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From the Executive Director

Dear Members,

This issue of *Nightscape* details the significant accomplishments resulting from work related to the NPS Cooperative Agreement (CA) and the Parks and Protected Areas (PPA) program. IDA staff has completed the design and retrofit of most of the parks included in the CA. In the process, we have developed new lighting fixtures and lamps with the help of manufacturers from the Fixture Seal of Approval using the most ecologically responsible new technologies (page 4).

The culmination of this work is presented in the new Guidelines for Outdoor Lighting (GOL) for Dark Sky Places jointly developed with the Royal Astronomical Society of Canada (page 3). This work will serve as a solid foundation for our continued work with PPA and International Dark Sky Places (IDSP). The upcoming revised requirements for the IDSP program will include the new GOL.

The popularity of the IDSP program continues to grow with two new International Dark Sky Reserves (IDSR) that were certified recently (pages 6 and 8). New staff member Ameé Hennig has come on board to manage the PPA and IDSP programs and to assist with outreach and chapter activities. She will also be responsible for writing and editing IDA communications.

We have partnered with the new Arizona Science and Astronomy Expo to hold the 2012 IDA Annual General Meeting (AGM) in Tucson November 10. Please make plans to join us in person or by webinar. At the AGM, we will present the winner of the IDA Dark Sky Giveaway with a complete set of TeleVue Ethos eyepieces. We also offer many thanks to corporate sponsor, TeleVue (page 21).

Plans are underway to celebrate IDA's 25th birthday with a Light at Night (LAN) science conference in fall 2013. It will be IDA's third science conference and will highlight a wide spectrum of important research related to the impact of LAN on the environment. Stay tuned for more details (page 20).

Speaking of science, pay particular attention to the new American Medical Association's (AMA) recent policy statement on page 11. This action by the AMA is a very significant acknowledgement of many of the issues that IDA has been presenting for years. Having a prestigious group like the AMA joining forces with IDA will increase our audience and the credibility of our positions. Special thanks to IDA director Mario Motta for his tireless effort on this document.

IDA is joining with Southern Skies to offer a discount on the promotion of its great "Sky Safari" planetarium/sky chart application for the iPhone, iPad and Android. During September 21-23, during the 2012 Pacific Astronomy and Telescope Show, Southern Skies will offer sale pricing for its apps on the iTunes Store and Google Play app store. Sale prices (in USD) will be as follows: \$2 for basic version (regularly \$3); \$12 for Plus version (regularly \$15); \$30 for Pro version (regularly \$40). Southern Skies will donate 30 percent of the sales to IDA during this promotion. Check it out: www.darksky.org/skysafari

Finally, board elections are around the corner (page 21). We introduced electronic voting for elections last year and will continue it this year to make it easier than ever for you to participate in the selection process.

Thank you,



Bob Parks, Executive Director



The mission of the International Dark-Sky Association (IDA) is to preserve and protect the nighttime environment and our heritage of dark skies through environmentally responsible outdoor lighting. IDA was incorporated in 1988 as a tax-exempt 501(c)(3) nonprofit organization. (FIN 74-2493011)

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PARKS AND PROTECTED AREAS PROGRAM

New Lighting Standards

**International Dark-Sky Association and
the Royal Astronomical Society of Canada
Join Forces to Battle Light Pollution**

While working with the National Parks it soon became obvious that new lighting technology and fixtures would be required to provide ecologically responsible lighting solutions. The International Dark-Sky Association (IDA) and The National Park Service (NPS) staff worked closely to define the criteria necessary to meet the unique needs of protected areas. Standard lighting design and traditional recommended practices would not provide the answers.

The guiding design principle that was adopted bears a striking resemblance to the Star Trek Federation's Prime Directive, "No interference...". However, the introduction of any lighting into a natural environment has an effect. Therefore, the guiding design principle of outdoor lighting for parks and protected areas can be summed up as "the least interference." This principle is embodied in guidelines soon to be released jointly by the Royal Astronomical Society of Canada's Light Pollution Abatement Program (RASC-LPA) and the IDA. The RASC-LPA group, led by Robert Dick, has been pursuing a parallel path with IDA, working to protect dark sky locations in Canada. Excellent *Guidelines for Outdoor Lighting in Dark-sky Preserves* were originally published in 2008 as a guide for their Dark-sky Preserves program – similar to the IDA's International Dark Sky Places (IDSP) program. The purpose of the RASC-LPA/IDA Parks and Protected Areas Guidelines for Outdoor Lighting is to incorporate all that has been learned by both organizations while working to protect dark sky locations internationally.

Chad Moore of NPS explains the impact of outdoor lighting in nature; "When we add light to the environment, that has the potential to disrupt habitat, just like running a bulldozer over the landscape can."

The first issue to be defined was illumination levels. To do so required that we start the process with a fundamental understanding of vision. Humans evolved over millennia to see under lighting levels provided by as little light as that of the moon (0.01-0.27 lux). As the eye becomes fully dark-adapted the retina's rods provide monochromatic vision. The rods are much more light-sensitive than the cones, which are responsible for color,

or photopic vision in brighter environments. However modern society has recently become accustomed to outdoor illumination levels 100 to 1000 times more than what occurs under the natural night sky. Using higher illumination levels forces the eye into photopic adaptation, making it very difficult to quickly transition back to the dark-adapted scotopic vision required to safely navigate the normally unlighted park environment. This introduces an inherent safety risk that most of us have experienced at some time. An example would be entering a darkened movie theater and trying to find your seat. In a park illuminated only with starlight or moonlight, a 20-40 minute adaptation period, depending upon age, is required to become fully dark adapted. That's when the risk of falls or injuries is greatest.

To navigate safely between lighted and unlighted areas it would be necessary to reduce illumination levels to as low as possible. For most outdoor lighting no more than 3 lux should be used; with as little as 0.5 lux being used in areas where vehicles are not involved. Coming from a dark environment into this level of lighting will cause less visual discomfort than higher-level lighting and readaptation to the dark will occur more quickly.

The next component of the new standards is very familiar to those involved in dark sky advocacy. All lighting must be fully shielded to completely avoid glare. Viewing the bright point source of a lamp, no matter what low illumination level is being used, will cause the loss of dark adaptation. The only unshielded lighting allowed is for "way-finding" (marking a path without employing overhead lighting) purposes. This is done using very low-level red light markers and photo luminescent "glow dots" on pathways.

The third criterion is light spectrum. To develop ecologically responsible standards, the color of light is critically important. Different species of flora and fauna have significantly different levels of sensitivity to various light spectra. The best wavelength of light to use for PPAs would be one that would enable good visual acuity

without causing the eye to lose dark adaptation. Humans are least sensitive to red, or long-wavelength light, and most sensitive to green. In contrast, some birds are sensitive to red, but less sensitive to green. It has become clear that there is not one area of the spectrum that will be the least sensitive to all species.

For these standards the decision was made to use a spectrum that would be best for the majority of species that are present in most parks. The starting point for testing was familiar to most of us as a "bug light", available for many years in incandescent and later compact fluorescent (CFL). Yellow light has been known for its property to attract fewer flying insects. In the last year two new studies¹ have been published giving us a much better understanding of them. Many insects are less sensitive to the yellow wavelength and most insects are more

recommendations² for turtle-safe lamps (as turtles have long been known to be less sensitive to yellow and red light). Furthermore, "true amber" LEDs have been determined to be the best technology currently available in this spectrum range. It combines a very narrow bandwidth, good energy efficiency, and long life. Other light sources including yellow and orange CFLs were also tested with good results.

Current research ranks the worst to best possible lamp types for Parks and Protected Areas (PPA) purposes: metal halide, mercury vapor, cool-white fluorescent/CFL, warm-white fluorescent/CFL, cool white (high CCT) LED, warm (lower CCT) LED, incandescent, high pressure sodium vapor (HPS), yellow/amber fluorescent/CFL, yellow/amber LED, and low pressure sodium vapor (LPS).

The final factor considered was the technology's ability to function

The next component of the new standards is very familiar to those involved in dark sky advocacy. All lighting must be fully shielded to completely avoid glare.

sensitive to, and therefore attracted to, shorter-wavelength blue and ultraviolet (UV) light.

Humans and many other mammals are also less sensitive to the yellow portion of the spectrum, compared to broad-spectrum white light. Overall, using a spectrum of light that animals are less sensitive to, at the lowest level possible, will reduce their attraction to lighted areas. This helps to decrease the affect of lighting on vegetation, predation, migration, and mating of wildlife.

