New Mexico Energy, Minerals and Natural Resources Department

INTERNATIONAL DARK-SKY PARK DESIGNATION (GOLD LEVEL)

CLAYTON LAKE STATE PARK NOMINATION PACKET

Star Point Observatory: Clayton Lake State Park

A proposal to:

The International Dark-Sky Association

3225 N. First Avenue
Tucson, Arizona 85719

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1. Letter of Nomination

IDA Board of Directors
3225 N. First Avenue
Tucson, Arizona 85719

March 28, 2008

Dear IDA Board of Directors,

Over the past five years, I have worked in support of New Mexico State Parks and their night sky interpretation efforts. Beginning first as a volunteer in 2003, then as a contractor in support of their innovative "Reach for the Stars" outreach program in 2005, and now as Director of the Night Sky Program with the New Mexico Heritage Preservation Alliance.

Throughout each level of involvement with New Mexico State Parks, I have been impressed by the quality of the night sky at many of the 35 state parks locations. The "Reach for the Stars" program has worked to bring the public a sense of appreciation and understanding that has garnered support for the precious natural resource we share in an unspoiled night sky.

In 2006, Clayton Lake State Park was visited by Kate Margargal of the National Park Service Night Sky Team. Measurements were taken of the night sky brightness and data revealed that the night sky above the park is of exceptional quality.

On June 17th, 2006 New Mexico State Parks held a grand opening and dedication of the Star Point Observatory at Clayton Lake State Park. Star Point is the second observatory of four being built throughout the state to serve as centers for night sky interpretation and education. Shortly after the dedication event, the Clayton Astronomy Club formed from a core group of enthusiastic individuals. They hold regular events to promote the educational opportunity afforded by the observatory and to leverage local interest in passage of night sky friendly lighting ordinances both in the town of Clayton and surrounding Union County.

Of all of the parks locations I have visited, none equals the combination of nighttime environment, broad level of community involvement, and regional stature that is possessed by Clayton Lake State Park.

Therefore, I nominate New Mexico's Clayton Lake State Park for designation as a Gold level Dark-Sky Park.

Sincerely,

Peter Lipscomb
Director, Night Sky Program
New Mexico Heritage Preservation Alliance
P.O. Box 2490 505-989-3696

2. Park Manager Letter of Support

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Dave J. Simon
Division Director
State Parks

March 21, 2008

To Whom It May Concern:

As Park Manager of Clayton Lake State Park, I would like to emphasize my support for the nomination of Clayton Lake State Park as an official "Dark Sky Park".

As only the second park in the entire nation to build, maintain and operate an observatory, the dark skies we enjoy are very important to us.

Clayton Lake State Park hosts approximately 65,000 visitors a year, from all over the United States, as well the entire world. We regularly have "Star Parties" for these visitors. The educational benefits of these star parties are immense, as we educate the visitors not just on the astronomical side, but also on the fact that we do have some of the darkest skies in the continental United States, and ways they can preserve and protect the skies in their local community.

We also work closely with the local community to educate on the benefits of the dark skies we enjoy. We are working closely with the local school systems, and have programs for both the students and their parents.

We speak regularly to local civic organizations, educating their members of the economic benefit to the Town of Clayton of having visitors spending their vacations in Clayton, and how preserving our observatory and dark skies will bring increased visitation to our local community. As such, the Town of Clayton has increased their efforts in reducing light pollution and preventing future light pollution in ongoing projects.

Sincerely,

Charles Jordan
Park Manager

3. IDA Member Letters of Support

March 4, 2008

Dear IDA Board of Directors,

I believe we should be nominated as the fist dark sky park in New Mexico because I have been fortunate to have witnessed astronomy change the dynamics of the isolated and historic town. New Mexico State Parks has been more than generous by providing us with some of the nicest facilities an amateur astronomer could hope for. The "No Child Left Inside" program initiated by the Clayton school system, NM State Parks and the Clayton Astronomy Club has been a phenomenal success.

Sincerely yours,

Art Grine
IDA Member and current President of the Clayton Astronomy Club

IDA Board of Directors
c/o Peter Lipscomb
Director, Night Sky Program
New Mexico Heritage Preservation Alliance

Dear IDA Board of Directors,

I guess to cover the Amarillo Astronomy Club's involvement with Clayton Lake State Park a brief bit of personal history is involved.

I moved from Folsom, NM to Amarillo in November, 1999, and joined the Amarillo Astronomy Club in February 2000. In the summer of 2000 I started floating the idea of exploring a new location for a club observing event, and suggested Clayton Lake. To verify the Lake's suitability as a dark sky location, I came up on a weekend in July and spent a nice night at the then deserted future site of Star Point. I took my report of the location back to the club and spent the next four weeks organizing the first Amarillo Astronomy Club observing weekend at the lake. That weekend in August started rather poorly, with 1.5" of rain on Friday night, but Saturday night worked out decently, with 8 telescopes set up and the public invited.

The club enjoyed the weekend enough that I somehow ended up as the new club president for the next three years, and a summer observing weekend was had for the next three summers. During this time period, a few of us started also coming in the springtime. By 2003, we had changed our planned club observing special events from Caprock Canyon State Park in Texas, to exclusively Clayton Lake State Park.

We currently plan two weekends a year at Clayton Lake, with other weekends as weather and schedules permit. I, and others, have been visitors and observers at the park anywhere from one to six times a year since then.

We have always had a very good relation with the park, with Charles Jordan and his staff always making us very welcome. This culminated with the planning and building of the Star Point observatory, opening in June 2006. The park also installed shielded fixtures on the park lighting at the boat ramp and RV sites.

The skies at the park are some of the better astronomical skies I have had the pleasure of enjoying, and I look forward to enjoying those dark skies for years to come. We have been spreading the word about the lake to other observing friends around the country, and those who have been there echo my sentiments.

I do express my sincere thanks to the park, and the state of New Mexico, for recognizing the potential of keeping the skies as they are as one of the most important things we can hand down to our descendents.

Bob Hill
IDA member
Former President, Amarillo Astronomy Club

4. Other Letters of Support

Clayton Municipal Schools

323 South Fifth Street
Clayton, New Mexico 88415
Phone: (505) 374-9611
Fax: (505) 374-9881

Jack Wiley
Superintendent

Claudia Montoya, Principal
Alvis Elementary School
Stacy Diller, Head Teacher
Kiser Elementary School
Terrell Jones, Principal
Clayton Junior High School
John Burgess, Principal
Clayton High School

IDA Board of Directors
c/o Mr. Peter Lipscomb
Director, Night Sky Program
NM Heritage Preservation Alliance
Santa Fe, NM

March 13, 2008

Dear Mr. Lipscomb;

It is very good to hear that you are nominating Clayton Lake State Park as a Dark Sky Park for the International Dark-sky Association (IDA). As junior high principal and Director of Instruction for the Clayton School District, let me assure you that this nomination is well deserved. The schools depend on the facilities and personnel at Clayton Lake along with the local astronomy club as integral parts of our "No Child Left Inside" emphasis.

As you know, the state on New Mexico mandates educational standards and benchmarks. The state also mandates an annual assessment to measure how well these standards have been taught. Our teachers really don't have time for "nature appreciation" due to the emphasis on reading and math. In addition, we are competing with multiple electronic distractions. We have found that by utilizing Clayton Lake State Park's facilities, we can teach hard-to-meet educational standards and benchmarks as we expose the children to the wonders of nature. Imagine that; students learning what they must learn while interacting with nature. It is a win-win situation.

We have had four star parties so far this year, one for each grade of 5^{th} -8^{th} graders. A bonus has been excellent attendance by the parents. That helps with another goal, namely, increased parental involvement in the schools. Please take a look at the attached article about the junior high's star parties.

In summary, our community has been very supportive of our use of the facility. Along with the Clayton Astronomy Club and Clayton Fishing Derby there is increased awareness of the dark skies around Clayton. This is a natural resource worth protecting. Thank you for your efforts.

Sincerely,

Terrell Jones

Principal, Clayton JHS

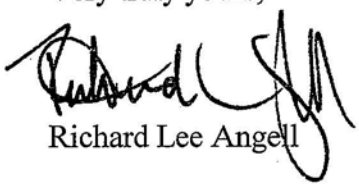
By the time we arrived at the Park, the Ranger had contacted the President of the Clayton Astronomy Club, Mr. Art Grine. He had also made arrangements for us to meet Mr. Grine and to tour the Starpoint Observatory facility. We were invited to camp directly on the grounds of the observatory and use the concrete observing pads provided for visiting astronomer's telescopes. At dusk, Mr. Grine joined us at the observatory and showed us what a wonderful facility was being developed. Before he left, I had joined the Clayton Astronomy Club. Did I mention that Mr. Grine is an enthusiastic salesman for astronomy, his Club and dark-sky?

Our observing experience that night and the next was outstanding. The light pollution map that I use shows that the site is in an area of Bortle 2 skies. It is my impression that it meets the criteria for that level. I know that during our observing sessions those two nights, I cast a shadow on the pad in light from the Milky Way. My Meade LX90 (8" nominal aperture) could not take full advantage of the darkness of the sky. Objects that I am usually only able to see with my telescope at many other star-party sites were naked eye visible at Starpoint Observatory.

Since last fall I have made two more trips to Starpoint Observatory and have stayed in contact with the members of the Clayton Astronomy Club. The quality of the experience has remained as high as the first visit. I have also been able to keep abreast of the Club's efforts to preserve and improve the dark sky in the area. The Club has worked with the City of Clayton on lighting ordinances. A new prison facility is being built East of Clayton. The Club met with the planners and gained their cooperation in using shielded lighting.

I whole-heartedly endorse Dark-Sky Park status for Star Point Observatory at Clayton Lake State Park.

Very truly yours,



Richard Lee Angell

RLA/tmb

To the Nominating committee:

Kiser Elementary fifth and sixth grade students took a wonderful field trip to Clayton Lake State Park. Fifth grade students went on October 29 and sixth grade students attended October 30. These trips were a collaboration of Kiser Elementary staff, Mr. Terrell Jones, the Clayton Astronomy Club, and State Parks and Wildlife. The children were given a tour of the dinosaur tracks. Ranger Bill Christy provided an informative presentation on the wildlife at the park. Many families of Kiser students joined their children at the park around 5:30 for a cook out and star gazing. Students were then given the opportunity to roast a hotdog over an open camp fire and make "s'mores" (flaming marshmallow, graham cracker, and Hershey bar) with the help of school staff and the Clayton Astronomy Club. While waiting for the sky to become dark enough for star viewing, songs were sung around the fire. The Clayton Astronomy Club set up three telescopes for star viewing. Students were able to see four of the moons that orbit Jupiter. They also saw comet Holmes in the constellation of Perseus, which is visible every seven years. They located many different constellations, star clusters, and even other galaxies. About 200 students, parents, and volunteers took part in these activities.

