

# NIGHTSCAPE

FALL 2019 | ISSUE #101  
2018 ANNUAL REPORT



INTERNATIONAL DARK-SKY ASSOCIATION



## FROM THE EXECUTIVE DIRECTOR

Since joining the International Dark-Sky Association in February of this year, I have come to appreciate the value of the night in our lives. The night is not just a time to rest and get ready for the coming day. Natural darkness is essential to all living things. The night sky, filled with stars, inspires our spirit and rejuvenates our souls.

I am blessed to spend many evenings immersed in the natural night outside with my family. From our home in Tucson, Arizona, we are often able to enjoy the Milky Way stretched over our heads, while bats flit around between us and the stars, and the coyotes howl in the distance. It's the perfect way for my family to unwind and reconnect with each other and the natural world around us.

This experience does not come about by accident. My enjoyment of the natural night from my home in Tucson is the result of thirty years of IDA's work to protect the night from light pollution.

I am in awe of our members and the work they are doing all around the world to protect the night in their communities. As you will read in this issue of Nightscape, despite the challenges and setbacks that we face, there are reasons to be hopeful.

I am especially encouraged that, together with our partners and advocates, we are introducing a new generation of night sky supporters.

In Alberta, Canada, the IDA chapter has offered educational programming to more than 6,000 school-aged students. The National Park Service's fastest-growing program is night sky interpretive outreach. Exposing people to the natural night is raising awareness about why urgent action is needed

to protect this resource – one that many young people today don't even know exists.

But light pollution does not know boundaries, and it is no longer enough to protect dark places. Our challenge today is to bring light pollution solutions to the cities and communities where people live.

Bad lighting that wastes energy, disrupts wildlife, contributes to climate change, and interrupts our view of the universe is the norm in too many places. Fortunately, we are learning how new technology – such as the LED streetlight – does not automatically mean we lose our view of the stars. Outdoor lighting can be beautiful, healthy, and functional. As you will read, a groundbreaking LED retrofit in the city of Tucson demonstrates that lights can save energy and money, meet lighting safety standards, and actually reduce skyglow.

My work at IDA is only just beginning. My commitment is to work with all of you – IDA's members and supporters – to ensure that more people around the world will come to know the natural darkness of the night from their home and community.

Thank you for your encouragement and support as, together, we work toward a world where the night sky, filled with stars, is celebrated and protected around the world as a shared heritage benefitting all living things.

Never stop looking up,

Ruskin K. Hartley  
Executive Director



## CONTENTS

**NATIONAL PARK SERVICE: NIGHT SKY ACADEMY**

**NIGHTS OVER TUCSON: HOW THE TUCSON, ARIZONA, LED CONVERSION IMPROVED THE QUALITY OF THE NIGHT**

**ESTRELLAS ANCESTRALES – GUATEMALA'S HERITAGE OF DARK SKIES**


**2018 ANNUAL REPORT: IMPACT REPORT AND FINANCIALS**

**RECOGNITION**

Cover Image: Stars over Mount Lemmon, Arizona, U.S. Photo by Bettymaya Foott

Image Right: A rushing river flows under the Milky Way. Taschachhaus, Austria. Photo by Stefan Liebermann



A large, complex gamma-ray instrument, the VERITAS, is shown at the Fred Lawrence Whipple Observatory. The instrument consists of a large, circular array of many smaller, hexagonal-shaped detectors mounted on a metal frame. It is supported by a tall, slender tower. The background is a deep blue night sky filled with numerous stars and the faint, glowing band of the Milky Way galaxy. The foreground shows the dark, silhouetted outlines of mountains and some low-lying structures of the observatory.