To balance the many conflicting spectra for species present in the park environment, yellow light in the 560 to 600 nm (yellow to amber) has been selected. This also conforms to the U.S. Fish and Wildlife Service's recom-

with adaptive controls (dimmers, timers, etc.). In this regard, LED scored the highest. In most situations the new guidelines recommend reducing lighting levels or turning off lighting when not needed. This can be accomplished with motion sensors or timers. Technologies like fluorescent/CFL are not normally dimmable and when turned on they require some time to come up to full brightness. In addition, short duration "burn cycles" (switching on and off) with a motion sensor can significantly decrease lamp life. Fluorescent and CFL also generally perform poorly in extremely cold temperatures. Incandescent lamps can function well with adaptive controls and cold temperatures, but their en-

CONTINUES ON PAGE 4

New Standards

CONTINUED FROM PAGE 3

ergy inefficiency works against them being a good candidate for lamps utilizing adaptive controls. All LEDs tested cycle on/off well and come to full brightness instantaneously. Many LEDs are also now dimmable, making them the most flexible lamp technology for use with adaptive controls.

The new PPA outdoor lighting standards will be released soon for public comment and, once ready, will become incorporated into the IDA's requirements for the IDSP program.

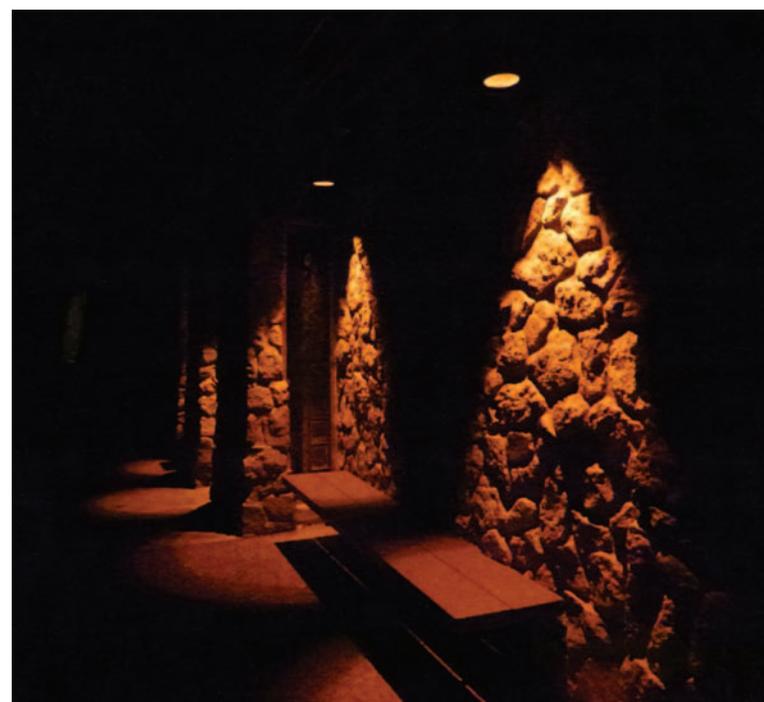
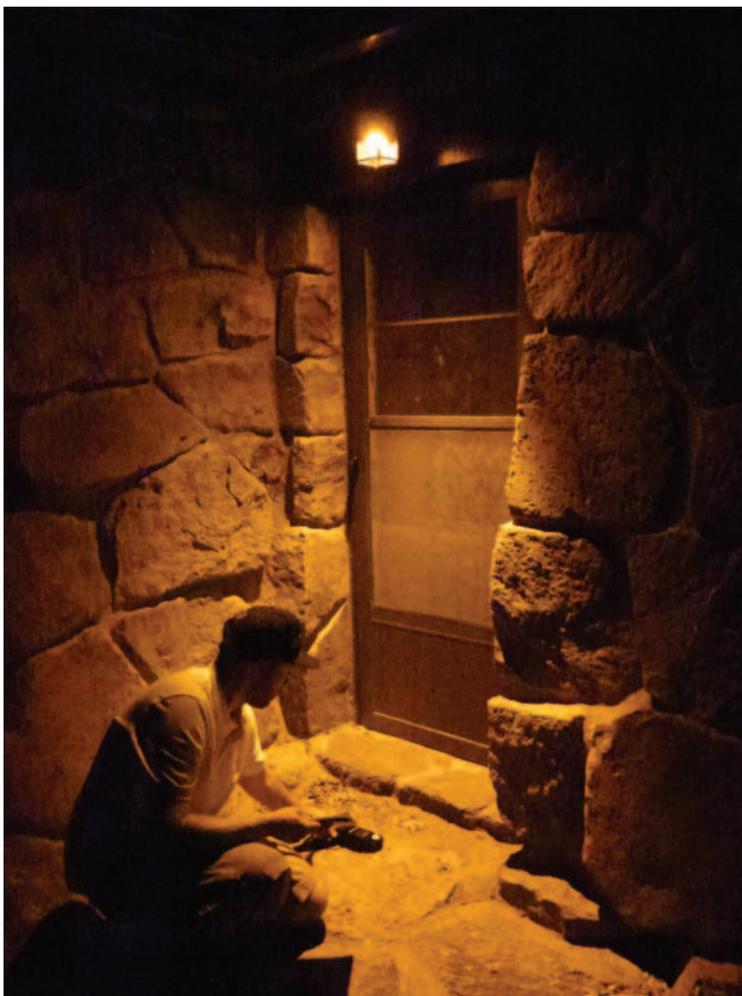
1. Research by Prof. Dr. Gerhard Eisenbeis: <http://tinyurl.com/9zcobye>

2. U.S. Fish and Wildlife Sea Turtle Lighting Guidelines: <http://tinyurl.com/916jydk>



This shows a range of LED lamps developed for use during the NPS Cooperative Agreement and now being produced for use in Park and Protected Areas worldwide. All use "true amber" yellow LEDs and have a range of light output ranging from 100 to 400 lumens. IDA thanks all of the manufacturers who have assisted in the development of the new lamps and fixtures.

ABOVE: Zenaro lamps
LEFT: Hubbell Nano fixture



LEFT: IDA Technical Advisor Matt Root taking light measurements at Chiricahua National Monument in Arizona.

ABOVE: New lighting installed for the Visitor Center in Chiricahua.

Walmart Adopts MLO Guidelines

As a market leader, Walmart has shown a willingness to set an example in energy conservation and reduction of light pollution. Through Walmart's sustainability initiatives, the company aims to reduce energy usage and environmental impact significantly. Three goals frame Walmart's sustainability mission: 1) To be supplied 100 percent by renewable energy, 2) To create zero waste, 3) To sell products that sustain people and the environment.

Recently, IDA Executive Director Bob Parks spoke with Ralph Williams, Engineering Manager of Walmart, and learned that, as part of Walmart's sustainability efforts, the IDA/IES Model Lighting Ordinance (MLO) was adopted as a template for their outdoor lighting standards worldwide. The decision to use the MLO came from Walmart's involvement in the U.S. Department of Energy (DOE) sponsored Commercial Building Energy Alliance (CBEA).

The CBEA was formed by the DOE to collaboratively develop energy efficient outdoor lighting standards for commercial facilities. The CBEA LED Site Lighting Specification (LEDSLS) drew from the MLO as one of the existing outdoor lighting standards available. The LEDSLS incorporates the use of the BUG rating, environmental zones, and per square foot energy allowances to conserve energy and eliminate over-lighting. For more details about the CBEA, go to: <http://tinyurl.com/br4mpqj>.

However, Walmart took the additional step of ensuring that their stores also meet the more restrictive requirements of the MLO to make their facilities dark sky compliant. As part of this updated standard Walmart is using fully shielded LED fixtures in all new construction. In addition, they will also retrofit many of their overseas stores using fully shielded LED fixtures. Walmart operates over 4,400 stores in the U.S. and 5,600 worldwide.



A Walmart parking lot in Puerto Rico shows the affects of good outdoor lighting at night. (PHOTO COURTESY OF WALMART)

Three goals frame Walmart's sustainability mission: 1) To be supplied 100 percent by renewable energy, 2) To create zero waste, 3) To sell products that sustain people and the environment.

Walmart will open over 300 new stores in the U.S. this year.*

Leavenworth, Kansas was the first location to receive new lighting in the U.S. Currently, 25 locations in the U.S. employ the new lighting and several hundred stores are currently in design. Walmart is installing fully shielded LED fixtures in parking lots globally, including 22 stores in Puerto Rico.

When asked what drove their decision to use the MLO for their lighting standard, Mr. Williams indicated that the installation of new lighting will reduce energy consumption, save

money, improve safety and reduce the average illumination levels due to LED's improved uniformity. He added that the new installations have received good reviews from customers, management, and associates. Walmart expects to reduce outdoor lighting energy consumption in the new stores by about 50 percent and this will contribute to meeting their Global Sustainability Initiative announced in 2005.