Stacy Diller

Head Teacher

Kiser Elementary

Dear Sir,

My name is Jeff Thibodeau. It has been my privilege to serve as president of the Oklahoma City Astronomy Club for the past four and one half years.

One of the things we do as a club is host the annual Okie Tex Star Party at Camp Billy Jo in Kenton, Oklahoma each fall. This year marks our twenty-fifth annual event.

Amateur astronomers from all over the country make the trip to Kenton each year to enjoy the local hospitality, unique tourist attractions, and the extremely dark skies.

For the first fifteen years our event was hosted in a state park halfway between Oklahoma City and Dallas, Texas in order to accommodate star gazers from both cities. However the city of Ardmore, Oklahoma grew rapidly during this period and the additional unshielded light which it added to the night sky at our original site forced us to leave the area in search of something darker.

Instead of a two hour drive each year our local members began to drive six and seven hours to Kenton because of the dark sky conditions there. Word quickly spread and now we entertain about three hundred astronomers from about twenty-five different states at any one event.

The reason I am writing this letter is to lend support to the efforts of having Clayton Lake State Park designated as an International Dark Sky Association (IDA) Dark Sky Park.

Northeastern New Mexico offers a unique environment for observing the night sky due to its high altitude, dry climate, and lack of light pollution. This combination makes the Clayton Lake area and its pristine night skies a treasure that the people of New Mexico should be proud of and help to preserve.

The night sky can inspire and refresh the human spirit in the best sense of what a state park designation is intended for. It can rouse a sense of curiosity and proportion that few other experiences can match.

A truly dark night sky is a useful scientific tool for the investigation of still unresolved mysteries in astronomy, physics, and cosmology. The observatory at Clayton Lake will be used to teach and inspire students and encourage a deeper appreciation for the sciences as well as help prepare them for careers in any of the technical or scientific fields.

The beauty of a clear dark night sky is already lost to many people across the nation and the people of New Mexico should appreciate this matchless treasure which they already have.

The encroachment of uncontrolled unshielded light can spoil this experience and lessen the value of the land. This does not need to be the case. By following guidelines laid out by the International Dark Sky Association, the natural beauty of the area can easily be preserved. At the same time cost and energy savings can be realized by the park and its neighbors.

So I hope that you will support the efforts of the Night Sky Program of the New Mexico Heritage Preservation Alliance and designate the Clayton Lake State Park as an IDA Dark Sky Park.

Jeff Thibodeau
President
Oklahoma City Astronomy Club
P.O. Box 22804
Oklahoma City, OK 73123-1804

To the IDA Board of Directors
c/o Mr Peter Lipscomb March 16, 2008
Director, Night Sky Program
New Mexico Heritage Preservation Alliance
Santa Fe, NM

Dear IDA Board of Directors:

Please accept this letter of support nominating Clayton Lake Sate Park as an IDA Dark Sky Park. If have observed at the park a number of time is the last year and rate the skies there as some of the best I have seen anywhere in the United States. I recently observed in Australia, and compare the dark sky to be quite favorable to that experience.

Clayton Lake State Park also has the advantage of being in a somewhat lower elevation than the surrounding countryside, which aids in reducing sky glow from the town of Clayton itself. For this reason and the 5000 ft + elevation, Amarillo Astronomy Club members schedule two observing sessions per year at the park. The Amarillo Astronomy club also supports the local astronomy club on some occasions. Maintaining dark sky status assures the park and it's observatory of continued excellence when it comes to viewing astronomical wonders. Visitors to many parks in Texas, for example, are treated to "sky parties" but the artificial lighting has not been controlled, and many time the parks are close to larger metropolitan areas. This is the big advantage for Clayton Lake State Park. Light shielding is already in use, Clayton, New Mexico is not that large, and there are numerous supporters who would like to see Clayton Lake State Park continue with this dark sky advantage.

I would think that a dark sky status would enhance visitation to the park, especially to observe the heavens. More star parties, and volunteers interpreting the skies above would be a positive outcome of gaining this status. I strongly endorse this nomination and sincerely hope Clayton Lake State Park is designated as a Dark Sky Park in the very near future.

Sincerely,

Arthur Schneider, Physical Sciences Professor/Retired
Amarillo College
Amarillo Texas.

5. Park History & Information

Background

The New Mexico State Game Commission created Clayton Lake as habitat for migratory waterfowl. Construction of a dam across Seneca (or Cinegilla) creek began in 1954, and was completed approximately two years later. Until 1965, the Game Commission and Union County jointly maintained the lake. In 1965, efforts by the Mayor and Board of Trustees in Clayton, the Union County Wildlife Association and many others paid off, and on August 10, 1965, the New Mexico State Park and Recreation Commission signed an agreement with the Game and Fish Commission, creating CLSP. Development of the park facilities began in 1967, and included twenty camping units, six toilets, a comfort station and road improvements.

The State Park and Recreation Commission held a formal Dedication Ceremony on June 28, 1968.

Environment

CLSP is located 12 miles northwest of Clayton via Highway 370. The park is located at the southwestern edge of the Great Plains. The landscape is characterized by rolling prairie, volcanic rock formations and sandstone bluffs. The average park altitude is approximately 5,050 feet. The average annual temperature is 53 degrees Fahrenheit. July temperatures average 74 degrees Fahrenheit, rarely, but occasionally reaching 100 degrees. January temperatures average 33 degrees Fahrenheit, occasionally dipping to below zero degrees Fahrenheit. The average annual rainfall is 14.12 inches; annual snowfall averages 21.3 inches.

Education and Interpretation

In the past, little emphasis was placed on interpretation. With the development and implementation of an Interpretive Master Plan (IMP) and with the assistance of the Regional Interpretive Ranger, interpretation and education will take on an increasingly important role. It is also hoped that with more interpretive programs off-season visitation can be increased.

CLSP has some of the darkest skies in the entire United States, and combined with a growing interest in astronomy, "star parties", using the Division's computerized telescope, as well as local's telescopes are becoming increasingly popular. Many area astronomy clubs also come to CLSP on a regular basis to set up their telescopes to observe the night skies. A permanent astronomy observatory will be constructed at "Star Point" at the site of the new Group Camping Area, to increase educational opportunities, and increase visitation from astronomers. (observatory completed June 2006)

Source: Clayton Lake State Park Management Plan

6. Star Point Observatory

Using the same design as New Mexico State Park's first observatory at City of Rocks State Park, the Star Point observatory at Clayton Lake State Park was opened to park visitors on June 17, 2006. The observatory uses a solar powered battery array for its electrical supply. This feature allows the observatory to be off-grid and demonstrates the use of alternative energy technology by enabling the public to view the stars on a system powered by our star, the sun.

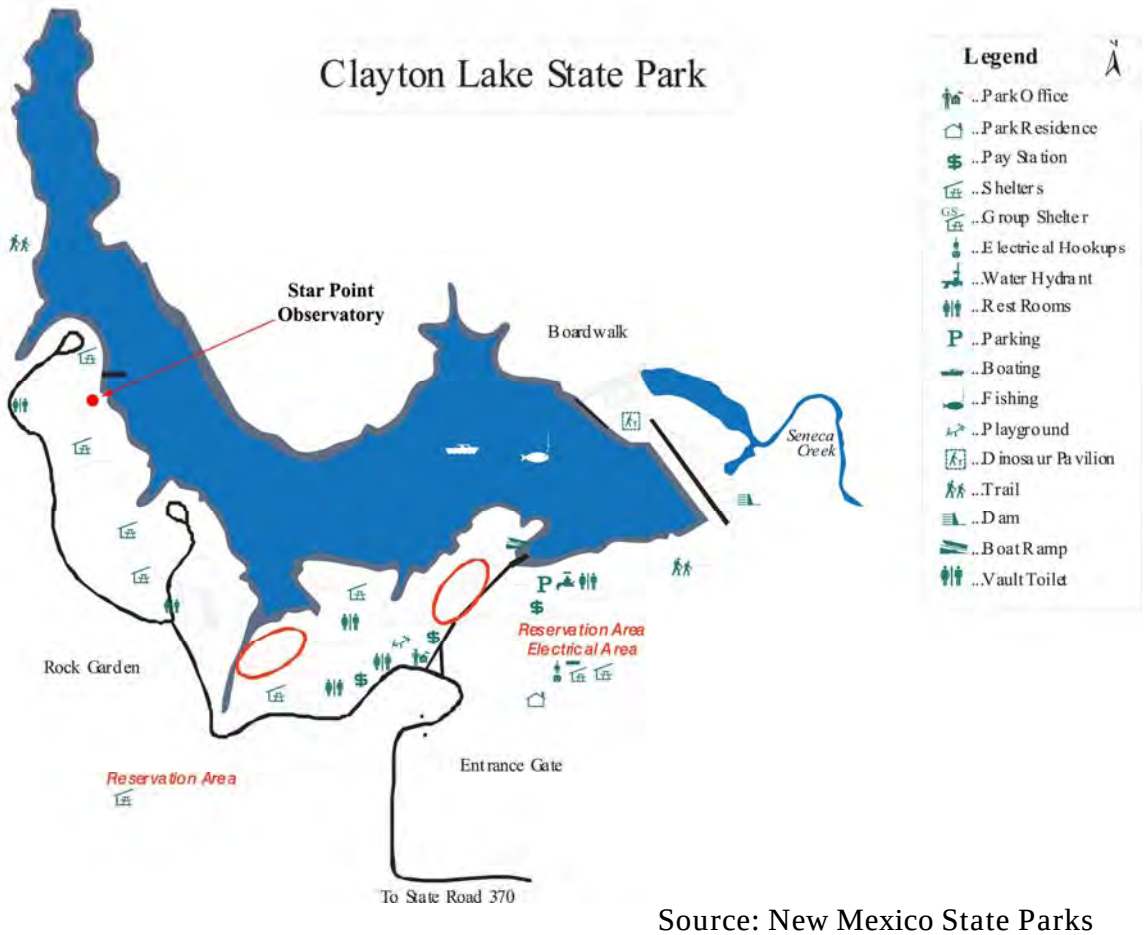
Star Point observatory is equipped with a polar mounted 12" Meade RCX 400 telescope atop a Pier Tech height adjustable pier. A camera and flip-mirror system allows visitors to view direct through the eyepiece and preview astronomical objects on a LCD monitor as they await their turn at the telescope.

The telescope is housed in a 12' x 16' metal structure with a roll-off roof. The observatory design provide for a low-maintenance building that combines state of the art technology with sensible and durable construction. Several concrete pads are located outside the Star Point observatory for placement of additional telescopes

The observatory site is on the west side of Clayton Lake State Park with no exposure to ambient light from any of other park facilities. New Mexico State Parks has also constructed a large group shelter adjacent to the observatory to accommodate visiting groups of school children, the public and astronomers.

