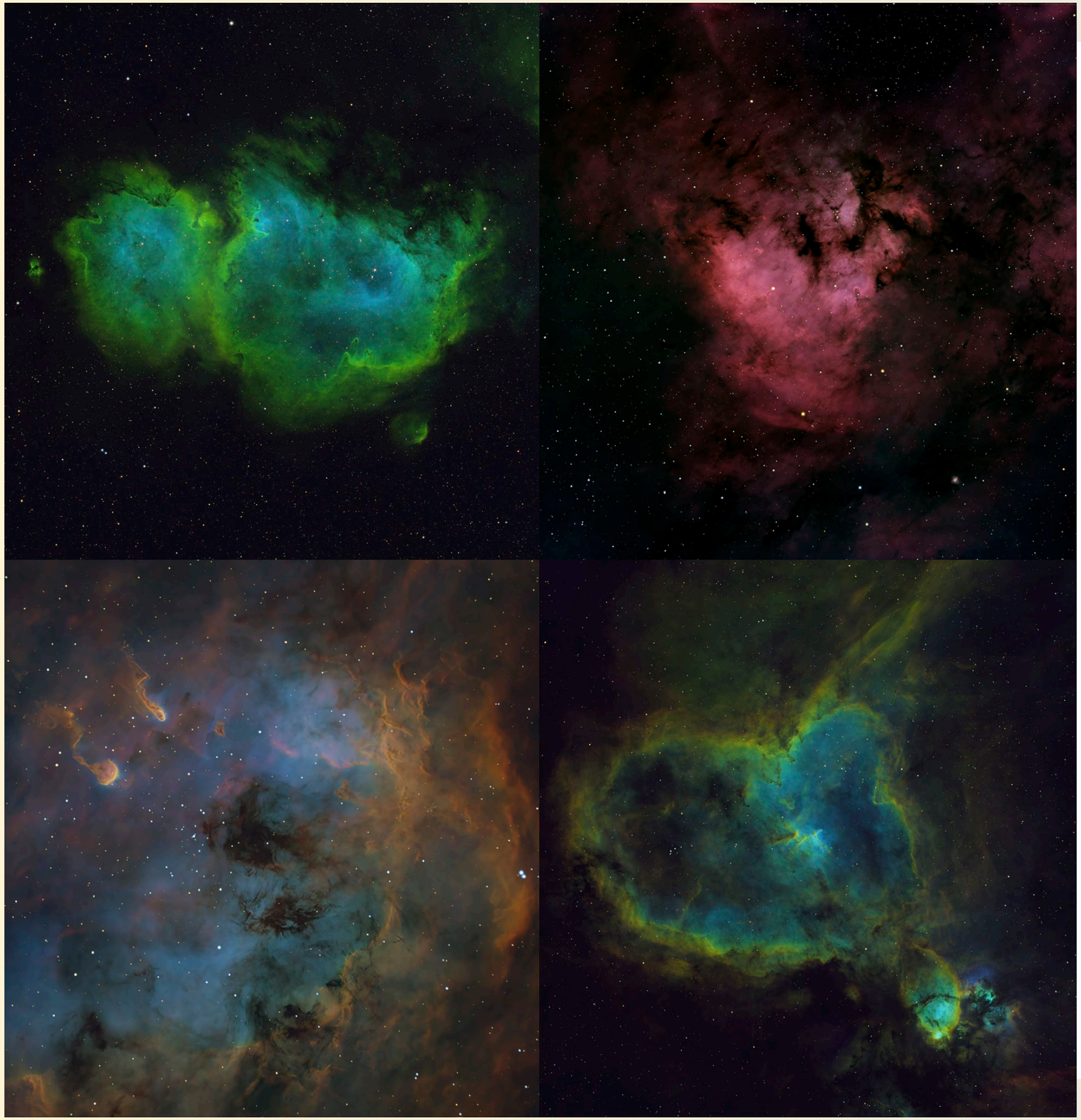
Pick a viewing spot. The path of annularity runs diagonally from the northwest corner to the southeast corner of New Mexico. Cities on the centerline include Farmington, Gallup, Los Alamos, Roswell, and Hobbs. Outside the path, viewers will see a partial eclipse.

Protect your eyes. Make sure your solar viewing glasses meet the ISO 12312-2 international standard. "A lot of organizations will distribute free glasses," Wallentinsen says.