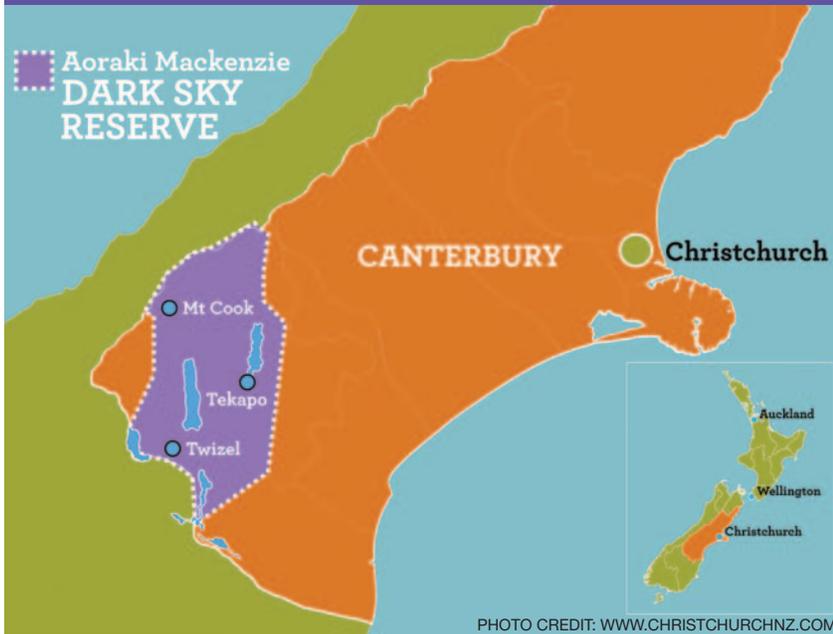
* Based on the ChainLinks 2012 Retail Forecast Report.



THE WORLD'S LARGEST INTERNATIONAL DARK SKY RESERVE

Aoraki Mackenzie

PHOTOS BY FRIEDEL PAS



To put it simply," IDA Executive Director Bob Parks states as he introduces Aoraki Mackenzie International Dark Sky Reserve (IDSR), "it is one of the best stargazing sites on Earth." The Aoraki Mackenzie IDSR is 1,600 square miles of New Zealand's South Island and contains the Aoraki/Mt. Cook National Park and the Mackenzie Basin, as well as an unbeatable starry sky.

In addition to a starry sky, this 'Gold' level reserve hosts a rich history of the Maori. The native people of New Zealand, the Maori, relied on the night sky as a navigation tool to the island and even today it forms an important part of the culture. Today, the sky is used for other purposes, but their culture survives and continues. In 1963, Lake Tekapo, along the northern edge of the Mackenzie Basin, was chosen as the site for Mt. John Observatory for the night sky's clarity and darkness. It remains a premier facility, protected by the IDSR status and operated by the University of Canterbury, where the on-site team is composed of astronomers from Japan's Nagoya University as well as investments by the United States and Germany.

While an important research location, New Zealand has recently become a tourist attraction for its fantasy-like landscapes made famous in Peter Jackson's "Lord of the Rings" film trilogy, but now it will also be known for its IDSR's magnificent night sky above. Four companies currently offer personalized day and night sky tours, as well as

educational and public outreach programs. This astrotourism, as well as the active astronomy research in the area, helped prompt a proposal to establish Aoraki Mackenzie as a reserve.

Residents of the reserve have persistently pursued dark skies. A lighting ordinance for the Mackenzie District Plan was one of the first ordinances in the southern hemisphere, controlling lighting throughout the reserve since 1981. This ordinance has minimized light pollution for Mt. John Observatory as well as conserving energy, protecting wildlife, and made the area a popular stargazing destination for tourists even before it was awarded IDSR status.

Our home galaxy's satellite galaxies, the Magellanic Clouds, are consistently visible throughout the year as well as many other night sky wonders. Bob Parks remarks about the reserve's views, "The new reserve is coming in at a

The native people of New Zealand, the Maori, relied on the night sky as a navigation tool to the island and it forms an important part of their culture.

Mt. John Observatory

IDA Executive Director Bob Parks





A group performing native dances for the assembled guests.

‘Gold’ level status. That means the skies there are almost totally free from light pollution.”

The announcement for the induction of this IDSR came at the Third International Starlight Conference (see page 12). The United Nations Starlight Initiative effort proclaims that a star-filled night sky is part of the common heritage of mankind and that protections are necessary to ensure that present and future generations will be able to see the stars. Having the conference at the newly minted IDSR clearly focused the important collaboration for protection of night skies everywhere.

Aoraki Mackenzie, along with NamibRand Nature Reserve, are the latest jewels in IDA’s expanding network of International Dark Sky Places. With each new addition, word spreads concerning the importance of preserving the night and keeping the stars visible for generations to come.

Lake Tekapo, New Zealand



Margaret Austin holds the International Dark Sky Reserve crystal plaque presented to Aoraki Mackenzie at the Starlight Conference in Lake Tekapo.



Opening of the Third International Starlight Conference with remarks by Sir Tumu Te Heuheu, Paramount Chief of Ngati Tuwharetoa.





A Sky Safari in Africa's First International Dark Sky Reserve

Declared an International Dark Sky Reserve (IDSR) on May 24, 2012, the NamibRand Nature Reserve (NRNR) is Africa's first International Dark Sky Place. It combines a safari experience with pristine skies, offering visitors views of African wildlife during the day and the southern skies at night.

The NamibRand, located in southern Namibia, is a private nature reserve established to help protect and conserve the unique ecology and wildlife of the Namib Desert. Encompassing an area of 665 square miles, it is one of the largest private nature reserves in Southern Africa. Its orange-red dunes, sandy plains, inselbergs (isolated rock hills), mountains, and gravel plains remind

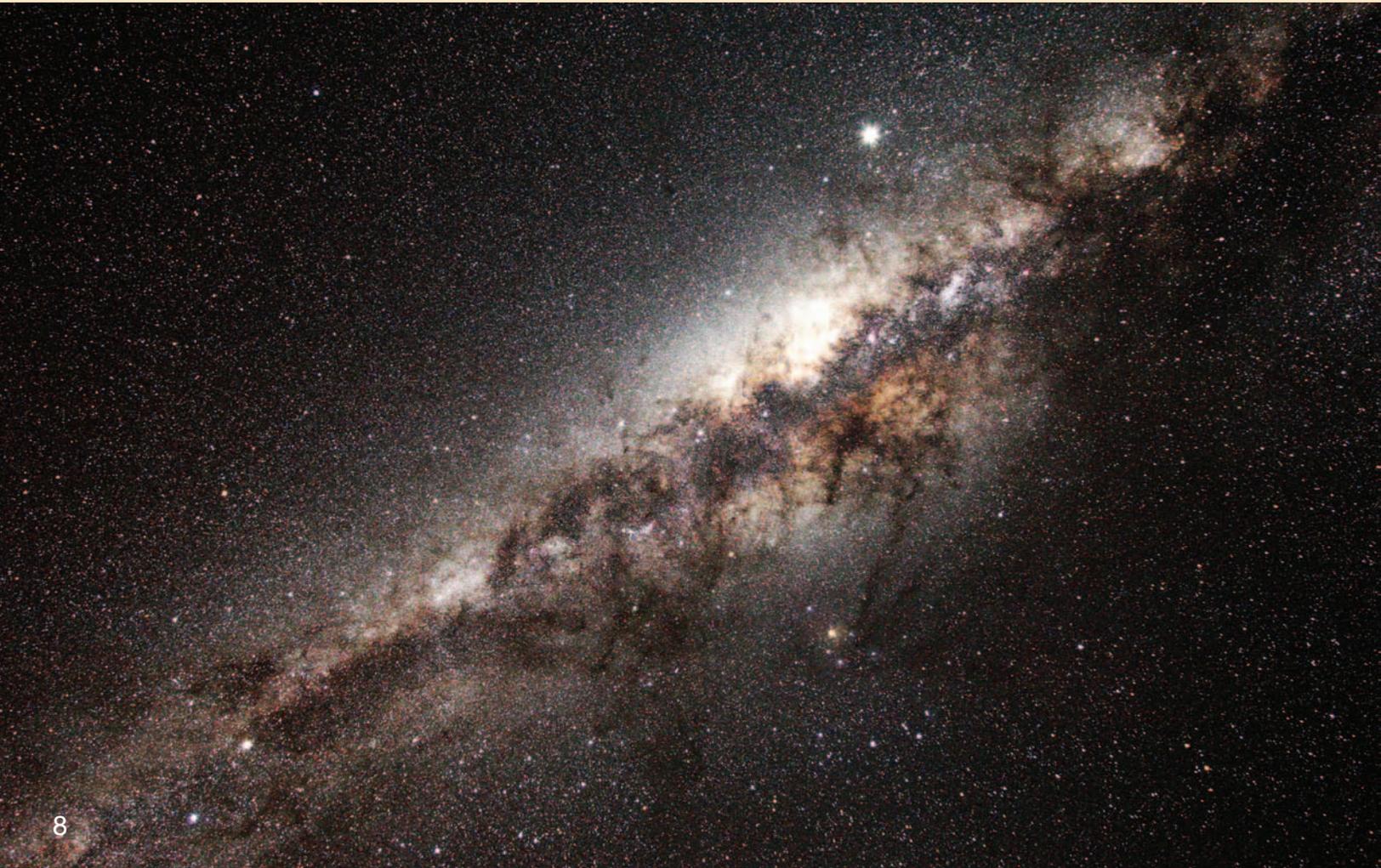
one of a Martian landscape. Among the animals found on the reserve are oryx, springbok, giraffe, cheetah, leopard, and the endangered Hartman's zebra. To provide operating funds six ecotourism concessions have been awarded by the reserve; each of which pays a daily, per-bed fee. The funds generated through these park fees enable the NamibRand to be financially self-sustaining. The reserve is also home to the Namib Desert Environmental Education Trust (NaDEET), a small nonprofit organization whose mission is to protect the natural environment of Namibia by educating its citizens to live a sustainable lifestyle.