7. Map of Clayton Lake State Park

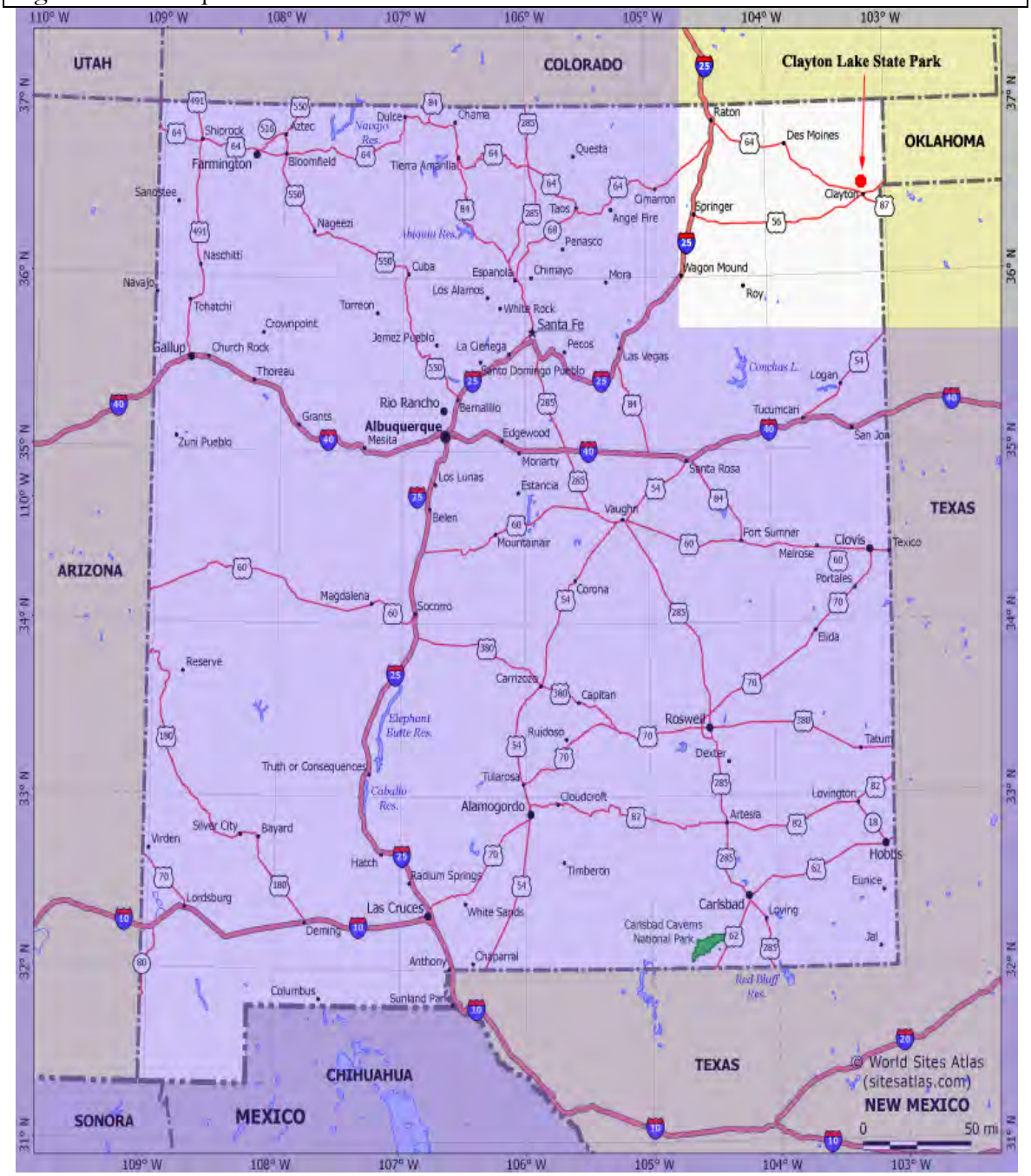
Clayton Lake State Park offers 36 camp sites throughout the developed area of the park. Star Point Observatory is located in a part of the park, free of direct illumination from any light source in the park. All three of the park's permanent buildings use minimal lighting. Besides being energy efficient compact fluorescent fixtures, they are fully shielded to prevent glare and emission of light into the sky.



Source: New Mexico State Parks

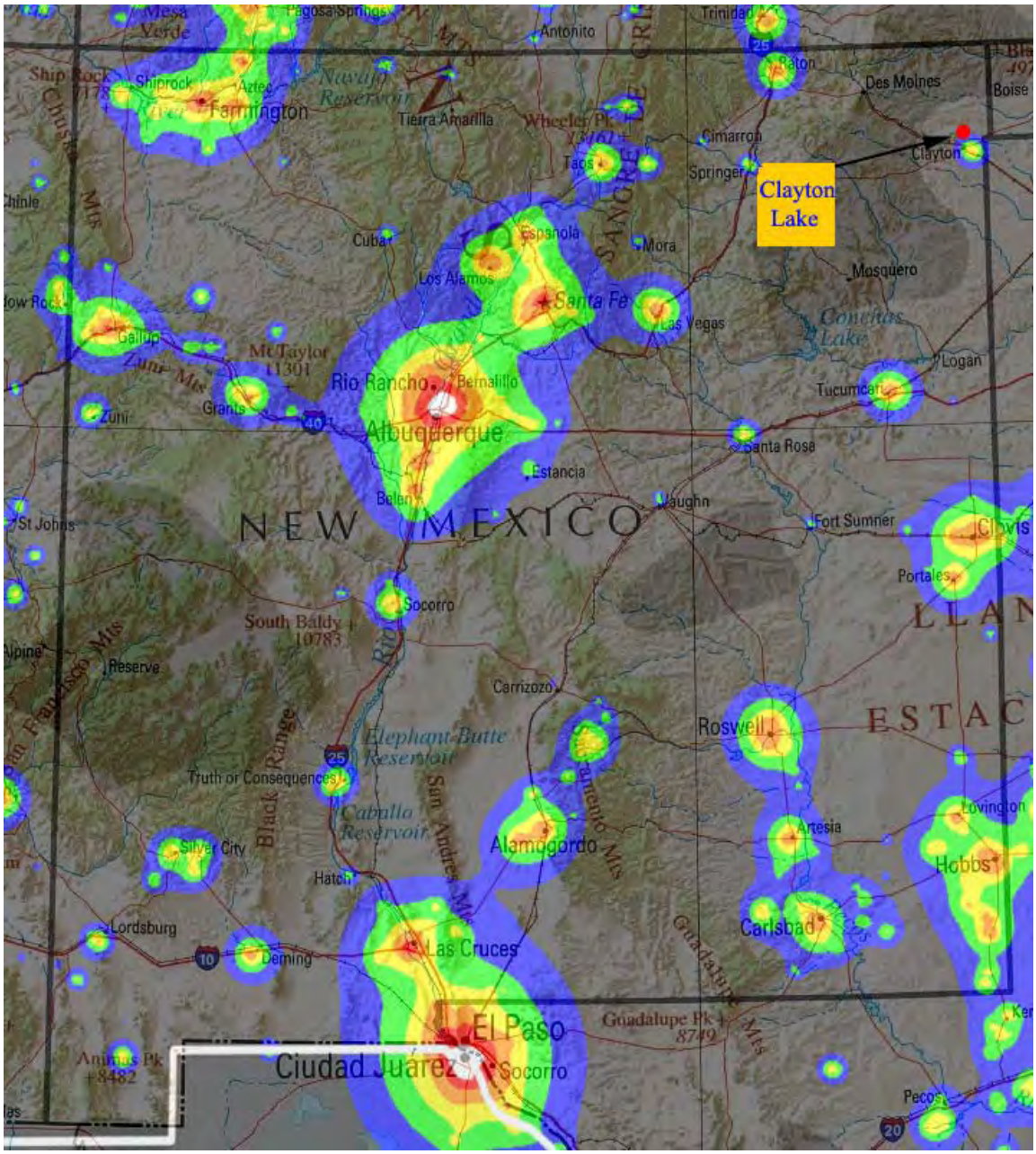
8. Location of Clayton Lake State Park

Clayton Lake State Park is located in an isolated part of northeastern New Mexico northwest of the town of Clayton, NM. It is becoming a popular site for stargazing, drawing visitors from Albuquerque, NM (284 miles), Amarillo, TX (144 miles), and Santa Fe, NM (228 miles). Ten years ago, organizers of the annual Okie-Tex star party sited their event just across the border in Oklahoma to take advantage of the exceptional sky quality. Many attendees of Okie-Tex make day trips to Clayton to sightsee and shop in local businesses.