*"I often think that the night  
is more alive and more richly  
colored than the day."*  
—Vincent Van Gogh

The stars above VERITAS gamma-ray instrument at the Fred Lawrence Whipple Observatory in southern Arizona, U.S.  
Photo by Bettymaya Foott





The Milky Way over Shenandoah National Park. Photo by William McIntosh

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## INTERNATIONAL DARK-SKY PLACES

# National Park Service: Night Sky Academy

Each year, millions of visitors to one of the seventy-six International Dark Sky Parks around the world experience the sense of wonder found when they see a truly dark sky for the first time. For many people, a visit to an International Dark Sky Place is the first time they have seen more than a handful of stars, let alone the rings of Saturn, the moons of Jupiter, the arc of our own galaxy, or a distant deep space object at an unfathomable distance.

Demand for night sky activities is growing rapidly around the world. For the United States National Park Service (NPS), demand for night sky programs is growing faster than any other interpretive program. In response, the Park Service is training a new cadre of night sky rangers to help share the wonder of a dark, star-studded sky with their visitors.

“IDA’s recognition program helps bring international awareness to the National Park Service’s important work in protecting special, dark places. After all, half the park is after dark,” said Karen Trevino, chief of the Natural Sounds and Nightscapes division for the National Park Service.

Earlier this summer, IDA’s Executive Director, Ruskin Hartley, joined a group of twenty-five National Park Service rangers and employees for a Night Sky Academy at Shenandoah National Park in Virginia, U.S. The workshop was the result of a collaborative partnership between the NPS Natural Sounds and Night Skies Division and the McDonald Observatory in Texas. For three days, attendees were immersed in the wonders of the night and given the tools and resources to lead night sky interpretive programs. Presenters talked about hosting star parties (even when it is cloudy), navigating the stars, setting up a telescope, telling the stories mapped in the constellations, and listening to the sounds of the night as birds return to roost and the night chorus of frogs and insects starts up. They even spent an evening touring lighting in the park to appreciate the difference between responsible, useful light and wasted light.

In fact, the night sky program at Shenandoah National Park started in 1999, when former IDA Board President, Bob Gent, volunteered to bring a few telescopes up to the park in return for a free room and dinner in the lodge. The program has gone on to thrive, and this summer 650 people lined up to look at the moon through the eyepiece of a telescope during the annual Shenandoah Night Sky Festival.

Shenandoah National Park is located two hours from Washington, D.C. Light pollution from the greater D.C. metro area means it lacks the pristine skies of a remote site like Dark Sky Places on the Colorado Plateau. But what it lacks in pristine skies, it makes up in easy access to the beautiful night sky for millions of visitors.

“On our final morning, two children visiting from Japan stopped by our table to say thank you,” Hartley said. “The previous night they had peered through a telescope and seen the rings of Saturn with their own eyes. You could still see the sense of wonder in their faces.”

You can help protect the night sky where you live by visiting our website. Learn more at [www.darksky.org/get-involved/](http://www.darksky.org/get-involved/).

International Dark Sky Places offer their visitors nighttime programs to celebrate the benefits of the natural night and raise awareness about the urgent need to protect it.

### **Yeongyang Firefly Eco Park International Dark Sky Park, South Korea**

Hosts annual events to celebrate the region’s fireflies and promote the preservation of their natural, dark habitat.

### **Cedar Breaks International Dark Sky Park, Cedar Breaks, Utah, U.S.**

Leads an annual Master Astronomer Program, a 40-hour workshop to train local residents as stewards of the dark night sky.

### **Thunder Mountain Pootseev Nightsky International Dark Sky Community, Kaibab Paiute Indian Reservation, U.S.**

Holds star parties that include traditional Southern Paiute songs, dances, and storytelling related to the night sky.

