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LD+A

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APRIL 2025 • VOLUME 55 • NO. 4

FIRST UP

PLUS

Photo: Bruce Damonte

FEATURES

On The Cover
Reducing the amount of artificial light that is visible from nesting beaches is essential for sea turtle conservation. Image generated by AI/Microsoft Copilot and Microsoft Designer.

EDITOR'S NOTE

Pining for Peace

If you've never visited New Jersey, chances are your perception is skewed by *The Sopranos* and/or *Jersey Shore*—pick your public relations poison: smoky, industrial New Jersey Turnpike congestion or fist-pumping, bar brawling, and party-town shenanigans. Mix in the fact that it's the most densely populated state, and the uninformed might begin to wonder where all the mafiosos and partygoers go to get a little bit of peace and quiet.

Back in the 1860s, by the time the American Civil War came to an end, New Jersey had adopted the moniker "The Garden State" for its fertile farmland. While the state has bolstered efforts to preserve farmland and open space, overdevelopment marches on with new housing, increased impervious surfaces, and added illumination all threatening local wildlife and delicate ecosystems.

The Pinelands National Reserve includes approximately 1.1 million acres (22% of New Jersey's land area) and spans seven counties. According to the New Jersey Pinelands Commission, the area is home to 39 species of mammals, 299 bird species, 59 reptile and amphibian species, and 91 fish species, of which 43 species are listed as threatened or endangered by the New Jersey Division of Fish and Wildlife.

A hidden gem in the Pine Barrens lies just 25 minutes west of Seaside Heights (of *Jersey Shore* infamy). Popcorn Park Animal Refuge is home to over 200 exotics, wildlife, farm animals, and birds who suffered abandonment, cruelty, injury, handicap, or exploitation and could not be safely returned to the wild. As a volunteer for the organization, it's been a pleasure to watch children and adults learn more about animals up close and see a refuge in action.

> "Understanding the unique qualities of birds, bats, butterflies, fireflies, and turtles, among others, is essential to discovering how artificial light affects each

Connecting to wildlife and experiencing natural ecosystems helps forge a passion and bond that informs both our personal and work lives. Understanding the unique qualities of birds, bats, butterflies, fireflies, and turtles, among others, is essential to discovering how artificial light affects each. Combining that comprehension with compassion leads to new breakthroughs that are beneficial to the coexistence of humans and wildlife.

In this issue of *LD+A*, we're focusing on illumination's effect on wildlife and ecosystems, but it's far from the end of the story; I recommend staying informed of the work by DarkSky and the U.S. National Park Service. It's a shared world—let's keep in mind all who we are sharing it with.

Peace out!

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landscapeforms

Spark a connection.

Inspired by its aviation history, 8 Hamilton Landing's Typology Stick Lights line the central path like a pedestrian "runway." Designed by siTe Landscape Architecture, lighting here is more than illumination — it shapes the experience, draws people in, and tells them a story of local heritage.

8 Hamilton Landing | Novato, CA

Typology Stick Lights

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is the CEO/founder of Wilger Testing, an accredited third-party laboratory testing for product safety and performance. **p.16**

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PRESIDENT'S PERSPECTIVE

Wilson Dau

The first Society in-person event I attended was the 1995 Annual Conference in Cleveland. It was the first of this kind of conference I attended in my life; I was quite excited and nervous about it since I really did not know what to expect.

Everyone I met was welcoming and helpful, and people were openly sharing their knowledge and experiences. I attended a couple of committee meetings as a guest and saw firsthand how an IES Standard was actively being written and discussed.

At the end of the first day, I was approached by a couple of people I had met earlier and invited to dinner—I was blown away by the openness and spirit of collaboration within the community. This is something that I have continued to experience every year, and I have attended 28 of the last 30 Annual Conferences.

As much as online platforms allow us to have virtual meetings from the comfort of our own spaces, and the proliferation of virtual CEUs make it easier than ever to achieve our continuing education goals, nothing comes close to the spirit of camaraderie, interaction, debate, idea generation, and fun that it is to attend an industry event in person.

In 2025, we have three **must-attend** events:

- LightFair, May 4 to 8, in Las Vegas. If you haven't heard the news, we have partnered with Messe Frankfurt for the organization of the event. I am really excited about what the team at Messe is going to deliver this year. For example, Immersive Lighting Installations are back, and there will be experience/trend areas throughout the floor. The conference includes 54 sessions delivered at different venues such as the LightFair theater and the Designery. Additionally, there will be more than 60 new companies participating, including international companies from Brazil, Portugal, and Turkey.
- IES25: The Lighting Conference, August 21 to 23, in Anaheim, CA. Some of the brightest minds in our industry attend and present at this event every year. In 2024, we had 492 attendees representing 16 countries, 37 states, and seven provinces. While not finalized at the time of this writing, attendees of this year's event will likely receive up to 12 IES CEUs, and a similar amount of AIA LUs and LU-HSWs.
- The Street and Area Lighting Conference, September 21 to 24, in New Orleans. As with The Lighting Conference, there will be plenty of learning opportunities on a wide range of topics, offering attendees the potential to earn numerous CEUs. Focused on outdoor environments, last year's event welcomed 900 attendees.

> "I am really excited about what the team at Messe is going to deliver this year

No matter where you are in your lighting career, one of these events is for you. Make it a point to attend—you won't regret it. You will see and experience the newest products, learn from the best minds in lighting, meet the people behind the research that is propelling our industry forward, and very likely, make, or get to spend time with, lifelong friends.