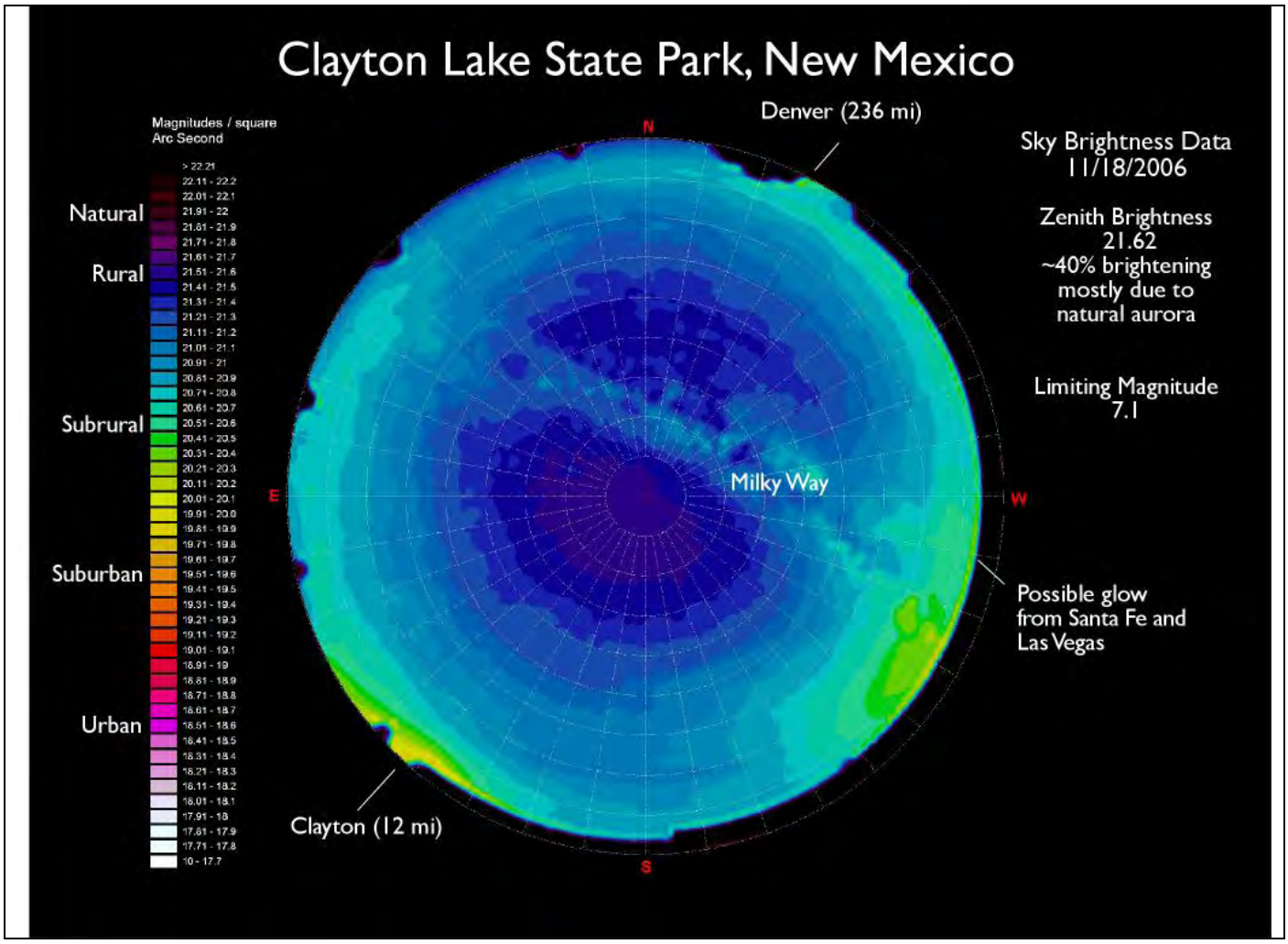
9. Documents of Sky Quality

Clayton Lake State Park is 12 miles northwest of Clayton near some of the darkest skies in the region. In the map of sky brightness shown below, the presence of light from Clayton is detected. But, because of the park's setting below the level of the surrounding plains very little sky glow can be seen from the park itself.



Source: Cinzano, et. al. *World Atlas of Artificial Night Sky Brightness* based upon data from DMSP/NOAA satellite imagery.

Working with the National Park Service Night Sky Team camera equipment, Kate Magargal performed a measurement of artificial sky brightness over the Star Point Observatory site. Even with the town of Clayton 12 miles to the southeast, the park typically shows a strong Bortle Class 3 sky on the cusp of Bortle Class 2.



A more complete explanation of the image above and details of sky brightness measures are on the next page.

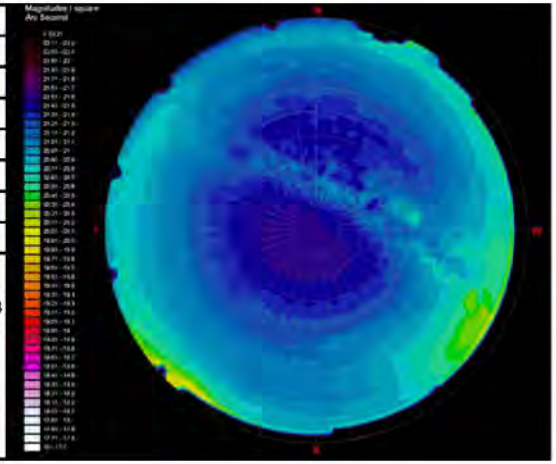
National Park Service Night Sky Team

Night Sky Quality Monitoring Report

Report date: 12/4/2006 by: Magargal, C. Moore

PARK:	Clayton Lake State Park	**EQUIPMENT:**	IMG2, 50mm f/2, 6084		
SITE NAME:	overlook beyond star point	**OBSERVERS:**	K Magargal		
LONGITUDE:	-103.30947	**AIR TEMP (°F):**	41		
LATITUDE:	36.57814	**REL HUMID (%):**	43		
ELEVATION (m):	1587	**WIND SP (mph):**	0		
DATE (UT):	November 18, 2006	**CCD TEMP (°C):**	-20		
TIME START (UT):	1:53:58	**EXP (seconds):**	12		
DATA QUALITY:	Very Good	**BORTLE CLASS:**	2-3	**ZLM:**	7.1

NARRATIVE: Some haze visible toward Capulin Volcano (prescribed burn) before sunset. Thin clouds to the NE. Stars visible to horizon. Clayton light dome the only one visible to unaided eye. M31an easy direct vision object, M15 and M33 both easy averted vision objects. ZLM 7.1 in Pegasus. Sky Quality Meter: 21.28 (1st), 21.25 (2nd). Camera detects slight glow from Albuquerque and Santa Fe, but is not measurable due to interference from Milky Way. Raton behind low mesa. Denver and I-25 corridor barely detectable behind terrain, but measure of -0.15 has low confidence. Airglow increased through the night; sky would be darker if not for this natural variation in light. This is likely one of the least light polluted sites in New Mexico. See NPS Capulin Volcano data as a comparison.

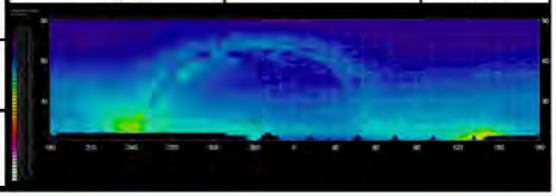


SKY BRIGHTNESS DATA

Data Set Number	Time (UT)	Extinction coefficient (mag/air-mass)	Std Err Y Extinction Stars (mags)	Zenith (mag/sq arc-sec)	Whole Sky (mags)	Sky Above 20° Altitude (mags)	Brightest (mag/sq arc-sec)	Darkest (mag/sq arc-sec)	Link to Sky Maps
1st Start	1:53:58			21.56					PAN
End	2:13:42	0.147	0.028	21.59	-7.44	-6.86	19.93	21.62	HEMI
2nd Start	2:37:43			21.57					PAN
End	2:57:25	0.147	0.030	21.58	-7.41	-6.84	20.00	21.61	HEMI
3rd Start	3:21:27			21.56					PAN
End	3:41:11	0.146	0.030	21.52	-7.44	-6.88	19.98	21.57	HEMI
4th Start									
End									
5th Start									
End									
6th Start									
End									

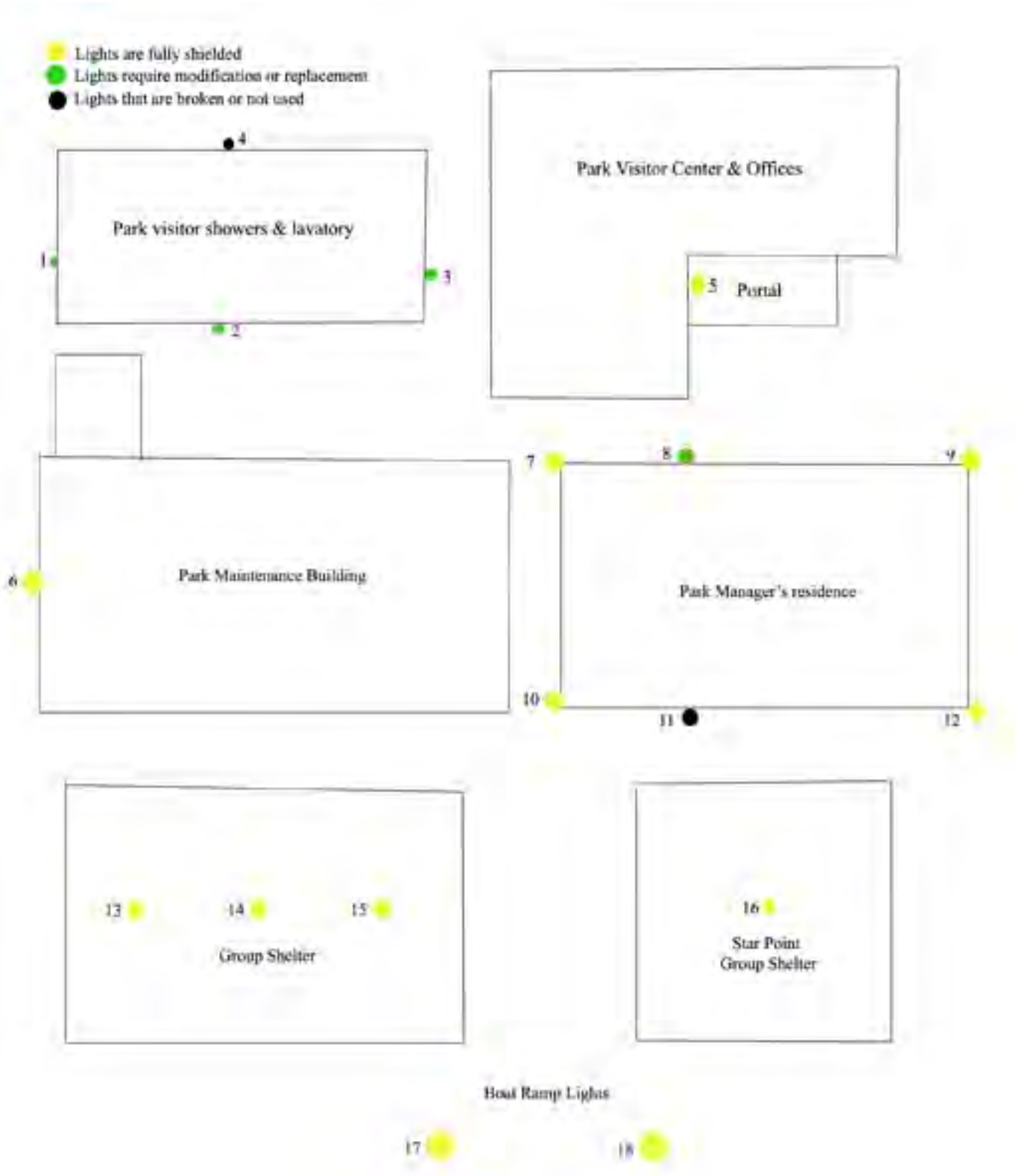
LIGHT DOME DATA

City	Distance (km)	Azimuth	1st Data Set Brightness (mags)
Clayton	19	139.5	-2.57
Albuquerque	341	242.5	MW interfere
Santa Fe	258	248.0	MW interfere
Raton	66	289.0	not visible
Denver	380	339.0	-0.15
Total			**-3.44**