### **Snowdonia National Park, International Dark Sky Reserve, Wales**

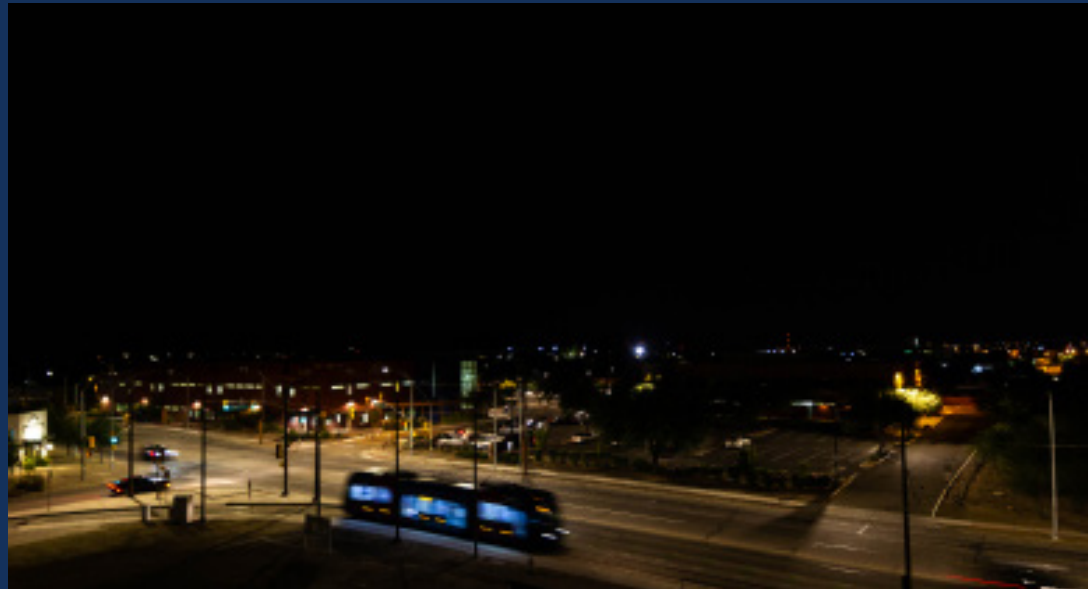
Organizes “Starry Night Swim” events within the Reserve to connect attendees with the beauty of the night sky in a unique way.

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*Thank you to The Fred Maytag Family Foundation for their generous support of the Dark Sky Places Program in 2019.*

***“IDA’s recognition program helps bring international awareness to the National Park Service’s important work in protecting special, dark places. After all, half the park is after dark.”***  
**—Karen Trevino, chief of the Natural Sounds and Nightscapes division for the National Park Service**





Tucson, Arizona, is lit by environmentally sensitive, modern lighting that saves energy.  
Photo by Bettymaya Foott

## LIGHTING

*Can a lighting retrofit in a growing metropolitan city save energy, maintain safety standards, and protect the starry night sky?*

# NIGHTS OVER TUCSON: How the Tucson, Arizona, LED Conversion Improved the Quality of the Night

Tucson, Arizona, is a major metropolitan city in the southwest United States. The city has a long-standing commitment to best lighting practices that protect the night. In fact, people who move to the area often remark on how bright the stars appear to shine. But as the city has grown, so has its light pollution. With major astronomical observatories within close range, city leaders enacted an outdoor lighting ordinance in 2012 that requires fully shielded lighting and sets limits on the total light produced at night, especially in natural areas and areas

close to astronomy sites.

In 2016, Daryl Cole, the Director of Transportation for the city of Tucson, in consultation with IDA member, Christian Monrad, of Monrad Engineering, and Ameresco, a global energy management firm, developed a plan to convert nearly 20,000 street lights from high-pressure sodium to energy-efficient LEDs with adaptive controls. The plan projected savings of \$180,000 per month in energy consumption and a sixty percent reduction in lumen output from street lighting.

The conversion plan was approved by

*“The cost savings and the dimming capability – which also saves money on electrical usage – should be enough for any jurisdiction to consider LED conversion with dimming.” –Jessie Sanders, city of Tucson*

the Tucson city council in February 2016 and completed in 2018. In total, 19,561 fixtures were replaced with 3,000K LED lights. To prolong the life of the lights and reduce lumen output, the lights are operated at ninety percent capacity from the hours of sunset until midnight. After midnight, most of the lights are further reduced to sixty percent of capacity until they are extinguished thirty minutes after sunrise.

The results of the conversion are encouraging. The city of Tucson is saving millions of dollars in annual energy costs. The total lumen output from street lighting was reduced from ~481 million to ~181 million lumens during the early nighttime hours. When the streetlights are dimmed to sixty percent after midnight, the total lumen output is further reduced to ~134 million, a seventy-two percent reduction.

