



## Star Search

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by Anne Constable | The New Mexican  
October 24, 2004

Chad Moore, program director of the National Park Service's Night Sky Team, stood in 40-mph winds at the top of Capulin volcano last week counting the stars overhead.

On Monday night, Moore said he measured a limiting magnitude of 6.6 at the national monument 33 miles east of Raton; the second night, he recorded an LM of 6.8.



Limiting magnitude is a measure of the brightness of the faintest star one can see. As light pollution increases, the limiting magnitude decreases. A dark, virgin sky might have an LM of 7,

indicating 14,000 stars are visible. A rating of 2 to 4 would mean only a couple hundred stars and the brightest constellations are discernible.

Moore's readings on Capulin show that approximately 10,000 stars were visible those nights (although only half can be seen at one time). In fact, an LM of 6.6 or higher makes it difficult to pick out individual constellations, Moore said, although the Milky Way, the Orion nebula and the Andromeda galaxy are easily detectable.

Capulin is one of the darkest places Moore's team has measured in New Mexico -- and one of the darkest park-service sites in the United States. The state's altitude and dry air make it a prime stargazing location. But even Capulin "still has a lot of obvious light pollution," Moore said. From the top of the volcano, he said, he could see lights from several Colorado cities including Trinidad, Pueblo, Colorado Springs and Denver.

"That's the daunting part of keeping the night skies," Moore said. "It doesn't take much light to degrade the sky."

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For thousands of years, the night skies have inspired poets and prophets, guided sailors and explorers and captivated astronomers and astrophysicists.

"The night sky has been something that has evoked mystical thought and feeling in human minds since time immemorial," said Jerry Rogers, a retired National Park Service preservation official from Santa Fe. "There's not a human who can look at a wonderful dark sky for more than a few minutes without thinking, 'What does that all mean?' and 'Where do we fit into it?'"

This week, there's a good chance to ponder these thoughts. New Mexico is

observing Dark Sky Appreciation Night on Wednesday. And this year, the event coincides with prime viewing conditions -- a total lunar eclipse beginning around 8:23 p.m.

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In many parts of the world, the night sky is disappearing. It is said that Muslim clerics often cannot make out the crescent moon because of glare from the ground. In the United States, less than 10 percent of the population can see the Milky Way. And urban lighting causes sky glow even in the nation's pristine national parks.

In New Mexico, the dark sky is one of the state's biggest attractions for tourists and residents.

Every year, Geoff Goins ([www.nightskyadventures.com](http://www.nightskyadventures.com)) shares his passion for the night sky with 1,000 or more visitors to his property in Red River. His guests observe the planets, constellations, nebulae -- the pockets of gas in outer space where stars form -- and galaxies up to 150 million light years away through his 10.5-foot-tall telescope.

"Most people cannot believe the amount of stars to be seen," he said.

But even though the state is large and lightly settled, light pollution from subdivisions, casinos and billboards is increasingly marring its dark skies.

At Chaco Culture National Historical Park 70 miles south of Farmington, park guide GB Cornucopia said the sky is almost as dark as when ancestors of the Pueblo Indians lived there a thousand years ago. "The constellations, the moon, the planets -- it's the same sky they saw, with few changes."

But during his 18 years at the park, the glow from Crownpoint, 40 miles to the south has increased, and increasingly he sees light pollution emanating from as far as Rio Rancho and Albuquerque.

"It's a shame that a park with such spectacular cultural resources is not that dark," Moore said.

The dark sky is vanishing in other places near Santa Fe. When Sheila Sullivan moved to Eldorado 20 years ago, the sky was "pitch black" and "dazzling." She could switch off her car lights when she turned into the subdivision and drive the rest of the way home by starlight. "You couldn't do that now," Sullivan said. Today, she added, about one-third of the distance from the horizon is "either gone completely or quite muted."

While the night sky is the part of the environment that has changed the least over the years, most people no longer experience it in the same way as their ancestors.

"That saddens me," Cornucopia said. "The more light pollution we create, the less we understand the nature of the world we live in. Keeping it accessible is real important."

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At the beginning of the 1990s, not many people were thinking about the loss of the night sky. But things began to change.