Industry Aid

Last week, I read a post on social media from our Lighting Conference Chair Cy Eaton, describing losing his house in the recent Palisades fires in California. I was about to reach out to Cy to offer my support when I received an email from him. With his permission, I am including an excerpt here:

> By now, I think you've all heard that my home was one of the 15,000 structures destroyed in the Los Angeles fires in January. By coincidence, I also left my role at Traxon that same month. So, aside from IES25: The Lighting Conference, I currently have no professional duties or commitments. This places me in a unique position to provide focused time and leadership towards the rebuilding and

(*continued on p. 54*)

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IES25 THE LIGHTING CONFERENCE

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Join us August 21-23, 2025 in sunny Anaheim, CA for IES' annual conference, **IES25: The Lighting Conference**, the preeminent conference for all things lighting, from research to design to technology and more—a true state of the industry event.

Our three day event includes a day of hands-on workshops, two days of educational sessions and technical papers & presentations, exhibits by leading manufacturers, Emerging Professionals Day, the Leadership Forum, and the industry benchmarking Illumination Awards Gala.

Visit ies.org/ac for more information. Registration opens March 2025!

INSIGHTS

Twin Arches • Winter Bright • Students on Stage

Photo: Jackie Chan

Seeing Double

A new bridge connects suburbanites to the Sydney Airport

The recently constructed Sydney Gateway Twin Arch Bridge serves not only as a vital throughway to and from the Australian suburb of St. Peters to the Sydney Airport but also as a colorful nighttime landmark. With regular 10-minute dynamic lighting shows designed by Coolon that can be triggered by the Transport Management Centre for New South Wales remotely via fiber link, 14 color presets that adhere to the Cival Aviation Safety Authority, and additional 25 colorways to celebrate special occasions, the bridge is alight with personality made possible by Pharos controls. Multiple fixtures in Coolon's Spectrum RGBW IP line work in tandem with a four-universe Pharos Designer LPC 4, a 5-in. Designer TPS 5, and an unmanaged Ethernet switch with four PoE-enabled output ports for power and data distribution to bring the structure to life.

Photo: JF Savaria

Photo: Nathalie St-Pierre - UQAM

Photo: Ulysse Lemerise - OSA

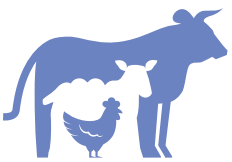
Photo: JF Savaria

Luminous Installations Brighten Montreal's Darkest Months

"LUMINO," the free, 15th-annual installation of luminous works of art, was on view in Montreal until the beginning of March. Produced and created by the Quartier des Spectacles Partnership, the 2025 event featured 30 works by 15 studios and 20 local and international artists, including seven video projections—and, for the first time, 11 indoor installations. The exhibit was on view daily from sunset to 11 p.m. Some of the works included *Cercle Polare*, by Canadian Aboriginal artist Jason Carter in collaboration with M.A.D. Collectif, which celebrated northern fauna (pictured top left); *Charleur Humaine*, a suspended sun, by Quebec artist Anne Lagacé (top right); *Lustres*, an open-air ballroom by TILT (bottom left); and the larger-than-life *Trumpet Flowers* (bottom right) by Australian studio Amigo and Amigo, which is accompanied by a jazz score.

Photo: Brad Resnick Photography

Eight Chroma-Q Color Force II 72 fixtures were used to illuminate the large cyclorama (backdrop) during the Mason Gross School of the Arts' production of *Orlando* at Rutgers University's Victoria J. Mastrobuono Theatre.



$13.28 BILLION

The projected growth of the Livestock Grow Lights Market by 2030.

Source: Research and Markets

MERGERS & MORE:

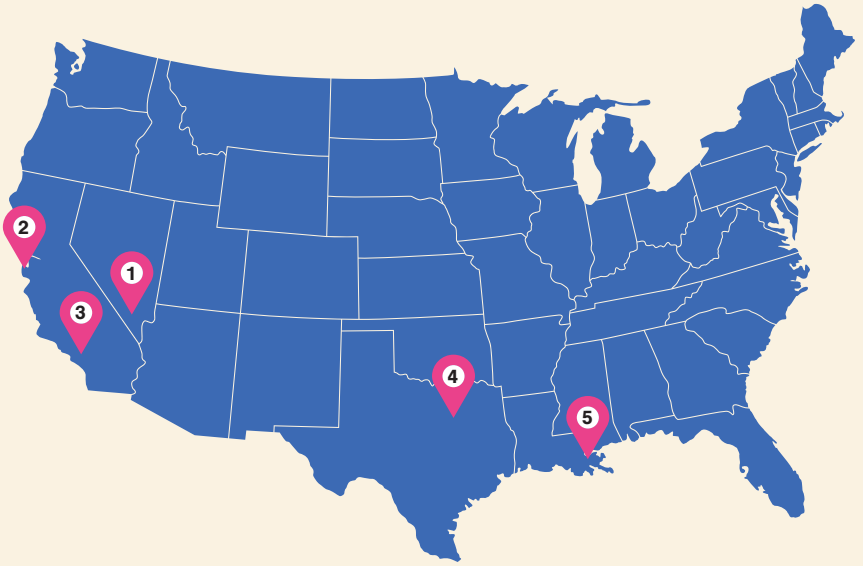
- The U.S. contingency of **Gigahertz-Optik GmbH** has set up an optical radiation calibration laboratory at its Amesbury, MA, facility.
- **LUG**, a manufacturer of professional lighting solutions, has been awarded the Platinum EcoVadis certification, placing the company in the top 1% of businesses worldwide in terms of sustainable business practices.
- **MossLED**, a Canada-based manufacturer of flexible LED lighting, dimmers, power supplies, and cabling systems, has partnered with lighting and rigging technology distributor **A.C. Lighting** to expand U.S. sales.
- Product and industrial design consultancy **Smith Dixon and Associates (SDA)** celebrated its 10th anniversary in business.
- LED-manufacturer **WAC Lighting** celebrated its 40th anniversary in business and introduced a new parent brand, **WAC Group**, to bring together WAC Lighting, Modern Forms, Schonbek, AiSPIRE, WAC Limited, and WAC Landscape Lighting under one umbrella.