City officials tell IDA that they have received few comments about the change in lighting. But the differences are meaningful to wildlife, the environment, and for night sky protection. The lower lumen output results in a reduction of blue light emissions of approximately thirty-four percent, which is an important factor in making the city safer for nocturnal wildlife. Recent measurements made by IDA indicate that total measured

## THE TUCSON RETROFIT AT A GLANCE:

- 19,561 lights retrofit to 3,000K LED lighting with adaptive controls
- Lights operate at 90% power until midnight
- Lights are further dimmed to 60% between midnight and sunrise

light emissions from the city of Tucson have been reduced by seven percent.

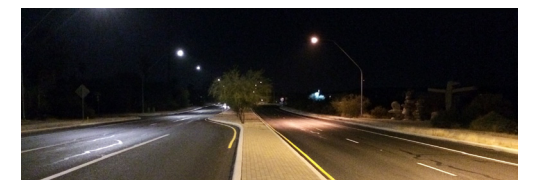
Best of all, the benefits realized by Tucson’s lighting retrofit can be applied anywhere in the world. Tucson’s project manager, Jessie Sanders, told IDA, “The cost savings and the dimming capability – which also saves money on electrical usage – should be enough for any jurisdiction to consider LED conversion with dimming.”

Has your city recently undergone or considered a street lighting retrofit? We’d love to hear about your experience. Contact IDA at [contact@darksky.org](mailto:contact@darksky.org) with the subject line: Lighting Where We Live.

## THE RESULTS

- ~\$2.16M in annual energy savings
- Expected lifetime of luminaires extended from 8 to 25 years\*
- 63% reduction of total lumens emitted by street lights
- Blue light emissions were reduced by ~34%
- 7% reduction in total light emissions from the Tucson metro area

*\*High-pressure sodium luminaire lifetime is approximately eight years. LEDs with the adaptive control measures implemented by the city of Tucson have an expected lifetime of twenty-five years.*



High-pressure sodium lights on the right were replaced with 3,000 Kelvin LED lights, shown on the left. Image by John Barentine.





Omega Centauri & The Great Jaguar. Photo by Sergio Emilio Montúfar Codoñer

## INSPIRATION

# ESTRELLAS ANCESTRALES Guatemala’s Heritage of Dark Skies



IDA delegate Sergio Montúfar has made it his mission to connect Guatemala’s with their heritage through the stars.

“I am a living witness of the stars disappearing,” says Guatemala-based delegate for IDA, Sergio Emilio Montúfar Codoñer. At a young age, Sergio started to notice that stars were disappearing, but didn’t realize it was because of light pollution until he got older.

In 2012, Montúfar was selected to participate in a special meeting of the Congress for Archaeoastronomy in Guatemala, where he was first exposed to the archaeoastronomy of the Maya. Montúfar met with leaders of the Maya community where he connected to their worldview and culture. He learned that in their spiritual ceremonies, Maya timekeepers often invoked the stars. With this fresh inspiration, Montúfar began working to preserve the night sky and restore its disappearing stars through photography and storytelling.

Montúfar traveled around Guatemala to document Mayan archaeological sites and sacred places under the dark, starry sky, and ultimately produced a photography exhibit titled “Estrellas Ancestrales” (Ancestral Stars). The twenty-two images in the show align the sacred sites to the stars, introducing people to astronomy and Maya culture. According to

Montúfar, “The Maya living culture has a very important message. They are still timekeepers and they are also astronomers. It’s a different science-based observation of nature.”

Along with documenting the living heritage of the Maya, Montúfar is also very active in preserving dark skies for the future. He wants people to be proud of their Guatemalan heritage and sees many opportunities for bringing tourism to the country to see the nation’s unique sites and pristine night skies. His goal is to prove that Latin America can be a leader in dark sky conservation.