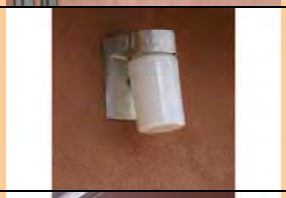
10. Park Lighting Inventory

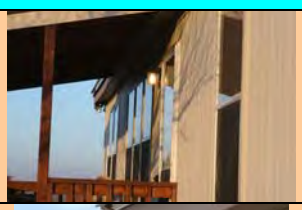
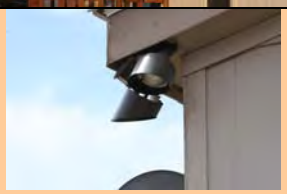
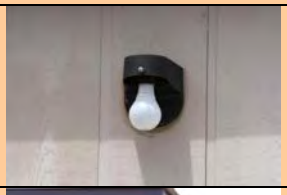
A) Map of All Lighting in Park

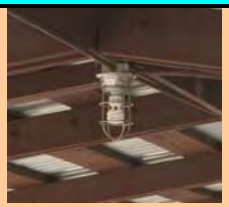


B) Light Inventory Matrix

Clayton Lake State Park Lighting Inventory

Light Ref #	Photo	Fixture	Application	Fully shielded	Special Purpose >1000 lumens	Conformity with Lighting Guidelines
1		26w compact flourescent	Entry and walkway women's lavatory	NO	NO	NO
2		26w compact flourescent	Walkway southside of building	NO	NO	NO
3		26w compact flourescent	Entry and walkway men's lavatory	NO	NO	NO
4		Old light unused	No application	NO	NO	Broken – no plan to replace or repair
5		Twin 26w Compact florescent tubes	Entry and portal for Visitor Center	YES	NO	YES
6		Twin 75w incandescent PAR floodlights	Parking area lights -seldom used	YES	NO	YES
7		Twin 75w Incandescent PAR floodlights – motion sensor	NW corner Manager's residence entry – seldom used	YES	NO	YES

Light Ref #	Photo	Fixture	Application	Fully Shielded	Special Purpose >1000 lumens	Conformity with Lighting Guidelines
8		75w incandescent in jelly jar housing	Front door Manager's Residence	NO	NO	NO
9		Twin 75w Incandescent PAR floodlights – motion sensor	NE corner Manager's Residence – seldom used	YES	NO	YES
10		Twin 75w Incandescent PAR floodlights – motion sensor	SW corner Manager's Residence-seldom used	YES	NO	YES
11		75w incandescent	Back door Manager's Residence	NO	NO	NO
12		Twin 75w Incandescent PAR floodlights – motion sensor	SE corner Manager's Residence-seldom used	YES	NO	YES
13		26w compact flourescent	Group Shelter table and area light	YES Recess created by low eaves	NO	YES
14		26w compact flourescent	Group Shelter table and area light	YES Recess created by low eaves	NO	YES

Light Ref #	Photo	Fixture	Application	Fully Shielded	Special Purpose >1000 lumens	Conformity with Lighting Guidelines
15		26w compact flourescent	Group Shelter table and area light	YES Recess created by low eaves	NO	YES
16		26w compact flourescent	Star Point Group Shelter table and area light	YES Recess created by low eaves	NO	YES
17		Unknown wattage Mercury Vapor	Boat Ramp	YES	NO	YES
18		Unknown wattage Mercury Vapor	Boat Ramp	YES	NO	YES

11. Reach for the Stars - Program Summary

Initiated in 2004, the New Mexico State Parks' "Reach for the Stars" program is a multi-faceted effort that promotes the night sky as a valuable educational, tourism, and economic resource, while encouraging the protection of New Mexico's night sky from light pollution. The program includes over one hundred night sky events per year, staff and volunteer training, investment in park astronomy observatories, public education about light pollution prevention, and reduction of light pollution within state parks.

In 2006, the program won the New Mexico Heritage Preservation Alliance (NMHPA)'s "Nebula Award," which recognizes extraordinary innovation in a program, project, or product that contributes significantly to the protection and preservation of New Mexico's night skies.

Since 2005, observatories have been constructed at two state parks in New Mexico—City of Rocks and Clayton Lake State Parks. The Division also retrofitted Oasis State Park with efficient outdoor lighting that protects the night sky and is installing innovative solar-powered LED lighting along park trails to save energy and reduce light pollution.

In May of 2008, Director of the New Mexico State Parks division, Dave Simon, announced the selection of Heron Lake State Park near the town of Chama, NM as the site third observatory location.

For more information on the New Mexico State Parks' "Reach for the Stars" program, or to see a schedule of star parties throughout the year, visit www.nmparks.com, or contact Steve Cary at (505) 476-3386 or steve.cary@state.nm.us.

CLAYTON JUNIOR HIGH ATTENDS "STAR PARTY"

Story by Terrell Jones
Principal, CJHS;
Photos by Bill McDowell
Clayton Yearbook Editor
November 30, 2007

The evenings of November 12th and 13th were calm, clear, warm, and beautiful at Clayton Lake State Park's *Star Point Observatory*. These were perfect conditions for a cookout and star party. Approximately 200 people including 85 seventh and eighth grade students from Clayton Junior High School along with their parents, teachers, and members of the Clayton Astronomy Club were on hand make it happen.

The Astronomy Club had a nice fire going upon arrival of the students and their parents. Everyone then set about roasting hotdogs and making smores (flaming marshmallow and Hershey bar sandwiched between Graham crackers). The hotdogs were donated by the Clayton Fishing Derby.

By the time everyone had eaten, the sun had set and the students, parents, and teachers enjoyed two hours of stargazing using the 12" Meade RCX 400 telescope furnished by Clayton Lake State Park and operated by the Clayton Astronomy Club. Two smaller personal telescopes were also in use.

Students viewed Jupiter and its Jovian Moons along with various Messier objects and Comet Holmes which was clearly visible in the constellation of Perseus. Impromptu lectures were given about the night sky and the cosmos in general. Students were also introduced to the concept of "light pollution". Many questions from parents and students alike were fielded by the astronomy club.

Both the school and Clayton Astronomy Club continue to receive positive feedback from parents and students alike about how much they enjoyed and appreciated the event. This activity is part of Clayton Public Schools' *No Child Left Inside* curriculum. It represents collaboration between Clayton Public Schools, New Mexico Public Education Department, New Mexico State Parks, and Clayton Lake State Park, New Mexico Museum of Natural History, Clayton Astronomy Club, and Clayton Fishing Derby.

13. Recent Developments

Recent activity in Union County and the town of Clayton show continued support for the preservation and protection natural darkness in the night sky above Clayton Lake State Park.

In October of 2008, the Union County commission passed an outdoor lighting ordinance. Later in January of 2009, the town council of Clayton followed suit by enacting a town outdoor lighting ordinance. These actions are significant considering the conservative and non-government culture of this rural ranching community.

In the summer of 2008, The Geo Group, a private prison corporation, opened the Northeast New Mexico Detention Facility. Members of the Clayton community and night sky advocates were disappointed by the abundance of unshielded wall-pack lights used to illuminate the yard and perimeter patrol road. While the lighting is necessary to establish a secure environment and provide safety to workers and inmates, the extent to which the light flooded the surrounding countryside was unacceptable and not compliant with the New Mexico Night Sky Protection Act.

In March of 2009, Warden Hatch, with support from members of the Clayton Astronomy Club, the Night Sky Program, and local civic leaders, initiated a retrofit program to place internal baffles to help better control light emission from the facility's wall-pack lights.

Local businesses, schools, civic leaders, NM State Parks management, the Clayton Astronomy Club and other night sky advocates have clearly demonstrated a comprehensive and cooperative approach to supporting activities at Star Point Observatory.

Considering the above and information on the proceeding pages, Clayton Lake State Park is a well-qualified candidate for designation as a Gold Level International Dark-Sky Park.

May 25, 2010

Kim Patten, Programs Director & Public Affairs
International Dark-Sky Association
3225 North 1st Avenue
Tucson, AZ 85719-2103

Re: Supplementing the Dark Sky Park nomination packet for Clayton Lake State Park

Dear Kim:

Several months ago New Mexico State Parks submitted an application to the International Dark-Sky Association in support of a Dark Sky Park designation for Clayton Lake State Park (CLSP). Several weeks ago you advised me via e-mail that three additional pieces of information were needed before the packet could be fully evaluated. By this letter I hereby submit those items as attachments, each of which is discussed below.

New Mexico State Parks' first official "Lighting Guidelines" is attached. This document was recently completed in part due to encouragement from IDA. Modeled closely on the NPS version, it represents Best Management Practice No. 3 in our Natural Resource Management Manual. This Manual is being assembled pursuant to our new Natural Resource Management Policy, which itself was adopted only in late 2009.

Second, CLSP will achieve compliance with those guidelines in the next few weeks. We are replacing the three non-compliant exterior wall lights on the restroom at the park. The old wall-packs will be replaced with heavy-gauge aluminum quarter-spheres with LED lights (see attached specification). A purchase document has been generated for this task and funds must be spent before June 30, 2010. I can assure you with reasonable certainty that CLSP will be in compliance with the new lighting guidelines by that time. I will let you know when this job is completed.

Third, I attach a map showing the Clayton Lake State Park boundary, which encompasses the entire area for which we seek Dark Sky Park designation.

Finally, I can add that Union County, NM, passed an outdoor lighting ordinance in October 2008. The Town of Clayton, the seat of Union County government, followed suit in January 2009.

Thank you for your support and assistance in this effort. Please let me know if you need anything else to support a favorable decision by IDA on our nomination. Upon your notice that a DSP designation will be awarded, I will arrange to have a letter of thanks sent to your attention.

Respectfully submitted,
Steve

Steven J. Cary
Natural Resource Planner, *New Mexico State Parks*
Short Trips, Long Memories - Your Best Recreation Value Close to Home
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Santa Fe, New Mexico 87504
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steve.cary@state.nm.us


Clayton Lake State Park
0
0.125
0.25
0.5
Miles
N

New Mexico State Parks
Best Management Practice 3: Interim Outdoor Lighting Guidelines

May 2010

I. Overview

A. Purpose and Need

New Mexico State Parks (Parks) has lacked agency-wide outdoor lighting guidelines. The need for better quality lighting and guidance to parks is evident in the variable quality of lighting installations found throughout various parks and an increased concern that park lighting is degrading the night environment. This guideline is meant to help parks immediately address lighting concerns and to guide development and compliance. This guideline is modeled on the Interim Outdoor Lighting Guidelines established by the National Park Service (NPS) in 2007.

Natural Resource Management Policy

Parks adopted its first comprehensive Natural Resource Management Policy in December 2008. That policy identifies night skies as natural resources worth protecting. Natural darkness is more than a visitor resource and a scenic value, it has important links to cultural landscapes, ecological integrity, operational efficiency and sustainability. The policy also calls for development of a natural resource management manual containing best management practices and resource-specific guidelines to assist parks in managing natural resource situations that may arise.