THEY SAID IT:

"As the biophilia theory explains, we are not just intertwined with nature, we are nature."

-Nicole Craanen and Lauren Schwade, "Biophilic Design and the Nature of Light," p.36

EVENTS



1. May 4–8
LightFair 2025 will be held at the Las Vegas Convention Center. Presented by Light + Building, the event is the premier, biennial architectural and commercial lighting trade show and conference as well as a preferred marketplace, networking, and education destination.
www.lightfair.com

2. June 12
The IES San Francisco Section will hold Light! Design Expo at Pier 27 on San Francisco's Embarcadero. The annual expo showcases the latest in architectural lighting products, attracts a wide range of design professionals, and is the only architectural lighting products show in Northern California.
https://lightdesignexpo.com

3. August 21–23
IES25: The Lighting Conference, IES' annual conference, will be held at the Anaheim Marriott in California. The event includes one day of hands-on workshops and two days of educational sessions, technical paper presentations, and manufacturers' exhibits as well as the Illumination Awards Gala.
www.ies.org

4. September 16–17
ArchLIGHT Summit, a commercial and architectural lighting event, will be held at the Dallas Market Center in Texas. It will showcase new products from leading commercial brands and include a full slate of accredited educational and hands-on experiential sessions facilitated by leading minds in design and lighting.
www.archlightsummit.com

5. September 21–25
The IES Street and Area Lighting Conference will be held in New Orleans and focus on improving outdoor lighting through training classes, seminars, and networking sessions as well as an exhibit hall.
www.ies.org

Photo: Zoë Gras

Q+A

NADER GAMMAS

The founder of **Nader Gammas Lighting Design Studio** discusses finding light and his newest collection of lighting fixtures, which debuted at Design Miami in December 2024 and is exclusively represented by Studio TwentySeven.

Photo: Courtesy of Nader Gammas

The Scarlet Cluster from the Vessels collection.

How did your journey lead you to light?

During my undergraduate studies, I was interested in what lighting had the ability to do. After I graduated and briefly practiced architecture, we were all faced with the 2008 global financial crisis. With no employment, I decided to continue my education. After being accepted into the Parsons lighting program, I understood the flexibility lighting had to offer. I worked at Tirschwell & Co. in New York City on high-end residential projects, then moved to Dubai where I started my own practice. In all, I've been working in the lighting field for almost 15 years. My practice is divided into architectural lighting design and designing custom lighting fixtures.

Where are some of your lighting designs located?

I've worked on a wide number of lighting projects, from residences in Beverly Hills, CA, and the Hamptons in New York, to Towers in Dubai and coffee shops in Riyadh, Saudi Arabia. Apart from the travel, I get to face varying site conditions, which is always a great learning experience. Some projects, especially those which are developer-run, tend to be bureaucratic; I've found working directly with clients on high-end residential projects to be much more rewarding.

Please talk about a favorite project you have worked on.

My favorite projects have strong architectural design concepts. A recent project was a residence in Dubai Hills called 'House of Courtyards.' It wasn't your typical home; it was an exercise in form and composition. Only the bedrooms and two formal spaces had outward-facing windows, the rest opened up to courtyards. For us, it was an exercise in what surfaces should not be illuminated, allowing for a careful approach to the story we wanted to tell. It was about illuminating the spaces end users would look at, not the spaces end users would be resting in.

Are there certain tools you find you continually return to working with?

I try to use a variety of tools. When designing for architectural lighting, I gravitate toward fixtures that offer many options and accessories within the same family for consistency. In designing custom lighting projects, I use fixtures that employ brass where designs host other material.