Montúfar says that critics often ask him, “How are your stars useful? You cannot do anything with them.” He says that it is very difficult to convince people to conserve something that they have never seen. With his knowledge of astronomy, astrophotography skills, and talent for storytelling, Montúfar is dedicated to showing people – in beautiful, panoramic shots – how important the stars are to cultural heritage and their identity as Guatemalans.

Read more about Montúfar’s work, and see more of his images at [www.darksky.org](http://www.darksky.org).

## IDA CHAPTERS

Dark sky advocates are working in more than twenty countries around the world to protect the night from light pollution.

## UNITED STATES

Dark Skies Northwest • Flagstaff Dark Skies Coalition • Geneva Lake Dark Sky • IDA Berrien County • IDA California • IDA Central Illinois • IDA Central Tennessee • IDA Chicago • IDA Colorado • IDA Connecticut • IDA Dark Sky Lake Worth • IDA Duluth, Minnesota • IDA Erie and Crawford County • IDA Florida • IDA Hawaii • IDA Massachusetts • IDA Memphis • IDA Missouri • IDA Montana • IDA New York • IDA North Carolina • IDA Ohio • IDA Oregon • IDA Pennsylvania • IDA Phoenix • IDA Pinal County, Arizona • IDA Rapid City • IDA San Bernardino County • California - High Deserts Region • IDA San Diego • IDA Santa Barbara County, California • IDA Santa Cruz • IDA South Central Kentucky • IDA South Florida • IDA Southern Arizona • IDA Texas • IDA Utah • IDA Virginia • IDA Washington, D.C. • IDA Westchester County • Northwest Illinois • Pennsylvania Outdoor Lighting Council

## INTERNATIONAL

Dark Sky Cyprus • Dark Sky Greece • Dark Sky Ireland • Dark Sky Switzerland • IDA Austria • IDA Beijing, China • IDA Czech Republic • IDA Daegu Gyeongbuk, Korea, IDA Guangdong Province, China • IDA Hungary • IDA India • IDA Israel • IDA Italy • IDA Mayo, Ireland • IDA México • IDA Punjab • IDA Québec, Canada, • IDA Shanghai, China • IDA Southern Alberta, Canada • IDA Tasmania • IDA Tokyo, Japan • IDA Victoria, Australia • Light Pollution Awareness Group, Malta • The Royal Astronomical Society of Canada

# CHAPTER HIGHLIGHTS

## IDA SOUTHERN ALBERTA

IDA Southern Alberta educates 6,000 schoolchildren about the value of dark skies each year, and has communicated with over 400 teachers on light pollution abatement programs. They also worked with the transportation department to install “Dark Sky Country” signage across roadways in Canada.



## IDA MEXICO

IDA Mexico was instrumental in modifying federal environmental law to include light pollution protections. It was approved unanimously in the deputy chamber of congress and is now in the final stages of ratification by the Senate.

## IDA MASSACHUSETTS

IDA Massachusetts wrote and supported a bill, currently in the Massachusetts Legislature, that will protect dark skies across the state.





Great Barrier Island,  
New Zealand. Photo by  
Carol Comer

## FROM THE PRESIDENT

In the words of IDA member Janet Muir, “IDA is a sane voice in a world of rapidly increasing light pollution.”

Globally, light pollution is growing at twice the rate of the world’s population growth, making our efforts to protect the night more urgent than ever before. In 2018, the IDA board and staff asked ourselves, “How can we leverage our 30 years of knowledge and pragmatic solutions to better protect and restore dark skies around the world?”

The answer is **you**.

We have made a commitment to you – our members, supporters, partners, and advocates – to provide more resources, tools, and information to advance the fight to protect the night.

With your support and passion for the night sky, IDA will continue to build on our work as a sane and reliable voice, bringing solutions to the urgent issue of light pollution. Thank you for your continued support.