The NRNR was identified as a potential IDSR by Dr. George Tucker,

a retired professor of physics and astronomy from New York, who also led the efforts to gain the status for the reserve. Recognizing the role that dark skies play in a healthy ecosystem, their importance to the nation's cultural heritage, and their value as an economic resource the management of the reserve committed to seeking International Dark Sky Reserve status for the NamibRand. They knew this status would call attention to the importance of the region's dark sky and the issue of light pollution.

The IDSR's core is the NaDEET Centre which hosts more than 30 groups each year who participate in a week-long program focused on sustainable living. As part of the program, the participants, mainly

The Milky Way as seen from NamibRand Nature Reserve. (PHOTO: GEORGE TUCKER FROM NAMIBRAND NATURE RESERVE)



Namibian schoolchildren, are introduced to the night sky and Namibian sky lore, observe celestial objects through a telescope, and receive instruction about the negative effects of light pollution.

An inventory of the Reserve's lights showed that although there were only 434 exterior lights in the whole reserve, many of these were not fully shielded. In preparation for the IDSR application, mandatory lighting guidelines were adopted for the entire reserve requiring that all lights emitting more than 1,000 lumens be fully shielded and retrofits performed on all lights not meeting the guidelines. The guidelines are so comprehensive that they even stipulate rules governing the use of vehicle lights when driving on the reserve's roads. As a result, light pollution on the reserve has been greatly reduced. In conjunction with these lighting improvements, NaDEET published an issue of their biannual magazine, the Bush Telegraph, devoted to the night sky, the threat posed by light pollution, and ways to combat it. 19,000 print copies were distributed to schoolchildren, neighboring landowners, and tourism operators. An online version can be downloaded at <http://tinyurl.com/c9lbu8u>.

The NamibRand's sky is extremely dark, especially since the nearest community, a small, rural village, is more than 60 miles from its border. Visual observations confirm that the sky across the entire reserve is classified as 1 on the Bortle Scale and Sky Quality Meter measurements show it to be one of the darkest yet-to-be measured. The desert air also provides an extremely clear atmosphere allowing stars to be seen all the way to the horizon. In addition, virtually no aircraft fly over the Reserve at night, making it an ideal site for astrophotography. As a result, the NamibRand has earned IDSR Gold status, given only to reserves with pristine or near-pristine skies. With the Milky Way's core near the zenith, visitors can easily see the shape of our galaxy's nuclear bulge and follow the dark dust lanes in its disk. The Magellanic Clouds are also clearly visible, as is the zodiacal light. Even the elusive gegenschein, a similar phenomenon to zodiacal light, can be spotted during the times of year when it is not overwhelmed by the Milky Way's glow. Dr. Tucker commented "Viewing the pristine night sky over the NamibRand is an unforgettable experience. It makes one realize what we are missing when we view the universe through light polluted skies".

When announcing the designation, the IDA's Executive Director Bob Parks explained, "The night sky over the NamibRand Nature Reserve is exceptional, as are the efforts the reserve has taken in upgrading its lighting for the sake of its wildlife and visitors." As the first IDSPPlace in a developing country, it is hoped that this project will inspire similar IDSPPlaces not only in Africa, but throughout the developing world. There has already been interest shown in creating IDSPPlaces in neighboring South Africa.

Opportunities exist at several of the ecotourism lodges on the Reserve for volunteers to present astronomy programs to guests using the lodges' telescopes. Room and board and access to activities including game drives and guided hikes are provided. Interested IDA members may contact George Tucker (gekcute@gmail.com) for details.

Homer Glen Award Ceremony

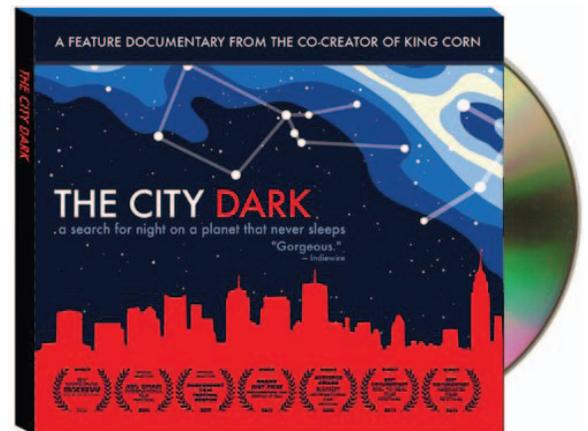
Bob Parks traveled to Homer Glen, Illinois on July 10, 2012 to present an award for their International Dark Sky Community (IDSC) status, earned November 2011. The mayor of Homer Glen, Jim Daley, received the crystal award from IDA with praise for the efforts of the committee, led by trustees Margaret Sabo and Debra Luginbuhl, that developed the community's IDSC application. The Village of Homer Glen Board passed a comprehensive outdoor lighting ordinance on December 18, 2007.

PHOTO CREDIT: RENEE MAILHOT



NOW AVAILABLE ON DVD!

Featuring stunning astrophotography and a cast of eclectic scientists, philosophers, historians, and lighting designers, THE CITY DARK is the definitive story of light pollution and the disappearing stars.



Part of the proceeds from your purchase of THE CITY DARK will benefit IDA's mission:
<http://www.darksky.org/shop>



From the title sequence of "Losing the Dark", being produced by Loch Ness Productions for IDA.

©2012 LOCH NESS PRODUCTIONS

PSA Gives Planetariums Potential to Educate Millions

A simulated depiction of a majestic star-filled night sky is seen daily at 1,600 planetariums nationwide. This results in a total viewing audience exceeding 30 million annually. Yet, many in the audiences do not believe what they are seeing is real because it looks so drastically different from the night sky in their own backyards. With the release of "Losing the Dark" each of these planetariums will have the opportunity to not only introduce more than 30 million people to the reality of the disappearing night sky, but also to explain the causes and what each person in the audience can do about it.

"Losing the Dark" is being created by Loch Ness Productions in cooperation with Adler Planetarium in Chicago with the direction of the International Dark-Sky Association's Education Committee headed by Dr. Constance Walker. Connie is senior science education specialist of the National Optical Astronomy Observatory and also a member on IDA's board of directors. When completed, the show will be a six to seven minute short, full-dome planetarium experience shown at the beginning of planetarium feature shows. When the project is fully funded, planetariums nationwide will be supplied with a free copy of the

film. Families, school groups, and any attendee coming in to see "the night sky" for the first time will not only be amazed by the experience, but will also realize the possibilities for the night sky outside of the dome.

The piece defines the problems with light pollution, its effects on life, and three ways in which people can implement "wise lighting" practices to mitigate light pollution. "Losing the Dark" uses clear narration and dramatic, immersive visuals to show how the sky glow from cities and towns has encroached even into remote areas of wilderness. It details how this luminous fog of artificial light disrupts the circadian cycles of plants, animals, and humans; wastes energy; contributes to air pollution and global climate change; and deprives everyone of the night sky's true beauty. A trip to the planetarium now becomes more than a day to learn about the night sky, it becomes a mission to save it.

Planetariums will not be the only venue for this film. IDA will contract to produce a traditional "flat-screen" version of the Public Service Announcement (PSA). This will allow its broadcast and viewing in traditional outlets like classrooms, museum kiosks, YouTube and iTunes downloads, and for dark sky advocates to use it in

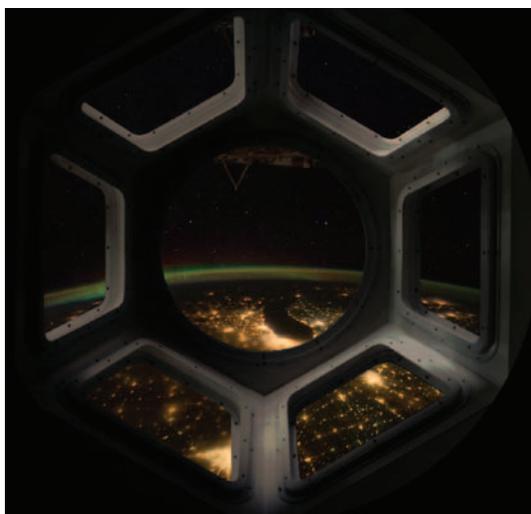
their own presentations.

The film will also be translated into many languages to make it accessible internationally.