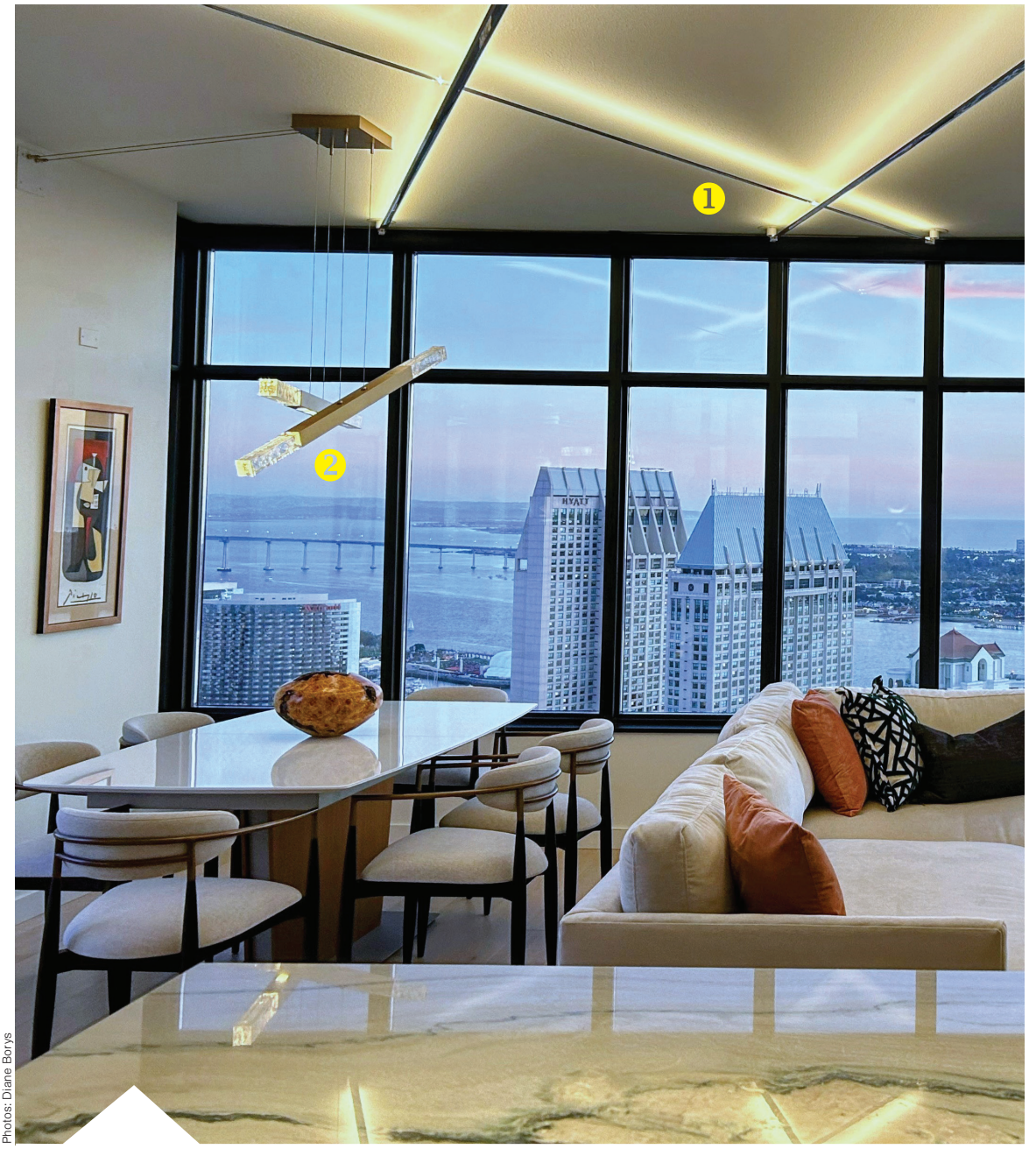
> "All Vessels are handmade without molds, so each is unqiue

Please discuss your newest collection that debuted at Design Miami. How does it differ from some of your past work?

The Vessels collection is an attempt to move away from heavily relying on brass and edgy shapes toward organic forms. The composition is inspired by selected families of cup fungi, each with a unique growth pattern. All Vessels are handmade without molds, so each is unique. The ceramic Vessels work well with a sensual play of light and shadow.

Where do you hope your work will take you in the next ten years?

I'm looking to expand my collection, explore collaborations with established brands, and use lighting as a tool to relay information about the built and natural environment.



Photos: Diane Borys

❶ Tensioned LED linear fixtures provide uplighting and a warm ambience.

❷ A single pendant over the dining table creates a sense of intimacy within the space while allowing for undisturbed 180-deg views through large windows.

❸ Magnet micro-track LEDs are integrated within wood-slat finishes above kitchen counters.

HOW THEY DID IT

IES ILLUMINATION AWARD OF MERIT

"Slatnick Residence – Electra"

Noctiluca Lighting designed the illumination for this 1,300-sq-ft penthouse condo with a ceiling visible for miles in San Diego, CA. The design overcomes hurdles such as an exposed concrete ceiling, dropped soffits, and dense mechanical ducting that prevented traditional lighting solutions.

SAFETY

Jerry Plank

Color Me Confused How blue is blue?

The 1952 Nobel Peace Prize recipient Albert Schweitzer was credited with saying "An optimist is a person who sees a green light everywhere, while a pessimist sees only the red stoplight. The truly wise person is color-blind." In the electrical field of safety, to succeed, you better not be color-blind. Let's review how colors can impact your life negatively.

This column typically looks at national electrical codes and ANSI safety codes as they relate to fire and/or electrical shock hazards in using lighting products. But often overlooked are the day-to-day trip wires that lighting designers face. Problems in the field range from electrical inspection issues, fire marshal and building inspector concerns, product performance issues, and/or other regulatory concerns.

The product safety system in the U.S. is considered voluntary, however, many municipalities enact their own technical legislation to either augment the national concerns or replace the national codes with their own versions. In some cases, local municipalities recognize a previous edition of a national standard with specific requirements that address local concerns. The U.S. safety system, while flawed, is quite efficient, as processes are followed as outlined by ANSI, National Fire Protection Association (NFPA), Underwriters Laboratories (UL), Consumer Product Safety Commission, Occupational Safety and Health Administration, and others interested in participating in the standards-making process.

Safety standards are typically published by a balanced committee comprising volunteers from industry, regulatory, consumer, installation, design and distributor groups; recognized laboratories; and other interested parties. The committee breakdown used by ANSI and others ensures that a consensus is brought forward without any one group having a dominance in the process. It's when industry goes outside of the system in use that confusion ensues.

One such area where industry has created confusion deals with electrical building non-metallic (NM) sheathed cable as it relates to the color coding of the outside jacket to denote voltage level. NM cable is used in many projects to electrify lighting products, and it consists of insulted hot and neutral conductors along with an insulated or uninsulated ground wire encased in an insulating outer jacket.

> "It's time for the NFPA, NEC, and UL to step up and address NM colors

NM cable was first designed by Rome Wire Company in the 1920s for addressing fire concerns of the old knob and tube systems plagued with degradation of insulating materials causing fires. The cable was named "Romex," which is a term still used generically today, although all electrical codes and standards identify NM as non-metallic sheathed cable. The NM-type cable was suitable for a maximum temperature of 60 deg Celsius (140 deg Fahrenheit).