Ken Kattner  
IDA President



## 2018 IMPACT REPORT

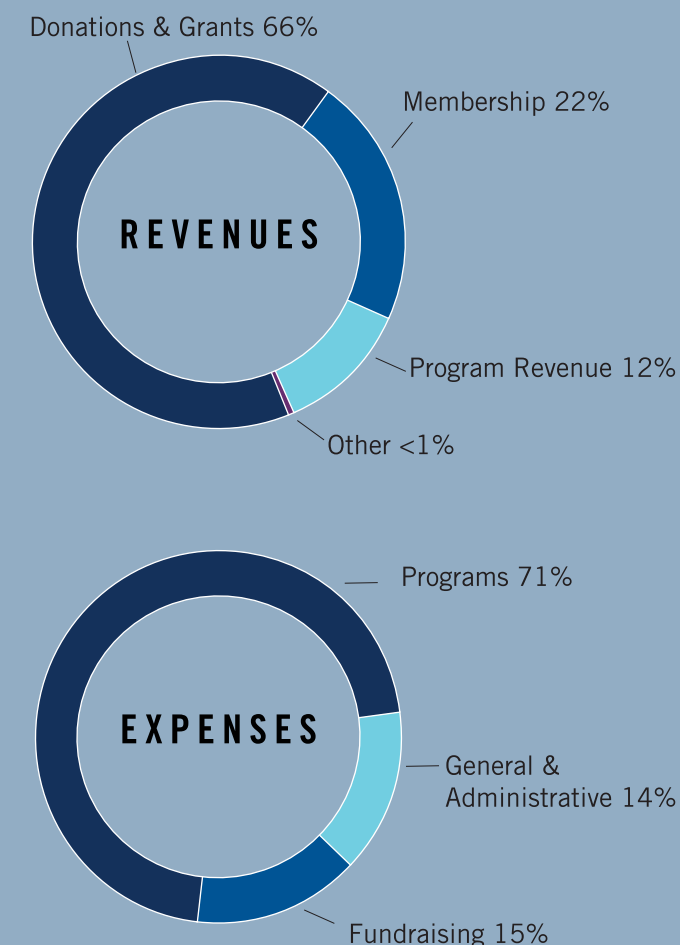
- 1 Provided training to our network of advocates, and dispatched grassroots volunteers in twenty-four U.S. states and nineteen countries to fight for better nights in their communities.
- 2 Designated the 100<sup>th</sup> International Dark Sky Place. More people than ever before – from all over the world – can now be inspired by a naturally dark night.
- 3 Launched the Community Friendly Outdoor Sports Lighting Program to protect the night and improve outdoor sports lighting design.
- 4 Established a Public Policy program to support responsible outdoor lighting policies in cities and communities around the globe.
- 5 Distributed more than 42,000 light pollution education brochures to people in the U.S., Canada, Ireland, Japan, Kenya, Malaysia, and New Zealand.

## STATEMENT OF FINANCIAL ACTIVITY FOR THE FISCAL YEAR ENDING DECEMBER 31, 2018

<b>REVENUES &amp; SUPPORT</b>	<b>\$904,079</b>
Donations & Grants	\$598,842
Membership	\$195,766
Program Revenue	\$106,300
Other	\$3,171

<b>EXPENSES</b>	<b>\$854,689</b>
Programs	\$608,682
General & Administrative	\$121,161
Fundraising	\$124,855

*This information is based on Reviewed Consolidated Financial Statements for the year ended December 31, 2018. For more detailed financial information, please visit [darksky.org/about/funding](https://darksky.org/about/funding).*



## SPECIAL THANKS

The International Dark-Sky Association’s Brand Partners are dedicated members of the dark sky protection community from the corporate and business sectors. They support programs, outreach, education, and night sky conservation efforts. We are grateful to our Brand Partners for their support in 2018.