Lightscape Management

Parks will preserve, to the greatest extent possible, the natural lightscapes of parks. Natural lightscapes are natural resources and have values that exist in the absence of human-caused light. Humans are influenced by stars, planets and earth's moon, which are visible during clear nights. Many kinds of animals, such as birds that navigate by stars or prey animals that reduce their activities during moonlit nights, also are influenced by lightscapes. Improper outdoor lighting can impede views and visitor enjoyment of a natural dark night sky. Recognizing the roles that light and dark periods and darkness play in natural resource processes, Parks will protect natural darkness and other components of the natural lightscape in parks. To prevent loss of dark conditions and natural night skies, Parks will minimize light that emanates from park facilities and seek cooperation from park visitors, neighbors and local government agencies to prevent or minimize intrusion of artificial light into night scenes of park ecosystems.

Parks will not use artificial lighting where its presence would disrupt a park's dark-dependent natural resources. Parks will:

- *restrict use of artificial lighting in parks to areas where security, basic human safety, and specific cultural resource requirements must be met;*
- *use minimal-impact lighting techniques;*
- *shield artificial lighting where necessary to prevent disruption of the night sky, physiological processes of living organisms, and similar natural processes.*

The decision whether or not to install artificial lighting in particular circumstances is left to the discretion of the park superintendent and is made through the planning process.

Existing Standards and Codes
A variety of lighting standards already exist, many of them in conflict and each focusing on a specialized aspect of lighting. Most are too complex to be applied at small or medium sized parks; few recognize the unique lighting needs of parks; and most do not address rising concerns about light pollution. Other codes and standards being developed include the International Dark-sky Association Model Lighting Ordinance (IDAMLO) and the New Buildings Institute Lighting Guidelines. The National Park Service recently researched and consolidated several current and developing guidelines and adopted Service-wide Interim Outdoor Lighting Guidelines.

Lighting recommendations put forth here produce illumination levels sometimes much lower than recommended by Illuminating Engineers Society of North America (IESNA). The trend in newer guidelines, such as the IDAMLO, is toward less illumination, especially in darker ambient environments. In most cases, parks have ambient light levels lower than what was considered when many existing guidelines were developed. Lower ambient light levels often require less light, thus the disparity between IESNA standards and recommendations in this document.

Guideline Objectives
Objectives of this lighting guideline are to provide parks a planning framework and best management practices for outdoor lighting. This document balances the need for safety with the need to protect parks' nocturnal environments. It focuses on "off the shelf" solutions, although new technologies like LEDs soon will allow parks to more precisely manage outdoor lights. Ease of understanding and implementing these guidelines received more weight than details of lighting design, visibility research and energy efficiency. Specific objectives include:

- Curtail and reverse degradation of the nighttime visual environment and night sky.
- Minimize glare, light trespass, obtrusive light, and artificial sky glow by limiting outdoor lighting that is misdirected, excessive or unnecessary.
- Ensure "good neighbor lighting" by minimizing light trespass.
- Minimize suspected health risks to humans from adverse exposure to light at night.
- Help protect natural ecosystems from damaging effects of night lighting.
- Allow reasonable use of night lighting for safety, utility, security and productivity.
- Help conserve energy and resources.
- Minimize maintenance and operating costs.
- Provide flexibility for architectural and artistic lighting within the above constraints.

Scope
This guideline is intended to address outdoor lighting within park boundaries, including developed areas and concessions. It does not address transportation rights of way where state and federal transportation codes may supersede park authority. Complex facilities and lighting situations may require more guidance than is found here. In those cases, consultation with additional guidelines, lighting engineers and outside experts is encouraged.

B. Outdoor Lighting in Park Settings

Virtually all parks need some outdoor lighting. In every case of outdoor lighting it is important to specify the need and choose a lighting design that meets that need. Too often, lighting is absent where it should exist, the quality of lighting is poor, or brightness levels exceed what is needed.

Less Can Be Better
Research by NPS indicates that levels much lower than IESNA recommended practices are adequate and appropriate for park environments, even heavily used parks. When combined with Parks own experience retrofitting outdoor lighting and with emerging ethics in the lighting field, these findings lead to design approaches that balance positive and negative attributes of light by using higher performance designs at lower illumination levels.

Human Needs
Lighting serves objective and subjective human needs. Objectively, light is used to provide adequate visual perception in low light. A healthy human eye is capable of adequate visual perception in very low light levels, but it cannot easily transition from bright (e.g., indoors) to dark (e.g., outside at night) conditions. Full dark adaptation can take several minutes and that adjustment is facilitated by outdoor lighting at low illumination. The more detailed the visual task, the more light is typically needed. It must be noted that human eyes function by reference to contrast, not absolute illumination. At night, an eye can perceive that 10 footcandles (a common measure of illumination) is twice as bright as 5 fc, but it cannot quantify the amount of light. If those lights were gradually dimmed by 50% each, the eye may not distinguish any change. The setting that a light fixture is in - the ambient light level, lighting uniformity, glare, and contrast in that setting - is more important than absolute illumination level. Strict adherence to engineering standards without considering setting is ill-advised. Overall, visual performance in an artificial lighting environment is more closely tied to lighting *quality* than lighting *quantity*.

Safety can be defined as *freedom from danger*, an objective requirement of lighting. Security can be defined as *freedom from worry*, a subjective aspect of lighting. Lighting can provide both, but how does one gage the type, amount and quality of light needed for adequate security? People often associate more or brighter light with *safer* surroundings, but too much or poorly directed light actually decreases visibility. For example, a light that is too bright or misdirected can prevent people from discerning important details because of the *high brightness contrast* or glare. At first glance, appropriate park outdoor lighting may not seem to some visitors to meet their security needs, especially if they associate a glary environment with security, but such quality lighting has several advantages.

Transitions
In urban environments people move among multiple lit areas, but parks usually have large naturally dark spaces surrounding few isolated lit areas. Ambient light levels are much lower in parks, visitors expect fewer amenities, and self reliance is emphasized (i.e., people carry flashlights). Low ambient light levels mean *less* light is needed to provide visibility and security, but transitions between lit and unlit areas are important and glare must be properly controlled.

Accessibility Standards
Parks must provide accessible routes meeting standards set by the Americans with Disabilities Act (ADA). The ADA does not give guidelines on appropriate lighting levels for accessible routes, so lighting on accessible routes should follow the general guidelines stated here. To accommodate people with impaired vision, lighting should produce continuous illumination, minimize glare, and not create a spotty effect.

C. Problems with Light

Light is not innocuous. It is an alteration of our environment like many other human products, but only recently is it recognized to have environmental consequences. As seen in many images of Earth from space, outdoor lights have sprung up across the globe. The fact that light is visible from space, directly overhead, shows how easily this human artifact leaks into the environment.

Light Pollution

Upward spill of light is often called light pollution. Light emitted into the atmosphere is scattered and reflected by dust, water vapor and other particles, creating sky glow. Light escaping directly upward into the sky is a major contributor to loss of night darkness: light from even a few fixtures can create an unnatural glow over a wide area; city light can be visible more than 200 miles away; even a streetlight in the countryside can be seen for tens of miles. Most of the upward flux is from light escaping the fixture horizontally or upward. A small fraction (~15%) of light pollution is caused by reflection off the ground and other surfaces. Control direct uplight by using *full cut-off* (shielded) fixtures, which reduce direct uplight by 75%. Control the reflected component by using the least illumination level needed. Minimizing sky glow helps maintain a natural nocturnal lightscape and sets an example for park visitors and neighboring communities.

Light Trespass and Glare

Light shining sideways (horizontally) from a fixture is not only a source of light pollution, but it is likely to trespass into areas where light is unwanted. This low-angle light also is the main source of glare. Light reflected from lit surfaces carries information about depth, texture, detail, color, and shape, but glare light strikes the eye directly and carries no visual information. Glare's effects vary from minor discomfort to complete disabling of an eye's ability to see properly. Even at low levels it causes the pupil to constrict, diminishing the remaining light in the visual field. Glare always should be minimized to improve lighting quality and to minimize light trespass. Solutions for glare include: use full or partial cut-off fixtures, aim lights downward or away from typical observation angles, increase lighting uniformity, and reduce brightness levels. Interior lights shining outside a structure cause the same effect as poor quality outdoor lights.

Ecological and Health Impacts

Artificial light affects biological rhythms of plants and animals. Effects on wildlife can include avoidance or attraction behavior with significant consequences affecting not only the species themselves, but also their predators and prey. Nocturnal predators are particularly affected by artificial light, either positively or negatively, which can have resultant impacts on their prey species. Birds, many of which migrate at night, are prone to disorientation by artificial lights. Research to date has concentrated on effects of artificial light on birds and insects, but light probably affects larger animals, too. Mammals (e.g., mountain lions) that travel long distances to find food or mates may avoid links between natural areas if the links emit artificial light. Wetlands, ponds, shorelines, alpine areas, deserts and grasslands are thought to be particularly sensitive. Humans are animals too, and a solid and growing body of research links artificial light at night (as well as insuficient daytime light exposure) to health problems.

D. Sustainability

Outdoor lighting is the last appliance to be scrutinized for energy efficiency. Though different types of lamps are well studied (e.g., a 4x energy savings is realized by replacing a traditional

incandescent light bulb with a compact fluorescent), questions of what type of fixture, how much light, and if an area should be lit at all, have not had much examination. The portion of light shining upward and creating light pollution in the US is estimated to represent $2 to $5 Billion annually. Thus, proper lighting can have large economic and energy benefits.

Designing for Efficiency

Basic tenets of efficiency are to use light only when, where needed, and in the amount needed, then use the most efficient source meeting the need. Lamp technology has evolved much and efficiencies can be improved 2x-5x by using modern lamp types. Reducing light level can yield efficiencies if less illumination still meets the need. Full cut-off shielding reflects downward all light that otherwise would go into space, further improving efficiency. Technologies such as timers, motion sensors, computer controlled lighting and LED lamps, also add efficiency.

Maintenance Cost

That which is energy efficient almost always is cost efficient, but maintainability is another aspect of cost. Lighting design should consider workload needed for upkeep. Compare capital cost with energy efficiency and maintenance intervals to get a true picture of lighting cost. Too often, lighting choices are based only on fixture cost. A $40 "yardblaster" available at a hardware store compares favorably to a fixture costing $400, but if the "yardblaster" uses 175 watts to the full cut-off luminaire's 18 watts, the blaster's capital cost will be offset by energy savings in 4 years. Over a 20-year lifetime the difference becomes $1200. A similar comparison can be made with lamp lifetimes. A typical incandescent lamp lasts about 1500 hours, compared to 10,000 hours for a compact fluorescent lamp (CFL). The old-fashioned bulb will be changed 6 or 7 times before the CFL burns out, more than making up for the higher initial cost of a CFL.