The early form of NM cable used individual hot and neutral conductors insulated in a cotton braid, where the outer jacket was formed with a cotton braid that was impregnated with varnish or tar for extra moisture resistance. In the 1925 National Electrical Code (NEC), NM-type cable was added. As insulation materials improved in 1950, rayon replaced the cotton braid, and around the 1960s, thermoplastic materials started to be used for the individual conductors and outer jacket.

The initial design of NM-type cable did not include a ground wire. Then, in 1962, the NEC required a ground lead to be included, but it was permitted to be undersized in lieu of being the same wire gauge as the conductors.

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In 1965, the NEC was again revised such that the ground wire had to be the same wire gauge as the hot and neutral conductors. NM cable then was differentiated by either NM-2 for two conductors plus a ground or NM-3 for three conductors plus a ground. A major change arrived in 1970, as the outer jacket could now be composed of PVC. Then, in 1984, NM-B was added, which increased the temperature rating to 90 deg Celsius (194 deg Fahrenheit) for the individual conductors and 75 deg Celsius (167 deg Fahrenheit) for the outer jacket. All changes were clearly delineated in the NEC as materials were upgraded and changed.

World of Color

So, why isn't it good to be color-blind where NM cable is concerned? Back in 2001, NM was made available by some manufacturers as color-coded white for 14 AWG for 15-ampere service, yellow for 12 AWG for 20-ampere service, and orange for 10 AWG for 30-ampere service, in either two or three conductor types plus a ground wire. The colors differentiating the wire gauge are not covered by the NEC or the 13th edition UL719, and no color is offered for 8 AWG conductors or higher. Last year, some cable manufacturers elected to increase colors such that 14-3 is light blue, 12-3 is purple, and 10-3 is pink. All this color coding is not specified in any electrical code or safety standard nor has anyone identified how blue is blue, how purple is purple, and how pink is pink, as being the primary colors.

To be honest, this whole color-coding topic of NM cables just makes field enforcement more difficult, as municipal inspectors are confronted with the new unofficial colors. It's time for the NFPA, NEC, and UL to step up and address NM colors; the colors should be standardized to an accepted global color chart with a footnote stating that color-blind folks need to read the cable jacket to prevent a misuse of current rating.

While the safety system in the U.S. is considered voluntary, the protocol of having requirements adopted by consensus should not be circumvented as any stray from the systems established will open the door to more confusion.

Jerry Plank, LC, is the CEO/founder of Wilger Testing, an accredited third-party laboratory testing for product safety and performance.

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*Note: not all courses are eligible for CEUs. Please look for the CEU indicator on each course description to determine eligibility.

SIGHTLINES

Ben Pfeiffer

You Can't Take the Sky from Me Light pollution's impact on fireflies

The rapid evolution of lighting technology over the past century has dramatically altered our nighttime environment, with significant consequences for nocturnal species. Among the most affected are fireflies, whose unique bioluminescent communication system is increasingly disrupted by artificial light at night (ALAN). This disruption poses a serious threat to firefly reproduction and population sustainability.

The impact of light pollution is staggering: 80% of North Americans can no longer see the Milky Way, even under optimal conditions, due to skyglow. For fireflies, the consequences are even more dire. ALAN interferes with their species-specific light signals, crucial for mate selection and reproduction. When artificial light drowns out these natural signals, it effectively blinds fireflies to their potential mates, directly impacting their reproductive success.

Fireflies play vital roles in their ecosystems as both indicators of environmental health and nature's pest control. The presence of fireflies often signals a healthy, full-functioning, natural environment, as they require specific conditions to thrive. As predators in their larval stage, fireflies help control populations of snails, slugs, and other small invertebrates, contributing to natural pest management. Additionally, their bioluminescent properties have led to important scientific discoveries, particularly in medical research and biotechnology. Protecting firefly populations not only maintains biodiversity but also preserves vital ecosystem functions and opportunities for scientific discovery.

Technical Considerations for Lighting Professionals

Understanding wavelength impacts is crucial for lighting design in firefly-sensitive areas. Research shows that fireflies communicate in the yellow-green spectrum (475 to 670 nanometers). Standard bright, bluish-white LEDs emit light across the 430- to 700-nanometer range, effectively washing out firefly signals. Recommended lighting specifications include:

- utilizing amber or red LEDs (600- to 700-nanometer range)
- avoiding cool-white or daylight LEDs, CFLs, halogen globes, color-changing LED strips, and blue LEDs with phosphor coatings that might fail
- implementing downward-facing fixtures with proper shielding
- installing motion sensors and timers for automated control.

> Protecting firefly populations not only maintains biodiversity but also preserves vital ecosystem functions and opportunities for scientific discovery

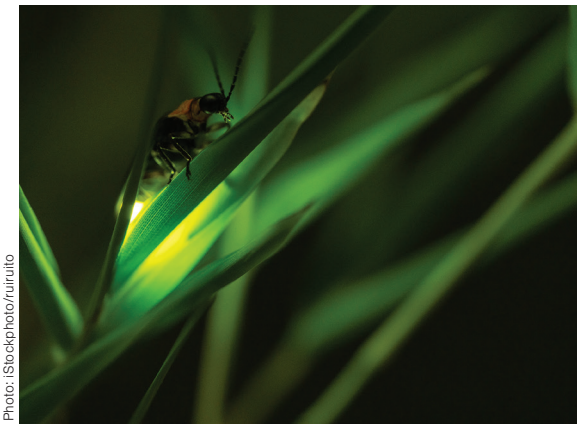


Photo: iStockphoto/ruiruito

The Firefly Habitat Certification program (*https://www.firefly.org/certify*), from Firefly Conservation & Research, offers lighting professionals a structured approach to environmentally conscious design. This certification can be leveraged as a valuable tool for justifying lighting control strategies in sensitive areas, meeting dark sky compliance, enhancing sustainable design credentials, and creating zones of controlled lighting that benefit both human users and local ecosystems.