### LEADING PARTNERS

Lumican • Musco Lighting

### GUIDING PARTNERS

Grand Canyon National Park Lodges • The Home Depot • GreaterSkies

### SUSTAINING PARTNERS

Your True Nature • Earth Sun Moon Trading Company

### ALLY PARTNERS

C&W Energy Solutions • Fairmont Jasper Park Lodge • Hipcamp • Holiday River Expeditions • Selux Corp • VOLT • Sunday Afternoons



# MEMBER MENTIONS

*Thank you to our members and supporters for your generous financial support.  
We couldn't protect the night from light pollution without you!*

Reconnecting with our night sky heritage is so important. Every time I experience a dark sky I feel reset, energized, and reminded of how small we are in this vast universe. It's essential that every person on Earth has the opportunity to experience this firsthand. I'm often invited to give talks about light pollution and prevention to local communities and conservation groups, and I'm so proud to be working with such a great organization helping to bring awareness to this issue. Thanks to IDA, there's an ongoing effort to educate the public to reduce and prevent light pollution.

– Jeremy Evans, California, U.S.  
IDA Member since 2017



I support IDA because my membership funds are used to provide the reliable scientific information and policy tools needed to empower an army of volunteers within their own communities. I see IDA's model being akin to the old saying, "Give a man a fish, and you'll feed him for a day. Teach a man to fish, and you've fed him for a lifetime." I plan to do "free commercials" on behalf of IDA until light pollution becomes as archaic as poisonous smokestacks. Join IDA and help us teach more people to fish.

– Dawn Nilson, Oregon, U.S.  
IDA Member since 2009

# DARK SKY DEFENDERS SOCIETY

The Dark Sky Defenders Society recognizes those who have arranged for planned gifts to IDA. Twelve individuals and families have made a commitment to a legacy that will protect the night long into the future. Some of the Dark Sky Defenders Society members wish to remain anonymous.

*If you would like to receive information about how to join the Dark Sky Defenders Society, please contact IDA's Executive Director, Ruskin Hartley, at [ruskin@darksky.org](mailto:ruskin@darksky.org).*

# DARK SKY DEFENDERS SOCIETY MEMBERS

- Tom Buchanan
- Jim Altenstadter
- Thomas and Brenda Corbin
- J. Ryan Currens
- Susan Harder
- Tim and Carol Hunter
- Ruth Karl
- Heidi Massa
- Leo and Judy Smith
- Anonymous (3)

## IDA BOARD OF DIRECTORS:

Ken Kattner, President, USA • Kellie Pendoley, Vice President, Australia • Kim Patten, Treasurer, USA • Jessica Cleeves, Secretary, USA • Laurel Alyn-Forest, USA • Diane Knutson, USA • Alejandro Sanchez Miguel, Spain • Diana Umpierre, USA

## COMMITTEE CHAIRS:

Chad Moore, Technical Committee • Mike Weasner, International Dark Sky Places Committee • Connie Walker, Education Committee

# FUNDING SPOTLIGHT

Located in Los Angeles, California, U.S., Metabolic Studio recently made a significant grant to support IDA's work. One of their team members, Dani Lunn, recommended the grant. Dani lives in the city, yet her biggest love is the stars. "Wasted energy from light pollution is a symptom of the crisis our cities face," says Lunn. "The