Stand under a tree. "Look at the ground. The tree's leaves will project thousands of images as the eclipse progresses," he suggests.

Attend an event. Knowledgeable people can share pointers. On October 14, Wallentinsen will be at Chaco Culture National Historical Park, where one petroglyph is thought to depict a 1097 solar eclipse, for "an atmospheric, time-drenched view of the eclipse." Check out these organizations hosting annular eclipse viewing and education events:

New Mexico Museum of Natural History and Science *nmnaturalhistory.org*
Valles Caldera National Preserve *nps.gov/vall/index.htm*
Jemez Pueblo Visitor Center *nmmag.us/walatowa*
Valle del Oro National Wildlife Refuge *nmmag.us/valledeoro*
PEEC with Bandelier National Monument, Los Alamos Library, and the Manhattan Project National Historical Park *peecnature.org*
Sunspot Solar Observatory *sunspot.nmsu.edu*
New Mexico Museum of Space History *nmspacemuseum.org*
Amateur Astronomers Group at Oliver Lee Memorial State Park *astronomersgroup.org*
Salinas Pueblo Missions National Monument *nmmag.us/spmnm*
Capulin Volcano National Monument *nps.gov/cavo/index.htm*



Deep Thoughts

ASTROPHOTOGRAPHY BRINGS DISTANT OBJECTS INTO VIEW.

A form of astrophotography that's popular among more serious amateur astronomers is taking photos of distant objects in space. Retired aerospace engineers Lori and Barry Flansburg take pictures of deep-sky objects from their backyard observatory and share them on their Night Skies Over New Mexico Facebook page (facebook.com/NightSkiesNM).

Photographs of nebulae, star clusters, and galaxies capture the color human vision cannot in low light. "Your eyes are built with rods and cones. One is sensitive to light and the other to colors," Barry explains. "When things dim down while you're looking at a galaxy far away, you can't see the colors because it's too dim."

With the naked eye, the planet Mars really does appear reddish, as does the 10th brightest star, Betelgeuse. Most dimmer objects look monochromatic through telescope eyepieces, which the Flansburgs almost never use. "When you're looking through the eyepiece, you have to have a vivid imagination," Lori says. "In photos, we get gorgeous colors in high resolution."

◀ **Clockwise from top left:** The Soul Nebula, an emission nebula 100 light-years across, is located in the constellation Cassiopeia. NGC 7882 is a star-forming region in the constellation Cepheus, where stars are born within clouds of gas. Heart Nebula is an emission nebula located 7,500 light-years from Earth in the constellation Cassiopeia. An emission nebula in the constellation Auriga, the Tadpoles Nebula features star-forming regions known as tadpoles (located in the upper left corner), similar to the "Pillars of Creation" made famous by the Hubble Space Telescope.

COURTESY OF BARRY AND LORI FLANSBURG

Jennifer C. Olson *stargazes from her toddler's bed after story time every night in Pinos Altos. There, the night sky remains almost as twinkly as it was 163 years ago, when gold was discovered in the mountains she calls home.*

Dim Sum

PROTECTING OUR NATURAL SKIES CAN BE A SIMPLE EQUATION.

Valle de Oro National Wildlife Refuge is an oasis just seven miles south of Albuquerque. The former 570-acre farm, the first urban wildlife refuge in the Southwest, also ranks as an Urban Night Sky Place that includes a dark-sky-compliant visitor center. "We demonstrate best practices for protecting the night sky and do education about protecting the night sky, which is really important for our human health and the health of migrating wildlife or nocturnal animals," says Valle de Oro manager Jennifer Owen-White. "By protecting night skies, you can have a big impact and an immediate impact."

Put outdoor lights on a motion sensor or timer. Having lights on only when needed protects the night skies and the property. "Our visitor center is set back from the main road," Owen-White says. "If we have lighting on at all times, it points out where this big building is. Having lights off makes it less obvious."

Stay focused. Keep light directed down where you need it. Also, install lights in the red and orange spectrum. Although touted for energy efficiency, LEDs emit bluer light, which adds to the artificial night sky brightness more than the warmer light cast by incandescent bulbs. "Those bright blue-white lights affect our circadian rhythm," Owen-White says. "Look at the Kelvin temperature rating. The lower the number, the warmer the light."

Follow DarkSky's central guideline. "Light where you need it, when you need it, in the amount needed, and no more." NM