Since its launch in 2022, the Firefly Habitat Certification program has achieved remarkable success, with 2024 marking its most impactful year to date. The program has certified nearly 500 habitats, including state parks, natural areas, conservation lands, community gardens, and schools. The certification sign has become the primary tool for conservationists initiating new firefly sanctuary designations. Through donor support, the program has distributed 45 signs to resource-limited landowners, preserves, and parks, significantly enhancing public awareness

and community engagement in firefly conservation efforts.

Integration Into Lighting Design Practice

Lighting professionals can implement firefly-friendly design through a comprehensive approach to project planning and execution. By conducting thorough site assessments early in the design process, designers can identify critical habitat areas and develop appropriate lighting strategies. These assessments inform the creation of lighting zones that protect dark spaces while ensuring human safety and functionality.

The implementation of adaptive controls allows for dynamic light-level management, particularly during peak firefly activity periods. This can be achieved through sophisticated control systems that adjust illumination based on time of day, season, and usage patterns. Shielded fixtures, carefully selected for their light distribution characteristics, ensure precise light placement while minimizing light trespass into sensitive areas.

Decorative lighting elements in sensitive areas require particular attention. While these features often enhance architectural appeal, their impact on firefly habitats must be carefully evaluated.

Best Practices for Implementation

To successfully integrate firefly-friendly lighting, designers should adhere to the following best practices:

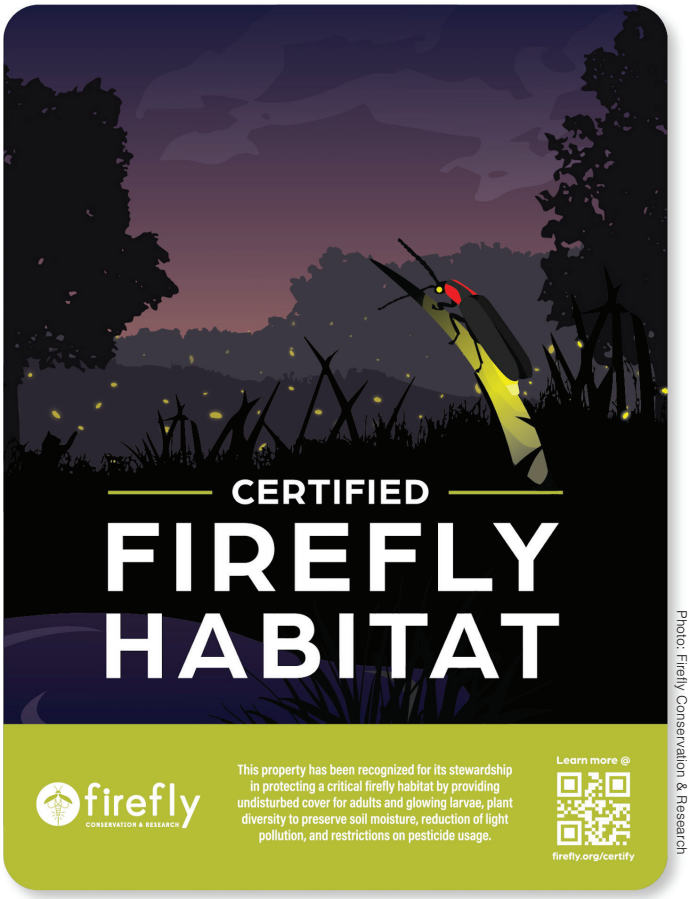


Photo: Firefly Conservation & Research

Certified Firefly Habitat signs identify areas that provide the essential elements to create and sustain a healthy habitat for adult and larval fireflies.

- Conduct site assessments to identify critical habitat areas and active areas of habitat restoration.
- Develop lighting zones that protect dark spaces.
- Implement adaptive controls to reduce light levels during peak firefly activity, which is 30 minutes before dusk until 12 a.m., to cover all species in their desired peak mating times.
- Design with shielded fixtures that direct light precisely where needed, specifically away from any areas with native vegetation near rivers or streams.
- Remove purely decorative lighting elements in sensitive areas.

Everyone, including lighting professionals, have both the responsibility and opportunity to protect firefly populations through thoughtful design. By incorporating these principles into our lighting designs, we can contribute to the conservation of these remarkable insects while advancing the field of sustainable lighting practice.

Ben Pfeiffer is a recognized firefly scientist, national speaker, and founder of Firefly Conservation & Research, a nonprofit organization established in 2009.

DIVERSITY

Amanda Schaneman

Prioritizing Neurodivergence Supporting diverse sensory needs

Lighting plays a fundamental role in shaping our environments. For individuals with neurodivergence—a term encompassing conditions like autism, ADHD, and sensory processing disorders, among others—lighting can profoundly influence their ability to function and thrive. Unfortunately, despite its importance, the specific needs of neurodivergent individuals have often been overlooked in our field.

Neurodivergent individuals experience the world differently. They often have heightened sensory responses, making them more sensitive to environmental factors such as light, sound, and touch. Lighting, one of the most pervasive elements of any environment, can act as a supportive tool or a source of distress. For example, glare, flicker, or the hum of a light fixture driver may be minor annoyances to some but can completely derail focus or overstimulate a neurodivergent person.

The stakes go beyond individual comfort. Neurodivergent people contribute significant value to society through their unique strengths—such as creative problem-solving, attention to detail, and pattern recognition. Research indicates that neurodiverse teams are 30% more productive than neurotypical teams alone, underlining the importance of creating environments where these individuals can thrive. Yet, by ignoring their specific needs, we risk alienating a substantial segment of the population—estimated at 15 to 20% or more—and hindering their contributions.