IDA is currently looking for donations to finish this important work and will match your donation up to \$5,000. To help support this project or help raise funds for it, please contact Scott Kardel at wskardel@darksky.org. The show was premiered in August at the International Astronomical Union meeting in Beijing.



One frame from a time-lapse sequence shot in Chicago by Dome3D, showing light pollution at ground level. ©2012 DOME3D



The view of light pollution as seen from the International Space Station. ©2012 LOCH NESS PRODUCTIONS

American Medical Association Weighs in on Light Pollution



The American Medical Association (AMA) has become increasingly vocal in their stance on light pollution and light at night. In 2009, the AMA adopted a short resolution that put the organization on record as endorsing the use of fully shielded lighting. They did this primarily in support of glare reduction to improve safety and ensure good visibility for all drivers, especially older ones. They also recognized that inefficient lighting wastes energy and contributes unnecessarily to the production of greenhouse gasses. While many dark sky advocates cheered the resolution, it was just a tentative first step by the AMA in defining a position on light at night. “The AMA’s Council on Science and Public Health published a report earlier this year. It was adopted by the full AMA and further advances their position.

In 2009, the AMA adopted a short resolution that put the organization on record as endorsing the use of fully shielded lighting.

The new document, posted on the IDA website, cites 134 references and covers a wide-range of health issues related to light at night. Many of which address situations beyond what most people think of as light pollution – light at night inside our homes.

The report expands the AMA’s position on glare, discussing both disability glare and discomfort glare. According to the AMA, “Disability glare is unwanted and poorly directed light that temporarily blinds, causes poor vision by decreasing contrast, and creates an unsafe viewing condition, especially at night, by limiting the ability of the person to see.” To limit disability glare the AMA cites the need for “proper design techniques” to be used. One of the primary difficulties, especially for roadways, is that lighting is not governed by a single jurisdiction. Even when there is properly designed roadway lighting, lights next to the roadway can spill out beyond their intended area affecting the driver and degrading the performance of the lighting.

Both overhead roadway lighting and opposing headlamps can produce discomfort glare for nighttime drivers. New headlamp technologies have made this glare “more serious” and the brighter, bluer headlamps “have a higher complaint rate for glare than for any other light source.”

The AMA cites research showing “that the effects of the glare are cumulative, meaning that the glare from two light sources is the sum of the glare from the individual light sources. As a result, every light source within the field of view has an impact on the comfort and visual capability of the driver.”

With respect to lighting on roadways, luminaires that direct their light horizontally will create more glare for drivers than light sources that cut off horizontal light. A flat glass streetlamp “provides a lower level of both disability and discomfort glare.”

Decorative lamps do not fare well with regard to glare and the AMA recommends that such luminaires be only used, if at all, where pedestrians are the primary roadway users.

As more and more roadway lighting is switched over to LED, the conversions are often touted as reducing light pollution and glare. However, the AMA finds that some of the techniques used “results in light aimed at the driver and pedestrians causing a higher glare impact.” Additionally, “solid state lighting systems typically have a higher glare impact than traditional sources.”

The report also expands to more general environmental issues, such as energy waste, the loss of the Milky Way, and the impact on wildlife, with the majority of the document focused directly on health affects from light at night. This includes disruption of circadian rhythms, disruption of sleep, nighttime suppression of melatonin levels, increased risk of cancers and other diseases such as diabetes. Pervasive use of nighttime lighting disrupts our natural cycles and “creates potentially harmful health effects and/or hazardous situations with varying degrees of harm.”

Overnight shift workers are most at danger for these risks, but the AMA also cites concerns over increased use of electronic media at night. Light from televisions, computer monitors, cell phone screens, etc. is having an impact on all of us. This includes the development of consequences on the sleeping patterns of children and adolescents as well as suppressed concentrations of melatonin.

Our relatively recent ability to artificially override the natural cycle of day and night is an on-going experiment we perform on ourselves and the natural world. The AMA asserts that “it is imperative to evaluate the unintended adverse health consequences of electric lighting practices in the human environment, and determine their physiological bases so that effective interventions can be developed to mitigate harmful effects of suboptimal light exposure.”

CONTINUES ON PAGE 12

Third International Starlight Conference

The Third International Starlight Conference was held in Lake Tekapo, New Zealand on June 11-13, 2012.

This conference was recognized by the Starlight Initiative as the third of a series started in 2007 on the island of La Palma with the World Conference in Defence of the Night Sky and the Right to Observe the Stars, where the Starlight Declaration was adopted. The University of Canterbury and Royal Astronomical Society of New Zealand organized the conference.

The issues addressed included:

- the defence of the quality of the night sky,
- the right to observe the stars,
- the heritage of starlight,
- the issues of light pollution,

- the protection of observatory sites,
- the benefits of public outreach in astronomy,
- the starlight tourism,
- and the cultural aspects of visual astronomy.

The Starlight Conference in New Zealand coincided with a bid for International Dark Sky Reserve (IDSR) status for the Mackenzie Basin region around Lake Tekapo, including nearby Aoraki/Mt. Cook National Park. IDA Executive Director Bob Parks and other IDA members including former board directors Reginald Wilson, Malcolm Smith and Friedel Pas attended. Mr. Parks announced the first IDSR des-

ignation in the Southern hemisphere to Aoraki/MacKenzie at the opening ceremonies. He presented the crystal award to Margaret Austin, who led the committee that submitted the application. After remarks from the assembled dignitaries, the attendees were treated to a traditional dance performance of the Ngati Tuwharetoa.

The conference included presentations from dark sky advocates and researchers on topics ranging from night sky brightness monitoring, legal issues and promoting ecotourism. The conference was an excellent opportunity for dark sky advocates to share their experience and expertise. (Other pictures of the event are on pages 6-7.)

Attendees of the Starlight Conference in New Zealand. (PHOTO: FRIEDEL PAS)



AMA

CONTINUED FROM PAGE 11

Finally, the AMA report concluded with four recommendations. The American Medical Association:

1. Supports the need for developing and implementing technologies to reduce glare from vehicle headlamps and roadway lighting schemes, and developing lighting technologies at home and at work that minimize circadian

disruption, while maintaining visual efficiency.

2. Recognizes that exposure to excessive light at night, including extended use of various electronic media, can disrupt sleep or exacerbate sleep disorders, especially in children and adolescents. Using dim red lighting in the nighttime bedroom environment can minimize this affect.

3. Supports the need for further multidisciplinary research on the risks and benefits of occupational and environmental exposure to light-at-night.
4. That work environments operating in a 24/7-hour fashion have an employee fatigue risk management plan in place.



Dark-Sky Ambassadors

The International Dark-Sky Association created the Dark Sky Ambassadors program to identify individuals who help spread the word of IDA and its mission to the general public through mass communication. Ambassadors have achieved a level of popularity and recognition that allows them to communicate the mission broadly and raise the awareness of light pollution in the popular media. Examples of good prospects are performers, athletes, authors, directors, and celebrities.

Suitable candidates should be willing to participate in IDA awareness events, activities, and publicity and use their recognition in a way that reaches the broad public and expands awareness of our mission.

Among this elite group, four individuals have been selected by IDA to be our representatives on the public stage.

The first person chosen for distinction as a Dark Sky Ambassador was Arthur C. Clarke (1917-2008). He was an award-winning science fiction writer who gave the world the numerous novels of which “2001: A Space Odyssey” is probably the most well known. Speaking in support of IDA, Clarke shared his opinion about light pollution and his hopes for the future saying, “Isn’t it a tragedy that our children and grandchildren cannot enjoy the night sky in the way our forefathers have done for thousands of years? Yet it is not too late to save our skies. Your active participation and campaigning with the International Dark-Sky Association can help ensure that the nights are restored to what they ought to be in many locations.”

Co-founder of Wicked Delicate Films LLC, Ian Cheney produced and directed *The City Dark*, a documentary discussing “a search for night on a planet that never sleeps”. It asks the question, “What do we lose, when we lose the night?” Ian has traveled the country with his film, showing and discussing it, and exposing the problem of light pollution to the world. His film continues to enlighten viewers across the world, especially after its release on PBS.

You may have tuned in to watch science writer Geoffrey Notkin, host of Science Channel’s award-winning adventure series *Meteorite Men*, owner of Aerolite Meteorites LLC.

Geoff actively supports and promotes the International Dark-Sky Association. He expresses his opinion about light pollution and the night sky saying, “Keep the night sky the way nature intended it; dark, majestic, and mysterious.”

Lucianne Walkowicz, Professor in the Department of Astrophysical Sciences at Princeton has also been named a Dark Sky Ambassador. She uses her work with NASA as a platform to raise awareness of dark skies and night sky conservation.

If you know of a potential candidate that meets these requirements, you may nominate them by sending an email to ida@darksky.org. Include a brief explanation of why you believe that they would be a good Dark Sky Ambassador, a CV for the candidate, and contact information. For the candidate to be considered, you should be able to arrange a meeting with him or her, or know someone who can do so.