E. Design

Lighting is an important design element in architecture and landscapes. It can emphasize spaces, highlight landscapes, and serve purposes beyond basic visibility needs. Lighting may be part of a design vision at a park. Design issues can include pole height and pole spacing, fixture appearance, illumination pattern, light level or light color. Although lighting can be an important design element, architectural and artistic lighting may not be appropriate in parks. Exceptions may exist, but washes of light on buildings, lit statues, or dramatically lit boulders are usually not consistent with missions and goals of the agency or of individual parks.

Lamp Color

Color of light receives causes some professional disagreement, but this can be resolved by affirming the purpose for the light. High Pressure Sodium (HPS) and Low Pressure Sodium (LPS) lamps produce yellow light. This color-biased, monochromatic light is thought to be less harmful to nocturnal wildlife, but it does not render colors properly to human eyes and some feel it has an industrial character. Yellow light scatters less in the atmosphere and interferes less with human night vision than white light, which help maintain dark night skies. HPS and LPS lights are more efficient (produce more lumens/watt) than white sources such as Metal Halide (MH), Mercury Vapor (MV), or even Compact Fluorescent Lamps (CFL). Research shows that less light (thus less energy) is needed for the human eye to see efficiently with a white (blue/green) light source than with a yellow source. High color rending ability and better visibility of white lights contrast with its lower energy efficiency and higher impacts to wildlife and night skies.

This guideline recommends parks use yellow light sources when available, unless a need for better color rendition is demonstrated.

Historic Integrity
Historic structures and cultural landscapes have special lighting needs that may not be addressed in this document. Light fixtures themselves and the character of light they produce both are of concern. Often there is too much emphasis on selecting fixtures that look of the appropriate period, while the nighttime scene is neglected though just as important to historic integrity.

II. Lighting Guidelines

A. Approaches

Lighting guidelines can take one of two forms: prescriptive, where the type, size, lamp, etc. of the light is defined; or performance, where resulting illumination levels are defined. The latter is more accurate, but requires computer modeling and photometric data on each light fixture. A prescriptive approach is used here because expertise to run computer models is not available and most park fixtures are low cost units lacking custom or photometric designs.

Several aspects of lighting design can be controlled and defined. Those prescribed in this guideline are limited for simplicity (see table below).

Prescriptive Parameters	Performance Parameters
Lumens	Illumination (minimum, avg., max)
Watts	Glare or Glare Ratio
Power density	Uniformity (average : minimum)
Lumen density	Uplight and light distribution
Pole spacing	Spill light/light trespass
Pole height	Transition
Fixture shielding and aiming	

B. Lighting Zones

Lighting zones should be established in each park consistent with the existing Parks' BMP for Land Management Zones. Permanent outdoor lighting is allowed within the guidelines in LMZ classes 1 and 2. No permanent light fixtures are permitted in LMZ classes 3 and 4.

Typical Lighting Zones	Description	State Parks LMZ Class
No Outdoor Lighting	All wildland areas and viewpoints	3, 4
Lighting Allowed	Developed facilities area	1, 2

C. Planning and Compliance

Lighting has been considered a routine maintenance practice and therefore has escaped most planning and compliance processes. This leads to situations where parks themselves contribute to light pollution. Lighting should be part of park planning and natural resource planning efforts. This interim guideline is meant to ease this process while providing more autonomy to facility managers when working within the guideline.

Cumulative Effect
Cumulative effect is not directly addressed in this guideline, but it is recommended that parks consider not only the specifications of an individual light, but the total impact that a new or expanded lighting project would have. These guidelines mitigate negative impacts as much as possible, but dramatic increases in installed lights will have a noticeable adverse impact on nocturnal lightscapes. For parks with an existing base of mixed quality lights, impacts from new lighting projects can be offset by retrofitting existing poor quality lights.

D. Lighting Applicability

Lights should not be installed where visitors or employees expect darkness or where people are generally prepared for darkness, either through dark adaptation or by carrying their own lights.

Lights should be installed as an illumination transition on commonly used building egress points, where outdoor work is done at night, where critical information is posted, to draw night visitors to key information or a safety point (e.g., phone booth), where there is a clear need to protect assets, where there is a known safety hazard, or where facilities are often used at night.

When deciding whether to light an area, consider cumulative effects of the action as well as whether the illumination will achieve its purpose. Also consider lighting transitions; an isolated light may effectively light a small area, but will render the surrounding dark area less visible.

Security lighting where no patrols exist (e.g., a remote storage yard) often is counterproductive, inviting crime without the opportunity to intercede.

E. Requirements

Exterior Lighting
All permanent exterior lighting shall be fully shielded and use proper illumination levels. Articulating fixtures, such as PAR floodlamps, must have directional shields, must be aimed within 45° of downward, and must not illuminate areas beyond intended targets.

Special Use Lighting
Unshielded and partially shielded fixtures under 7 watts each are permitted for low voltage LED pathway lights, under-canopy lights at phone booths, and other guidance lighting.

F. Prescriptions

These prescriptions are directed toward types of activities regardless of where they take place. For example, lighting recommendations for pedestrian walkways are relevant to any place people typically walk: from campsite to comfort station; from parking lot to building; any trail. Areas and functions typically not lit because users are expected to provide their own lighting include: campgrounds, campsites, trails, walkways and parking areas.

Maximum Lamp Lumens
7000 lumens is the maximum allowable lamp output (except for emergency lighting). In most cases, 500-1500 lumens will be sufficient.

Pedestrian Walkways (including amphitheatres, trails, sidewalks)	
Maximum Lamp Lumens	1000
Recommended Light Types	Typically not lit. If required, use low voltage LED way-finding lighting or low lumen fully shielded lamps. Higher illumination for steps or uneven ground.
Recommended Illuminated Area	Pathway and area immediately adjacent to path.
Recommended Duty Cycle	Timer for operation during frequently used times.

Park Staff Housing (private buildings)	
Maximum Lamp Lumens	2000
Recommended Light Types	CFL 500-1000 lumens
Recommended Illuminated Area	Light dispersal limited to residential boundary
Recommended Duty Cycle	Mix of switches (for occasional use) and motion sensors

Building Egress Points (public and staff buildings)	
Maximum Lamp Lumens	3000
Recommended Light Types	CFL 500-1500 lumens; Forward throw fully shielded fixture
Recommended Illuminated Area	Egress point and approach; transition from lit to dark area should be gradual with no hard shadows
Recommended Duty Cycle	Night operation at critical safety, frequently used, visitor contact points; motion sensors or user accessible switches for other tasks

Parking Lots	
Maximum Lamp Lumens	7000
Recommended Light Types	Not generally recommended; if required, use LPS or HPS lamps of 3500-7000 lumens (depending on pole height)
Recommended Illuminated Area	Portion of parking lot used at night
Recommended Duty Cycle	Switched with timers to prevent all-night operation

Safety and Work Areas (fueling station, generator bay, maintenance yard, etc)	
Maximum Lamp Lumens	7000
Recommended Light Types	CFL of 1200-3000 lumens for most applications; fully shielded
Recommended Illuminated Area	Only immediate work area
Recommended Duty Cycle	User controlled switches or power-interrupt sensor

Boating Facilities (ramps, docks, marinas)	
Maximum Lamp Lumens	7000
Recommended Light Types	CFL of 1200-3000 lumens for most applications; fully shielded
Recommended Illuminated Area	Portions used at night
Recommended Duty Cycle	Timers or power-interrupt sensor

Group Shelters	
Maximum Lamp Lumens	3000
Recommended Light Types	CFL of 1200-3000 lumens for most applications; fully shielded, usually at top of canopy under roof
Recommended Illuminated Area	Shelter interior and approaches
Recommended Duty Cycle	User controlled switch or power-interrupt sensor

Outdoor Evening Venues (patios, restaurants)	
Maximum Lamp Lumens	2000
Recommended Light Types	CFL of 500-1000 lumens for way-finding applications; CFL of 500-1000 lumens for table uses; all fully shielded;
Recommended Illuminated Area	Walkways should use amber low voltage LED; table tops should use CFL of 500-1000 lumens
Recommended Duty Cycle	User controlled switch, timer, or power-interrupt sensor

G. Lamp Selections

The standard lamp shall be a cold-start compact fluorescent lamp (CFL), ideal for its high energy efficiency and range of wattages. These should be less disruptive to nocturnal species and the human experience of night than a 70-watt High Pressure Sodium (HPS) lamp, provided the CFL lamps are 26 watts or less. Incandescent lamps may be used with motion sensor lights. Lighting requiring more than 2000 lumens should use HPS lighting.

H. Other Situations

Sign Lighting

Internally illuminated signs should use light lettering on a dark background and should not be lit after the related facility has ceased operation for the night. Externally illuminated signs should be lit from the top downward with fully or partially shielded fixtures using the minimum amount of light necessary. No specific guidelines are established in this interim guideline, but signs should be lit only where it is clearly necessary and then luminance should be limited to <1000 lumens per side per modest size sign, depending on viewing distance and ambient light level.

Flag Lighting
The preferred practice is to raise and lower the American flag daily at staffed facilities. There is a growing misconception that flags should be up all night and should be lit. At active sites there is little excuse to not honor the flag daily by its raising and lowing. The Patriot Act of 1976 requires nighttime flags to be lit, but does not in any way indicate a preference for leaving the flag up during darkness. Recently some top-down lighting solutions for flags have come to market. This would allow full compliance of flag lighting if there is such a need.

I. Exempt Lighting

1) Where OSHA states that specific lighting levels are necessary for work situations, these are considered exempt from the Lighting Guidelines. Although the lighting levels for the actual work environment must meet OSHA requirements, all measures outlined in this document must be taken to exercise best energy practices and shield the light from the surrounding environment.

2) Emergency lighting is exempt from these controls provided it is not used for routine maintenance or scheduled functions. Typically, emergency lighting is used once a year or less and is necessary for human safety in emergency or unforeseen circumstances.

3) Traffic safety warning lights and speed indicators are NOT automatically exempt but should be considered on a case by case basis.

4) Holiday lighting provided it is in operation only during the holiday period.

5) Special event lighting provided it is shielded and in operation only during the event.

J. Implementation and Relation to Planning Processes

These guidelines must be consulted when considering any new park lighting project, to ensure adherence to guidelines; when any park is identifying land management zones to accurately map or designate unlit areas; during park management planning to schedule retrofits for existing lighting as may be needed; and at any time to evaluate, design and upgrade park lighting.

Appendices

Glossary

Fully shielded - a fixture that throws light downward only and in which the lamp itself is shielded so it cannot be seen except from under the fixture.

Full-cut-off – a fixture that is fully shielded and has virtually no part (or a negligible amount) of the fixture lit below the horizontal.