Designing with neurodivergence in mind is not just about inclusion; it's about embracing and empowering all individuals and making progress. When we create environments that support diverse sensory needs, we unlock the potential of a significant portion of the population. Lighting professionals have a unique opportunity to lead this charge by rethinking traditional practices and championing designs that reflect the diversity of human experience.

Overlooking Neurodivergent Needs

The historical oversight of neurodivergence in lighting design stems, in part, from limited awareness and a tendency to generalize environmental standards.

> When we create environments that support diverse sensory needs, we unlock the potential of a significant portion of the population

Conventional lighting solutions often prioritize energy efficiency, aesthetics, or cost over individual comfort, particularly for those with unique sensory processing needs. This one-size-fits-all approach has unintentionally marginalized neurodivergent individuals.

For decades, building codes and design guidelines have largely been written with neurotypical individuals in mind, treating the diverse ways people experience light as outliers rather than fundamental considerations. Furthermore, the subjective nature of lighting preferences has made it easy for designers to default to what works for the majority rather than exploring how to accommodate a broader spectrum of needs.

Although the conversation about inclusivity in design has expanded in recent years, it has often focused on visible or physical disabilities, leaving neurological and other sensory differences underrepresented. The tide is beginning to shift, but there remains a significant gap in knowledge and implementation regarding how lighting impacts neurodivergence.

To address this gap, the industry must embrace a shift in perspective. Viewing lighting through the lens of neurodivergence means acknowledging that sensory needs vary widely and that flexible spaces serve everyone.

Creating Significant Impact

For neurodivergent individuals, the relationship between lighting and well-being is multifaceted. Poor lighting can exacerbate anxiety, disrupt focus, and lead to overstimulation—a state where sensory input becomes overwhelming, potentially triggering a shutdown or meltdown. Such environments can be not only uncomfortable but also exclusionary, limiting access to workspaces, schools, healthcare facilities, and public spaces. Conversely, thoughtful lighting design can transform spaces into places of comfort and functionality. It can reduce sensory distractions, promote emotional regulation, and enhance overall quality of life.

Moreover, the benefits of inclusive lighting extend beyond neurodivergent individuals. When environments are designed to reduce sensory triggers, everyone benefits from reduced stress, improved focus, and greater comfort. Neurodivergent-inclusive design is essentially universal design—providing thoughtful solutions that uplift all users.

Creating lighting environments that incorporate neurodivergent needs requires addressing basic sensory triggers and building flexibility in the system. High-quality LED fixtures with flicker-free drivers and low-glare optics are the first step to reducing unnecessary discomfort. Offering adjustable lighting and controls further empowers individuals to tailor the environment to their needs, whether it's through dimming, color temperature adjustments, or even color-changing lights that allow users to select hues that best support their focus or relaxation.

Spatial awareness and navigation can also present challenges for neurodivergent individuals in both familiar and unfamiliar settings. Using lighting to define clear pathways and exit routes provides practical navigation and fosters a sense of security, ensuring that individuals can leave a space easily, if needed.

Task lighting is another

simple yet effective solution for workspace settings. Adjustable desk lamps or localized lighting enable individuals to fine-tune their environment for specific activities.

Finally, sudden changes in brightness or color temperature can feel jarring and stressful, making it essential to implement systems that smoothly shift lighting levels. Intuitive and user-friendly controls, such as physical buttons or touchscreens, ensure everyone can adapt their surroundings to their unique preferences.

A Call to Action

To fully unlock the potential of neurodiverse collaboration, designers must prioritize spaces that accommodate everyone's needs and remove unnecessary barriers. Collaboration and education are key. Designers must engage with neurodivergent individuals to better understand their needs and invest in research to explore the nuanced ways lighting impacts sensory processing. For example, partnering with advocacy groups or conducting user-centered design workshops can provide valuable insights into how lighting affects neurodivergent people's daily lives.

Additionally, the industry must prioritize raising awareness among lighting professionals. By integrating neurodivergent perspectives into design education and professional training, we can shift the focus from traditional norms to a more inclusive approach that benefits everyone.

The path forward also involves rethinking metrics of success in lighting design. While energy efficiency and aesthetics remain important, they should not come at the expense of human comfort and well-being. Incorporating metrics that measure sensory inclusivity can help ensure that design projects adequately address neurodivergent needs.

As we look to the future, the goal is clear: prioritize lighting that fosters comfort, focus, and well-being. This will ensure that neurodivergent individuals feel seen, supported, and empowered in every environment they encounter. By doing so, we will create not only more inclusive spaces but also a better, brighter world for everyone.

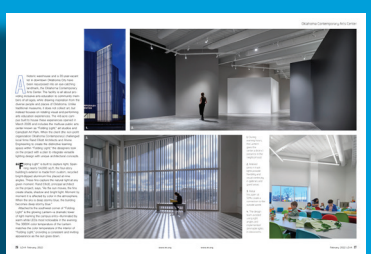
Amanda Schaneman is the director of marketing at Kirlin Lighting.

LD+A

LIGHTING DESIGN and APPLICATION

Share Your Voice

The flagship publication of the Illuminating Engineering Society, *LD+A* is an award-winning magazine for professionals involved in the art, science, study, manufacture, teaching and implementation of lighting. In an effort to continue to provide diverse voices in *LD+A*, we are looking for **industry professionals** who are interested in telling their stories, including work on unique lighting projects, their experiences in the profession, and opinions on current hot topics in the world of illumination.



EVERY ISSUE of *LD+A* includes feature articles on design projects, technical articles on the science of illumination, new product developments, industry trends, news of the Illuminating Engineering Society, and vital information about the illuminating profession.

EACH MONTHLY issue features a unique theme such as sustainable design, retail lighting, roadway lighting, industrial lighting, hospitality lighting, or office and commercial lighting.