Night Sky Brightness Measurement Standards

Light pollution is already continuously monitored at more than 50 locations worldwide, and the number of stations is expected to continue to grow in the coming years. While these developments are excellent news for those interested in monitoring light pollution, there currently exists no common standard for recording measurements from the various devices. This has greatly hampered efforts to compare measurements from different night sky brightness monitors (NSBM), and to develop databases containing long-term measurements from around the world.

IDA has convened a group of researchers to begin assembling a global

database of light pollution measurements. As a first step, a standard data format for reporting light pollution measurements was proposed in May 2012 at the Cabauw Lightmeter InterComparison workshop.

The goal of the standardization is to make comparisons of future measurements easier, regardless of whether the measurements were taken by currently available NSBMs, or future devices. For this reason, the community has designed a format that anticipates the needs of potential future devices.

The proposal has been under public discussion since it was introduced, and comments have been received

from astronomers, light pollution researchers, and interested citizen-scientists. The new standards were announced at the August 2012 meeting of the International Astronomical Union in Beijing, China. So far, the format has been endorsed by Unihedron (makers of the Sky Quality Meter) and by Knightware, the maker of the SQM Reader program. Both companies have pledged to release new versions of the readout code that conform to the community standard once it is finalized.

Having new data standards in place will be invaluable to scientists trying to understand the biological and ecological effects of light at night.

IDA Instrumental in Bringing Darker Skies to Parks

PARKS AND PROTECTED AREAS UPDATE

In July IDA visited two National Parks that are involved in the new Park and Protected Areas (PPA) program. The PPA program was described in the last issue of Nightscape, and is an extension of work IDA did under a Cooperative Agreement from the National Park Service (NPS). IDA has worked with the NPS to develop new standards for park lighting and to retrofit select parks to become more energy efficient and dark sky friendly. IDA has designed new fixtures and lamps to improve the quality of park lighting and to protect the ecology within parks (see page 2).

Cedar Breaks National Monument in Southern Utah was one of the first parks selected to participate in the NPS Cooperative Agreement. IDA made an initial visit in June of 2011 to analyze and inventory the existing lighting and to develop a lighting plan to improve it. After consultation with the park staff, the lighting equipment was shipped



IDA Executive Director Bob Parks worked with Interpretive Ranger Kevin Poe to retrofit the lighting at the Bryce Canyon Visitor's Center. See the results of the center's walkway on the opposite page.

to them in September for them to install. We returned in July of this year to review progress and to document the improvements. After assisting the park with some remaining upgrades, we are happy to report that Cedar Breaks meets the requirements necessary to submit an application for International Dark Sky Park (IDSP) certification. We are hopeful that the park will prepare and submit their application in the next few months.

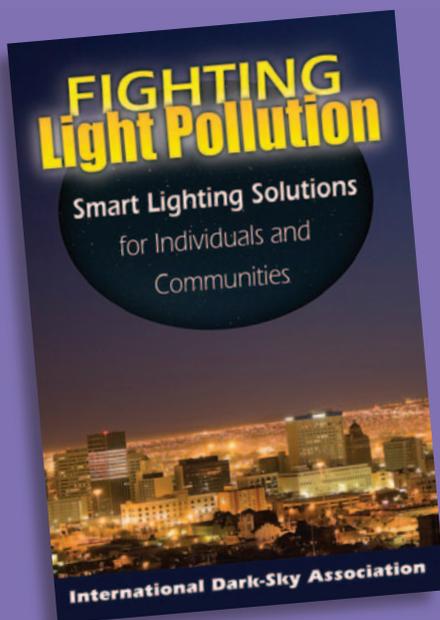
While at the park, Bob Parks was able to meet with a group of travel writers that had come to the park as part of a travel industry conference in nearby Cedar City, Utah. Both Cedar Breaks Superintendent Paul Roelandt and Mr. Parks addressed the group and explained the benefits of preserving the night sky and the potential impact that receiving an IDSP designation can mean for increased park visitation.

After visiting Cedar Breaks Mr. Parks visited Bryce Canyon National Park to discuss their plan to become an IDSP and to suggest lighting solutions. Kevin Poe, an interpretive ranger as well as a participant in the elite group of NPS "Dark Sky Rangers", has started the process of inventorying every light in the park. Mr. Parks surveyed the park's lighting and made specific recommendations based on IDA's work in other parks as part of the Cooperative Agreement. This is the first park IDA is working with as part of the new, extended PPA program funded by generous donations of IDA members.

After reviewing the work necessary to retrofit the park's lighting IDA agreed to start with a retrofit of the Visitor's Center (VC). The area around the VC is a perfect example of lighting that was not designed well with its location in mind. While most fixtures were fully shielded, the illumination levels were extremely high. Pathway lighting around the entrance to the VC was using 100 watt metal halide (MH) wall packs. While normally installed at mounting heights of 12' or more, they were installed 1' above the sidewalk producing an astounding, 1,600 footcandles of illumination

Learn how to effectively fight light pollution in your community with the first practical guide to alleviating an increasingly prevalent environmental concern!

This authoritative source is geared to home owners and renters, stargazers, nature-lovers, business owners, community leaders, and public officials – anyone with an interest in efficient and effective lighting.



You will automatically support IDA and its mission to preserve the night sky by making your purchase through this link:

<http://www.darksky.org/shop>

on the sidewalk. This reflected directly into the night sky – visible up to a mile away. There were also bollards and recessed cove lighting using the same excessive 100 watt MH lamps. IDA replaced these lamps with 3 watt amber LED lamps, saving 97 percent of the energy previously being used and providing a comfortable environment for the park’s frequent astronomy outreach programs. One of the areas that IDA has done extensive research into as part of the Cooperative Agreement is how to easily and cost effectively retrofit HID fixtures to use lower output lamps that are fully shielded. We have developed a line of yellow LED lamps that provide greatly reduced light output for use in fixtures ranging from bollards to NEMA head “glare bombs”. These LED replacements will work in most fixtures without removing the ballast and transform them into fully shielded fixtures.

While at the park, we retrofitted 22
CONTINUES ON PAGE 16

IDA has worked with the NPS to develop new standards for park lighting and to retrofit select parks to become more energy efficient and dark sky friendly. IDA has designed new fixtures and lamps to improve the quality of park lighting and to protect the ecology within parks.