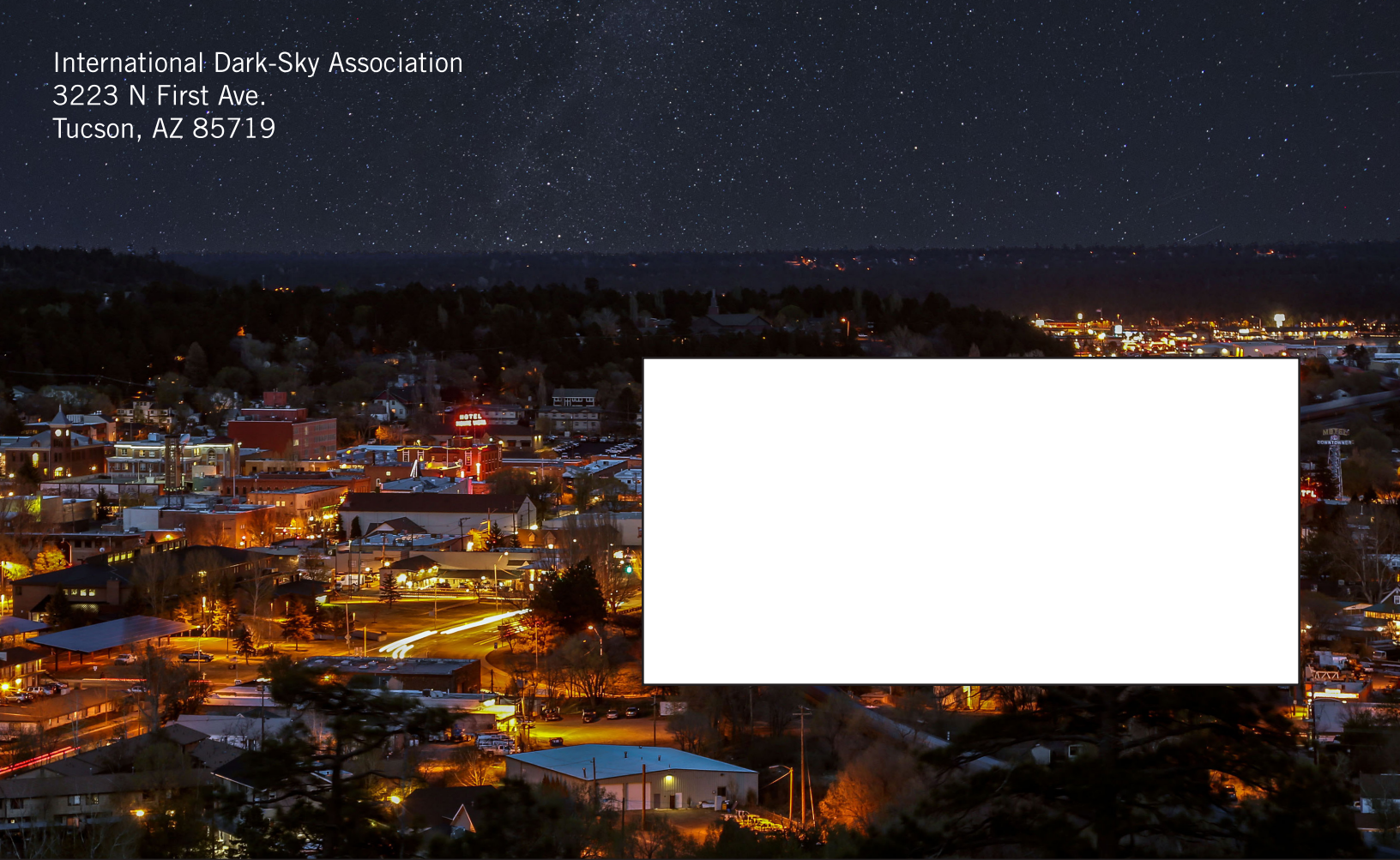
global dark sky movement gives me hope that we can reverse this and find new ways of making our cities livable, thriving places that respect the environment."

Metabolic Studio supports living systems. Learn more at [metabolic.org](http://metabolic.org).

**METABOLIC STUDIO**



International Dark-Sky Association  
3223 N First Ave.  
Tucson, AZ 85719



The starry night sky over Flagstaff, Arizona, U.S.  
Photo by SKYGLOW Project

## LIGHT TO PROTECT THE NIGHT

IDA's Five Lighting Principles for Responsible Outdoor Lighting

### 1. USE LIGHT ONLY IF IT IS NEEDED

All light should have a clear purpose. Consider how the use of light will impact the area, including wildlife and their habitat.

### 2. DIRECT LIGHT SO IT FALLS ONLY WHERE IT IS NEEDED

Use shielding and shaping methods to target the direction of the light beam so that it does not spill beyond where it is needed.

### 3. USE LIGHT ONLY WHEN IT IS NEEDED

Use active controls such as timers or motion-detectors to ensure that light is available when it is needed and turned off or dimmed when it is not needed.

### 4. LIGHT ONLY TO THE BRIGHTNESS NEEDED

Use the least amount of light needed.

### 5. MINIMIZE BLUE LIGHT TO THE AMOUNT NEEDED

Whenever possible, use warm color lights at night.