Cut-off - a fixture that shields upward light causing light to shine both downward and sideways only.

Luminance – the quantity of light reflected or emitted toward an observer, i.e., the light an observer sees.

Illuminance – a measure of light in either foot-candles (imperial) or lux (metric). Technically described as flux density per unit area.

Brightness – a subjective sensation to measured luminance.

Glare –

- ***Disability Glare*** (veiling luminance) – is stray light scattered within the eye reducing the contrast of the image.
- ***Discomfort Glare*** – is high contrast or non-uniform distribution of luminance in the field of view.
- ***Nuisance or annoyance glare*** – is not quantified but is basically annoying light such as "the light shining in the window."

Visual Adaptation to Light –

- ***Photopic Vision*** – is the eye's response at high light levels when cones are used to determine color and to focus on objects.
- ***Scotopic Vision*** – is the eye's response at low light levels such as moon-light when rods are used. Peripheral vision is strong and everything appears in shades of gray.
- ***Mesopic Vision*** – is a combination of photopic and scotopic Vision.

Lamp Characteristics

Lamp types should be carefully chosen. Proper lumen output, efficiency, and spectral characteristics should be key elements in the decision. Other factors to consider should be lamp life, lamp available and cost, aesthetics, and appropriateness.

The following are allowed under these guidelines when specifically permitted.

Typical Lamp Characteristics

Lamp	Watts	Lumens (initial output)	Lumens/watt (efficiency)	Lifetime (hours)	Color Rendering
A-Lamp Incandescent	40	500	12	1000	100
	60	850	15	1000	100
	100	1600	16	1000	100
Compact Fluorescent	7	400	57	10000	85
	13	775	60	10000	85
	23	1400	60	10000	85
	26	1650	65	10000	85
	42	2800	65	10000	85
Metal Halide	39	2800	72	6000	85
	50	3700	75	6000	85
	100	7500	75	6000	85
	150	10500	70	6000	85
High Pressure Sodium	35	2200	50	24000	40
	50	3700	60	24000	40
	70	6200	75	24000	40
	100	8000	80	24000	40
	150	14500	85	24000	40
Low Pressure Sodium	18	3800	150	18000	0
	35	6800	150	18000	0
	90	15300	150	18000	0

Note: High color rendering combined with total brightness typically results in higher impact to nocturnal environment.

DESCRIPTION

The IMPACT Elite family of cutoff wall luminaires is the ideal complement to site design. Incorporating modular LightBAR™ technology, Impact Elite provides outstanding uniformity and energy conscious illumination. Combined with a rugged construction, the Impact Elite is the ideal facade and security luminaire for zones surrounding schools, office complexes, apartments, and recreational facilities. UL and cUL listed for wet locations.

McGRAW-EDISON® energy solutions

Catalog #		Type
Project		
Comments		Date
Prepared by		

SPECIFICATION FEATURES

Construction
Heavy-wall, die-cast aluminum housing and removable hinged door frame for precise tolerance control and repeatability. Hinged door inset for clean mating with housing surface and secured via two (2) captive fasteners. Optional tamper resistant torx head fasteners [TR] offer vandal resistant access to the electrical chamber.

Optics
Choice of eight (8) high efficiency, patent pending AccuLED optical systems manufactured from injection molded acrylic. Optics are precisely designed to shape the distribution maximizing efficiency and application spacing. BL optics offer backlight control to decrease wall brightness. Offered standard in 4000°K (+/- 275K) CCT and >70 CRI.

Electrical
LED drivers mount to die-cast aluminum back casting for optimal heat sinking and operation efficiency. Impact Elite Wall Series LED operates from 120-277V 50/60Hz, 347V 60Hz or 480V 60Hz. Shipped standard with Cooper Lighting proprietary circuit module designed to withstand 10kV of transient line surge. 50,000+ hour life with >70% lumen maintenance. The Impact Elite Wall Series LED luminaire is suitable for operation in -30°C to 40°C ambient environments. LightBARS™ feature an IP66 enclosure rating.

Mounting
Gasketed and zinc plated rigid steel mounting attachment fits directly to 4" j-box or wall with the Impact Elite "Hook-N-Lock" mechanism for quick installation. Secured with two (2) captive corrosion resistant black oxide coated allen head set screws concealed but accessible from bottom of fixture.

Finish
Cast components finished in a 5 stage super durable TGIC polyester powder coat paint, 2.5 mil nominal thickness for superior protection against fade and wear. Standard colors include black, bronze, grey, white, dark platinum, and graphite metallic. RAL and custom color matches available. Consult the McGraw-Edison Architectural Colors brochure for the complete selection.

Warranty
Impact Elite LED features a 5 year limited warranty.

ISS
IMPACT ELITE LED QUARTER SPHERE

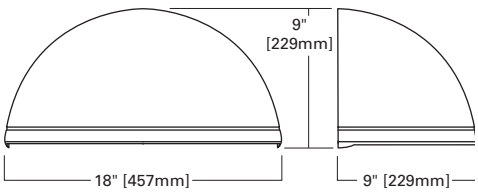
1 - 2 LightBARS
Solid State LED

WALL MOUNT LUMINAIRE

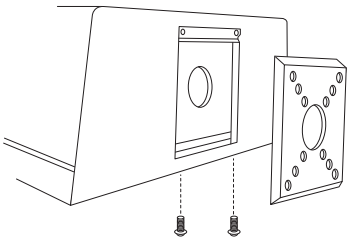
SustainabLEDesign

DIMENSIONS

Quarter Sphere



HOOK-N-LOCK MOUNTING



CERTIFICATION DATA
40°C Ambient Temperature Rating
UL and cUL Listed
LM79 / LM80 Compliant
IP66 LightBARS
ARRA Compliant
ISO 9001

ENERGY DATA
Electronic LED Driver
>0.9 Power Factor
<20% Total Harmonic Distortion
120-277V/50 & 60hz, 347V/60hz, 480V/60hz
-30°C Minimum Temperature

SHIPPING DATA
Approximate Net Weight:
18 lbs. (8 kgs.)

COOPER Lighting
www.cooperlighting.com

ISO 9001 SYSTEMS CERTIFIED

POWER AND LUMENS BY BAR COUNT

# of Bars	System Watts	Type BL2 Lumens	Type BL3 Lumens	Type BL4 Lumens	Type GZM Lumens
1 Bars	26	1,626	1,724	1,677	1,866
2 Bars	53	3,252	3,447	3,354	3,735

NOTE: Lumen values based upon 4000K CCT, 350mA drive current, 25°C ambient operating temperature.

Ambient Temperature	Lumen Multiplier
10°C	1.04
15°C	1.03
25°C	1.00
40°C	0.96

ORDERING INFORMATION

SAMPLE NUMBER: ISS-A02-LED-E1-BL3-GM

		LED						
Product Family **ISS**=Impact Elite Small Quarter Sphere	**Number of Lightbars** [1] **A01**=1 bar **A02**=2 bar	**Lamp Type** **LED**=Solid State Light Emitting Diodes	**Voltage** **E1**=Electronic (120-277V) **347**=347V [2] **480**=480V [2]	**Distribution** **BL2**=Type II w/ Back Light Control **BL3**=Type III w/ Back Light Control **BL4**=Type IV w/ Back Light Control **BLF**=Forward Throw w/ Back Light Control **GZM**=Wall Grazer Medium **GZW**=Wall Grazer Wide **SLL**=90° Spill Light Eliminator Left **SLR**=90° Spill Light Eliminator Right	**Finish** **AP**=Grey **BZ**=Bronze **BK**=Black **DP**=Dark Platinum **GM**=Graphite Mettallic **WH**=White	**Options** (add as suffix) **P**=Button Type Photocontrol (120, 208, 240 or 277) [3] **TR**=Tamper Resistant Fasteners **2L**=Bi-Level Switching Capable [4] **7060**=70 CRI/6000K CCT [5] **LCF**=LightBAR Cover Plate Matches Housing Finish	**Accessories** **MA1253**=10kV Circuit Module Replacement

NOTES: **1** Standard 4000K CCT and >70 CRI
2 Consult factory for availability
3 Must specify voltage
4 Only available in 2 bar [A02] configurations
5 Consult factory for lead times and lumen multiplier

SANTA FE NEW MEXICAN.com

Seeing a starry night sky

By | The New Mexican

6/30/2009

The past year has been an encouraging one for proponents of energy efficiency and night sky preservation.
Local governments in communities around the state took significant steps to reduce light pollution and protect the health, safety and welfare of the public. Such efforts garner support from a wide range of political, economic and cultural backgrounds.

This fact suggests that interest in working to reduce wasteful lighting practices extends beyond the special interest of a bunch of cranks with telescopes who just want to sit out in the dark.

In the autumn of 2008, Rio Arriba County updated and strengthened its lighting ordinance by more clearly defining what measures are needed to promote energy efficiency and to provide a balanced process for review of outdoor lighting applications.

Rio Arriba County leaders were motivated to make these changes in an effort to save money, energy and improve the quality of life for county residents.

By late October, Union County passed an outdoor lighting ordinance.

This development may surprise some who view this remote corner of our state as not exactly pro-government and generally conservative.

But the opening of the Star Point observatory at Clayton Lake State Park in June of 2006 bolstered interest to protect the night sky and reduce light waste.

Parks staff and a dedicated group of local volunteers offer a variety of educational and interpretive night sky programs.

The observatory serves as an important asset for educators who make access to programs a priority for local school children.

In January, the Clayton town council also passed their own lighting ordinance.

This year marks the 10th anniversary of our landmark state law, the New Mexico Night Sky Protection Act.

Even though the concepts of light pollution and night sky preservation were unknown to many in 1999, our state demonstrated foresight and leadership in passing the law.

Interestingly, the original version of the act did not include an enforcement clause. One was added a few years later, but its language was too vague and permissive, creating the perception that

enforcement was voluntary.

During the 2009 legislative session, a bill introduced by State Rep. Dona G. Irwin, D-Deming, sought to clarify the need for enforcement.

It received broad support in committee and passed both chambers with a clear majority. On April 3, Gov. Bill Richardson signed the bill into law.

The change to the law becomes effective today making enforcement mandatory.

Another noteworthy development is the American Medical Association's recent passage of Resolution 516: Advocating and Support for Light Pollution Control Efforts and Glare Reduction for Both Public Safety and Energy Savings.

At its annual meeting on June 15, Resolution 516 was approved as official policy.

The AMA now recognizes that the excessive and wasteful use of artificial lighting is detrimental to human health.

Saving money, reduced energy use, improved health and safety and a starry night sky — a winning combination.

Peter Lipscomb shares the wonder of the night sky as lead guide for Astronomy Adventures and works to promote sensible and energy efficient lighting practices. Contact him at pslipscomb@gmail.com