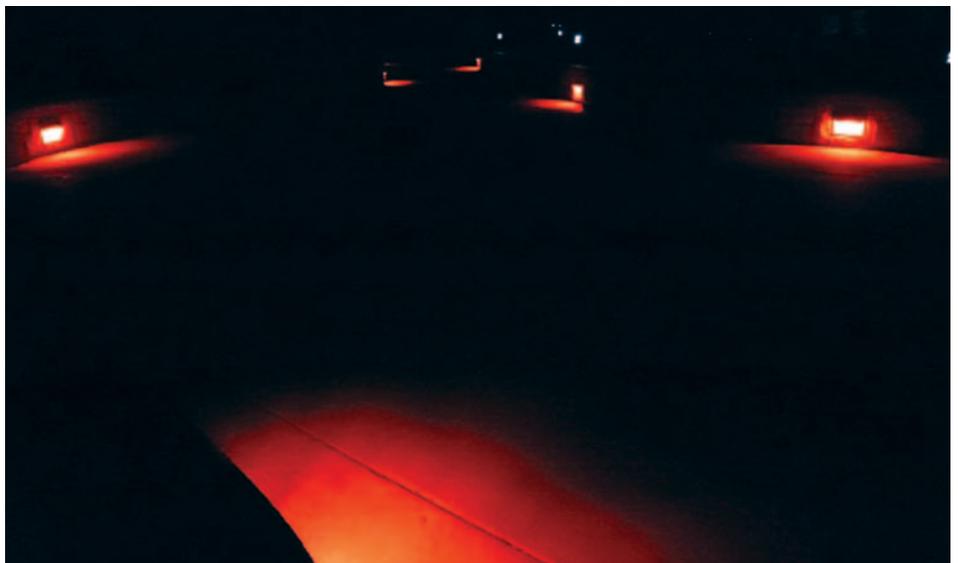
Bryce Canyon bollard BEFORE



Bryce Canyon bollard AFTER



Bryce Canyon Visitor's Center walkway at night, BEFORE



Bryce Canyon Visitor's Center walkway at night, AFTER

PPA Update

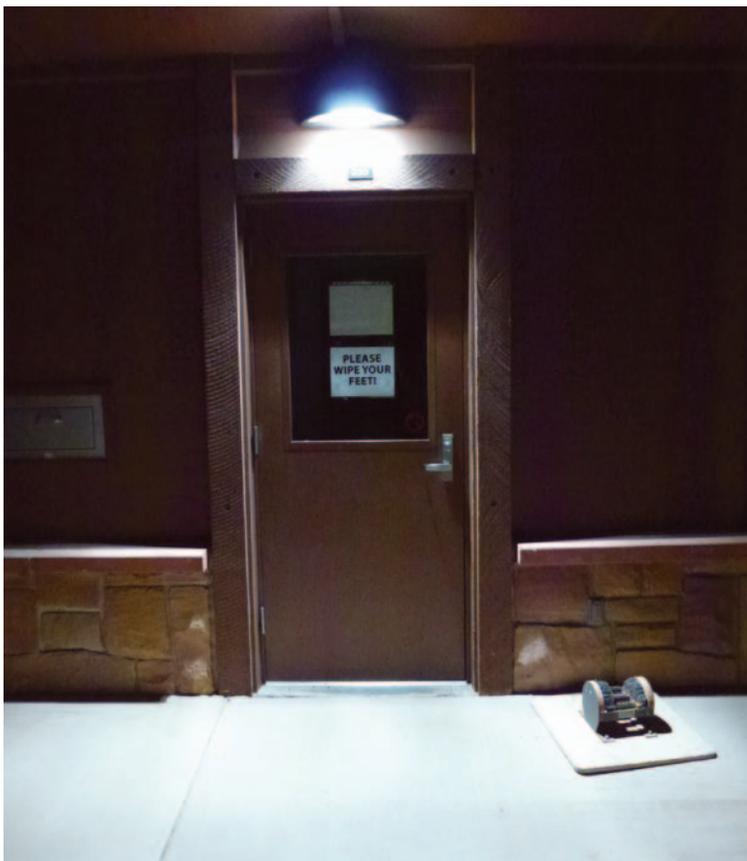
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“pathway”, 6 bollards and 8 recessed cove fixtures which each had 100 watt MH lamps, with 3 watt amber LED lamps. Used dusk to dawn, this represents an annual savings of over 12,000 kilowatt hours. This will save the park an astonishing \$1,000 annually, for just one building! This is money that can be spent to finance important park maintenance, salaries, and interpretive programs.

IDA intends to provide additional consultation and assistance to help Bryce Canyon retrofit the rest of its lighting and gain an IDSP certification in the future. If you would like to provide financial support for Bryce Canyon and the PPA program, please contact Scott Kardel at wskardel@darksky.org.



Cedar Breaks National Park Superintendent Paul Roelandt speaks to a group of travel industry writer’s about the significance of dark skies and the benefits of being certified as an International Dark Sky Park.



Bryce Canyon wallpack, BEFORE



Bryce Canyon wallpack, AFTER

IDA Chapter News

DARK SKIES NORTHWEST

David (Dave) Ingram, IDA Chapter Leader for Dark Skies Northwest (covering Idaho, Montana, Oregon and Washington) is one of IDA's busiest bees. In April he attended the coming out party for the newly formed Sisters Oregon Astronomical Society where he set up an IDA display and was involved in their screenings of *The City Dark* and other events held to coincide with National Astronomy Day. While he was in town Dave found time to consult with the town's city planner and city manager on their outdoor lighting ordinance. Dave was also the host for a screening of *The City Dark* at Capitol Theater in Olympia, Washington. Dave has been very active in many areas including his local astronomy clubs by working with them to support IDA and its programs.

As if that weren't enough, Dave and another IDA member Ray Stinson, have been spending much of their summer bringing astronomy and dark skies education to thousands of visitors at Glacier National Park. Programs are held nightly at the park's St. Mary Visitor Center and five days a week at Apgar Village. They include daytime solar viewing and evening viewing of stars and constellations.

In addition to running evening astronomy programs, Ray Stinson has been using the clear dark skies of Glacier National Park to photograph the park's star-filled skies and outbreaks of the Northern Lights (see photo on page 18).

Lying directly across the international border from Glacier National Park is Canada's Waterton Lakes National Park. Both parks are moving forward jointly with an application for dark sky park status. If granted, this would be the first dark sky park to receive recognition from both the IDA and the Royal Astronomical Society of Canada. It could also be the first dark sky park that encompasses parts of two nations, meaning that Waterton-Glacier International Dark Sky Park would truly have earned its international title.

DARK SKY UPDATE FROM MICHIGAN

In April the Northern Michigan Environmental Action Council recognized Mary Stewart Adams as an "Environmentalist of the Year." Mary is the program director of the Headlands International Dark Sky Park. The honor came almost one year after the park received its IDSP status. She was instrumental in advancing the dark sky movement for the park and continues to offer an amazing array of public outreach programs there; including a very recent evening with nationally acclaimed Great Lakes area aurora borealis photographer Shawn Malone. According to Emmet County Michigan press release hundreds of people attend the park's free monthly programs "to hear Adams' unique combination of astronomical insights, celestial lore, astrology and storytelling."

Michigan's first International Dark Sky Park is also leading the way for more night sky protection in the Great



IDA Chapter Leader for Dark Skies Northwest David Ingram at the entrance to Glacier National Park located in the northwest corner of Montana.

Programs are held nightly at the park's St. Mary Visitor Center and five days a week at Apgar Village.

Lakes State. In early July Governor Rick Snyder signed the "Dark Sky Coast" bill into law. The new legislation protects the night sky above 21,000 contiguous acres of state forestland in Emmet County's northwestern tip, near the Headlands International Dark Sky Park.

The bill only affects public lands, calling for lighting to be directed downward to avoid glare and disrupted viewing of the night sky. It is hoped that it will eventually encourage the use of dark sky friendly lighting with local businesses and residents. It is also anticipated that the area will increasingly become a draw for tourists that are eager to enjoy the night sky.

IDA SAN DIEGO

The very active San Diego Chapter has been bringing dark sky education to the masses by setting up their own display on light pollution at events around the region. In just the first half of this year the group has participated in the Greater San Diego Science Fair, Borrego Springs Energy Focus, Space Day at the San Diego Air & Space Museum, the Southern California Astronomy Expo, and the Del Mar Fair.

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Chapter News

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If that wasn't enough, they also presented to the San Diego Astronomy Association and provided detailed comments on the City of San Diego's revision to their outdoor lighting ordinance and other issues related to lighting in the area. The two also displayed at this summer's Julian Starfest. In October they will host a public forum on light pollution at the Reuben H. Fleet Science Center.

IDA ARKANSAS

IDA Arkansas held its annual meeting on Saturday, June 9, 2012. The meeting was held with the Central Arkansas Astronomical Society (CAAS) at the River Ridge Observatory, near Bigelow, Arkansas. Their special guest was Arkansas Representative Stephen Meeks. Representative Meeks, a strong advocate for dark skies protection in Arkansas, plans to re-introduce his "Arkansas Nighttime Environment Protection Act" legislation into the 2013 session of the Arkansas General Assembly. He discussed the legislation, his strategy for securing its enactment into law, and how members of the IDA Arkansas Chapter and CAAS can help in that effort.

Jim Fisher, IDA Arkansas Chapter Leader, also presented the program "Protecting the Night Environment" and provided an update on current programs from the IDA. The meeting also included discussion on how best to protect the River Ridge Observatory from future dark skies deterioration, caused by urban growth and proposed development.

Mr. Fisher has taken his "Protecting the Night Environment" talk on the road with a February presentation to the Memphis Astronomical Society. Tentatively, Rep Meeks and Mr. Fisher also plan to address the meeting of the Arkansas/Oklahoma Astronomical Society in Fort Smith on October 12, 2012.

IDA member Ray Stinson took this stunning photograph of the Northern Lights at Glacier National Park.



IDA San Diego members Jim Traweek & Kin Searcy display information at the San Diego Air & Space Museum last May.

IDA WELCOMES NEW CHAPTERS

Bryan Bodie is heading up our newest chapter – **IDA Palm Beach County Florida**. He has brought together a group of people with diverse interests and areas of expertise that are interested in making a difference in their area for wildlife, astronomy, and more. IDA is looking forward to hearing about their activities as they unfold.

The Riverside County, California Chapter has re-formed into **IDA San Bernardino County, California – High Deserts Region**. Tom O'Key of the Southern California Desert Video Astronomers (SCDVA) is running this "new" chapter. The chapter is working with local residents and the Joshua Tree Chamber of Commerce on a lighting retrofit program that will hopefully get more homes and businesses to employ dark sky friendly lighting. Tom and the SCDVA presented about light pollution not only at last May's RTMC

Astronomy Expo in Big Bear, but also locally at places like their farmer's market. He will be with SCDVA at the 16th Annual Starry Nights Festival 2012 in Yucca Valley, CA on Sept. 15. The event will include presentations by Dennis Mamanna, David Levy and more. Tom will be presenting on light pollution and IDA.

More info and updates to be posted at <http://tinyurl.com/cptx3ue>.

We are also very proud to announce that Arun George is the chapter leader for **IDA India**. Arun has started off running by meeting with the organizers of the World Wildlife Fund's Earth Hour and working with them on their global lights off campaign last March. He also met with officials from India's Forest Department on the possibility of creating International Dark Sky Parks in India and has been invited by his local zoo and park authority to conduct a lighting audit on their grounds to make sure that they use appropriate lighting.