Joe Sovcik was acting superintendent at Chaco Culture National Historical Park in 1991 when he became concerned about light pollution. He realized

that much of it was coming from inside the park. In response, Chaco installed shields and motion sensors on the lights at the visitors' center, reworked the lighting at the campground and changed outdoor fixtures at its housing units. The park also installed four large telescopes, strengthening the direct link with the ancient culture that inhabited Chaco. Other New Mexico parks began reorienting and retrofitting their lighting.

That was the beginning of the park service's night-sky program.

Today, Moore leads a team collecting baseline data at 44 National Park Service sites. In addition to determining the LM at Capulin last week, Moore also took 104 images of the night sky from the volcano with an astronomical-grade CCD camera. He will use the photographs to measure the brightness of the space between the stars. The camera system, he said, is a more precise way than visual observation to rate the night skies.

He expects to return to New Mexico next spring for more data collecting. "The basic tenet (of preservation) is to know what you've got and track what you have," Moore explained.

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As the parks were realizing the need to document the loss of the night sky, individuals in New Mexico were also becoming increasingly concerned about reducing light pollution.

In 1999, at the urging of Rogers and Sovcik, the newly formed New Mexico Heritage Preservation Alliance decided to put the night sky on its list of most endangered historic places. The same year, the Legislature passed the Night Sky Protection Act, one of the first of its kind in the country. The act requires outdoor lighting installed after Jan. 1, 2000, to be shielded and directed downward and outlaws the sale of mercury-vapor lights.

The legislation exempted ranches, farms and outdoor advertising (think billboards). And the penalties for noncompliance were weak. But the law raised public consciousness about the value of the dark sky.

Five years later, when the city of Santa Fe installed artificial turf at Salvador Perez Park, it selected state-of-the-art lighting fixtures for the sports field that are compliant both with state law and the city lighting ordinance. Earlier this year, Prime Electric of Albuquerque erected four 80-foot poles, each containing 13 Total Light Control fixtures manufactured by Musco Lighting, a Round Rock, Texas, firm that is a leader in the field. And the three new fixtures in the parking lot are down-lighting.

Frank Archuleta, who works in the community-facilities section of the city's engineering division, said the new lights reduce overspill on St. Francis Drive, which borders the park, and limit impact on the senior-housing center across Alta Vista Street.

Sullivan said the county, which has lighting regulations in its land-use code that are more stringent than state law, helped the Eldorado community persuade First National Bank to turn off the upward-pointing lights that were illuminating its façade and spilling light into the night sky.

"The law is working up to a point," Rogers said. "More people know about the value of the night skies. More are aware that it is something worth having and struggling for."

On the other hand, he said, "The problem of light pollution is continuing to

get worse."

One of the biggest offenders is the billboard industry. According to Moore, "Most state highway departments have gone to putting lights on top of signs, and the lighting companies are on our side, but the billboard industry still strongly insists on lighting from below."

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While Earth can't recapture its oil supply or easily clean up its water and air, the sky is unique. "There's no other environmental problem like that. It's very easy to make a fix," Moore said.

Many solutions are contained in the New Mexico Heritage Preservation Alliance's Consumer Guide to Good Lighting Practices, published later this month. It provides tips on choosing outdoor lighting fixtures and advice for architects, builders, property owners and state and local municipalities.

Restoring the night sky, proponents say, will not only restore our wonder about the universe, but better conditions for nocturnal animals, improve safety and security by reducing glare and dark shadows -- and it's economical.

If nothing else, Rogers said, "People ought to pay attention to the fact that they can save money by doing right." And, Moore added, "if every light from now on is a good light, in 20 years we can make a big difference."

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## Comments

**By Jan Hollan** (Submitted: 10/26/2004 8:23 am)

Thanks for a great article. To those, who would like to see all-sky images showing the influence of distant sources of pollution, I recommend Pierre Brunet's presentations available within

[http://amper.ped.muni.cz/light/luminance/piere\\_brunet](http://amper.ped.muni.cz/light/luminance/piere_brunet) - they are from France, but man-made light disperses the same way there...

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