ALCON Held in Chicago

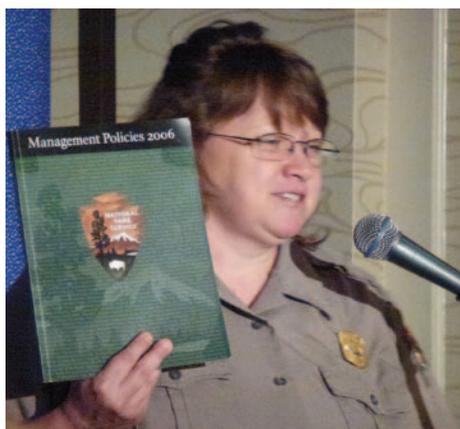
The Astronomical League held their annual conference in Chicago, Illinois on July 4–11, 2012. This year the program included a full day of dark sky related presentations.

World-renowned researchers Dr. George Brainard and Dr. David Blask spoke on the human health implications of Light at Night (LAN). Dr. Harold Stark presented his finding on the impact light pollution has on air pollution. Drew Carhart of the Illinois Coalition for Responsible Outdoor Lighting (ICROL) gave a talk on how to work with communities to enact lighting ordinances. National Park Service Ranger Sue Bennett of Indiana Dunes National Lakeshore spoke about dark sky protection efforts at the park. Astrophysicist and newest IDA Dark Sky Ambassador Lucianne Walkowitz shared how experiencing the night sky as a child near Tucson, affected her life and career choice.

In addition to an excellent program, attendees were able to take trips to the Adler Planetarium, Fermilab, and Yerkes Observatory.



Yerkes Observatory
in Williams Bay,
Wisconsin



National Park Service
Ranger Sue Bennett,
Chief of Interpretation
and Education
at Indiana Dunes
National Lakeshore

Attendees enjoyed a tour of Fermilab



Dr. David Blask (right) with Audrey Fischer



Lucianne Walkowitz

ASAE Meeting and IDA Annual General Meeting

The first inaugural Astronomy & Science Expo (ASAE) in the Southwest region will be hosted November 10-11 at the Tucson Convention Center. Exhibitors and manufacturers of astronomical products from around the world will feature top telescopes, binoculars, mounts, cameras, domes, and accessories.



World-renowned speakers such as Astronaut Donald Pettit (just home from the International Space Station); Dr. Steele Hill of NASA SOHO (Solar and Heliospheric Observatory); and Geoff Notkin, from Discovery Channel's "Meteorite Men" will make appearances along with others.

Events include, but are not limited to, lab tours at the University of Arizona, an imaging workshop by astrophotographer Adam Block, digital planetarium shows, daily solar observing, and nighttime star parties.

A wide variety of exhibitors will also attend including Astronomy Magazine, Astronomer's without Borders, Astronomical Society of the Pacific, Kitt Peak National Observatory, Kielder Observatory, NASA James Webb Space Telescope, Tele Vue, and of course, the International Dark-Sky Association.

Tickets for Saturday attendance to ASAE, allowing access to all exhibits and talks, is \$10 and can be purchased at the door or ahead of time (preferred) on ASAE's website. To buy tickets and to see a full list of speakers, vendors and exhibitors visit ASAE's website: <http://www.scienceandastronomy.com>

In addition to IDA's attendance and participation at ASAE, IDA plans to hold the Annual General Meeting (AGM) for IDA members and non-members. During this AGM invited speakers and experts will address dark sky issues. IDA will also host a dark sky workshop. Tickets for the IDA reception will be available at the IDA booth during ASAE for anyone who would like to attend. More information on IDA's AGM will be posted in the IDA E-newsletter and the next *Nightscape* magazine.

"Protecting the Nighttime Environment" 2013 Symposium

The International Dark-Sky Association (IDA) and other co-sponsors plan to present a two-day, multi-disciplinary symposium, "Protecting the Nighttime Environment" in 2013. The last conference of this type occurred in 2007 and was very successful. After six years, the massive advances made in light pollution topics will prove to make the "Protecting the Nighttime Environment" conference even more successful.

A wide variety of professionals will be invited ranging from congressional staff; researchers in the medical field as well as astronomical, biological, ecological, and economical; and manufacturers of important, advanced dark sky technology. This audience will continue to encourage state and local dark sky legislation, positively affect future research into current lighting technologies and practices, and may even inspire a national dark sky policy.

Together these experts will work to reveal a means of reducing our dependence on fossil fuels, cut greenhouse

gases, and lower waste and cost of nighttime illumination while still providing safe and effective lighting. At this symposium the importance of the dark sky nature of national parks and oceanic coastlines to ecosystems and human heritage will be accentuated, raising greater awareness for the necessity of their protection.

Discussion topics will be divided into four distinct sessions: 'Protecting the Nighttime Environment,' 'Ecological and Human Health Concerns,' 'Energy Efficiency and Technology,' and 'Solutions Necessary for Providing a Quality Nightscape.' These discussions will bring together the people needed to accomplish the larger goal of protecting the night sky while instilling a stronger sense of urgency for its mitigation.

This conference is currently being planned and requires the support and attention of IDA members, such as you. Just as we aspire to bring together experts at this conference to find a solution, we also hope to bring our members together in the common goal of seeing the symposium become a reality. Please donate today and see the greatest minds in light pollution come together beneath one roof, working towards a resolution.

Light at Night Invertebrate Research

Dark sky advocates often wonder about the effect of bright city lights shining on migrating birds and nocturnal species, but we rarely notice the smallest creatures, until recently. Thomas W. Davies, Jonathan Bennie, and Kevin J. Gaston state in their article "Street lighting changes the composition of invertebrate communities," published in *Biology Letters*, "...the potential ecological impact of the resultant light at night (LAN) has only recently emerged as a major cause for concern." For this reason, the research team, at the University of Exeter, shared their findings on how street lighting is changing the interactions of invertebrates.

Already, many studies have revealed that LAN has a large impact on a variety of wildlife ranging from birds, sea turtles, mammals, to even human health, but for the most part invertebrates have been ignored. "While the attraction of aerial invertebrates to artificial lighting is a well-documented phenomenon, this study is the first to document the effect of street lighting on ground-dwelling invertebrates," say the authors.

The research team aimed to catch a variety of different invertebrates such as harvestmen, ground beetles, ants, woodlice, and amphipods among others. Traps were set under and between fourteen high-pressure sodium streetlights for three days and three nights in Helston of Cornwall.

A total of 1194 ground-dwelling invertebrates were collected. The closer to the light, the more invertebrates were caught, whether sampled during the day or night. Underneath the lights a larger majority of carnivorous, or predatory and scavenging types (ground beetles, harvestmen, ants, woodlice, and amphipods) of invertebrates were found. The increase of predatory and scavenging populations beneath the light during the night largely suggests that night lighting is altering the composition of ecosystems in our cities and towns. This becomes the first evidence that it is possible for street lighting to change the way that ground-dwelling invertebrates exist.

This study takes a further step in understanding the effects of light pollution on invertebrate populations, and possibly a future step in anticipating an effect on human beings. As we light our cities we are having an impact on everything from the birds in the sky down to the insects on the ground. We must raise the question of what future impacts we will encounter and how we expect to confront them.

DON'T FORGET...

2013 BOD Vote!

The 2013 IDA Board of Directors (BOD) election process has begun. On-line electronic voting will be available again this year and paper ballots will be mailed to those without email addresses.

Your votes will determine the next generation of BODs. In a three-year term, the BODs provide long-term vision to IDA while also acting as spokespersons for the organization and its mission. Directors are responsible for establishing fiscal policy, approving budgets and financial records, providing resources for IDA's success and growth, and ensuring that it adheres to the mission.

The timeline for voting and elections is as follows:

- Online Voting Opens – September 12
- Mail-in Ballots Sent – September 12
- Balloting Closes – October 15
- Winning Candidates Notified – October 30
- Board of Directors Announced – November 10
- Elected Board of Directors Terms Begin – January 1, 2013

Watch for updates on voting for the Board of Directors at www.darksky.org.



THE DarkSky GIVEAWAY IS ON!

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Cree XSP Series street lights are powered by BetaLED® Technology, delivering outstanding illumination, lasting performance and optimum energy efficiency.



REVOLUTIONARY LED STREET LIGHTING

PAYS FOR ITSELF, THEN PAYS YOU.

The new Cree® XSP Series street light was designed to revolutionize the way municipalities light their communities.

The XSP Series efficiently delivers light where it matters, cutting energy consumption up to 50% and lasting over three times longer than traditional technologies. With no bulbs to change, you'll save on maintenance. Combine that with up to double the lumens-per-dollar compared to previous generations, and it all adds up to a faster return on investment while delivering clean, white light to help make your community appear beautiful and safe.

The Cree XSP Series LED street light is the best alternative to traditional street lighting with better payback, better performance and better price—it pays for itself, then starts paying you.

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