ROTATING COLUMNS cover topics including energy, green design, career issues, technology, regulations and legislation, research, and education—written by a veritable who's who of industry experts.

If you are interested in publishing an article in *LD+A*, please reach out to Editor-in-Chief Craig Causer at **craig.causer@sagepub.com** to discuss further.

Illuminating ENGINEERING SOCIETY

Photo: Patrick Gallegos

CREATURES OF HABITAT

Designing light for animal pleasure and comfort

By Patrick Gallegos

My team and I have had the privilege of working with some of the leaders in animal habitat design over the last 40 years on such renowned projects as the Monterey Bay Aquarium, New Doha Zoo, National Aquarium of Taiwan, Long Beach Aquarium of the Pacific, and many others. The lighting design process typically follows American Institute of Architects' or Royal Institute of British Architects' stages of development, dependent on what area of the world the project is located. The lighting designer is often brought in under contract through the architectural and engineering consultant or the specialty exhibit designer, depending

Photo: Bruce Damonte

Left: Lighting in preview focal tanks at Long Beach Aquarium of the Pacific is isolated from the main lobby area to avoid distracting reflections.

Top: The careful balance of lighting at Toledo Zoo Aquarium avoids distracting reflections.

on the extent of the lighting designer's scope of work. While the designer is often brought in at the concept/schematic phase(s), there may be a significant gap of time moving forward with subsequent phases if the project is dependent on using the concept/schematic documents to procure additional funding. This may be the norm versus the exception for publicly funded projects.

The lighting design approach has two primary objectives: illumination for the visitor experience as well as for animal curatorial needs. While animal habitat owners do an amazing amount of work (mostly unseen by the public) relative to overall animal husbandry and animal needs, it is key that the presentation to the public offers a visually appealing environment that must work in conjunction with the animals' needs. The lighting must work with the other dimensional objects—buildings, landscape, habitats, and the animals themselves—to create a memorable, magical, and fun experience using all the tools in the lighting designer's palette. Most of the lighting for the "dry" side of an animal-featured environment follows lighting design best practices, from the often-iconic lighting of the building exterior (many projects are also major civic or regional features), lobby spaces, and other guest services spaces, but with the significant interface with animal environments.

As an example, many animal environments require a physical separator between the guest and animal habitat, usually constructed of acrylic. An upside to acrylic is that it has similar optical properties as water, allowing it to virtually disappear so that the guest is unaware that it could be up to 12 in. (30 centimeters) thick in deep aquarium tanks. The downside to acrylic (as with any reflective surface) is that the lighting levels in the animal space need to be balanced with the lighting levels in the guest space to avoid any reflectance issues that compromise viewing into the animal habitat. This requires close collaboration with both the architectural designer and the dry-exhibit designer to avoid reflectance issues from both architectural elements (including illuminated exit and other signage) and from exhibits in the dry spaces with their own potentially distracting lighting. Modern programmable lighting control systems are also excellent to help create balanced solutions to this challenge.

Photo: Patrick Gallegos

Sea World Orlando's in-tank experience provides an up-close view of the environment.

One example, the Long Beach Aquarium of the Pacific, included an expansive lobby space and featured large windows that viewed outward to the Long Beach harbor, but it had multiple large, featured tanks. The tanks were situated in such a way that the reflective view opposite the primary viewing of each tank was of a neutral or non-competing environment, avoiding competition with the Sun during daylight hours and allowing the internal tank lighting to create iconic features.

The use of light in and through water requires one special note: while viewing upward into a tank, there is not usually an issue with unsightly guest views of the mechanical area above tanks, although this should be verified with each tank. However, when the view of the tank takes the guest into the tank itself, notably with pop-up domes at the floor of the tank, walk-in vestibules, or (worst case) walkthrough acrylic tunnels, the designer needs to take special care to avoid revealing back-of-house spaces that contain lighting and mechanical equipment. It is necessary to work with the architects and engineers to minimize the clutter and paint everything deep blue or black. In these scenarios, designers should additionally place the lighting so that it has glare shields aimed in a direction that minimizes direct light into the guest viewing areas; designers can also use the bending properties of water to assist with these issues.

Lighting for the Animal Experience

Since experiencing animals is the reason for these projects' existence, designers have to get this right. Besides the normal project design relationships with architects, engineers, and designers, critical team members with whom designers will need to collaborate include specialty exhibit designers and fabricators, specialty engineers (structural and life support), the lead animal curator, and that curator's husbandry staff and consultants. Literally every animal has an expert who knows everything about that species.

Most animals have very particular lighting requirements, such as illumination levels (day and night), both visible and nonvisible lighting spectrum needs, circadian rhythm considerations, and other lighting needs specific to individual species. On a project of any size, there will be one or more experts well-versed in those needs. In very general terms, the higher the animal is on the developmental scale, the more critical are the lighting needs, with birds and mammals at the top of the "need" chain. Some of these needs may include the specific requirements of certain wavelengths of light to maximize animal health. A recent example is the penguin habitat of the recently opened SeaWorld facility in Abu Dhabi, UAE. The project team developed new LED light sources to provide both tunable visible lighting as well as UV lighting. The husbandry experts report that the penguins are much healthier, look better, and are breeding more effectively.

Another project, this one at the Desert Biome at California Science Center's Ecosystems exhibit, involved bats. Bats, being nocturnal mammals who spend daylight hours in dark spaces and hunt/feed using echolocation, are extremely sensitive to visible light. Since a black exhibit is rather boring, the bats were displayed in a very dark cave environment with minimal pathway lighting. The display lighting for the bats themselves was extremely low-level lighting with light filtered to the deep blue portion of the visible spectrum.

Addressing Animal Environments

Artificial lighting for animal environments is, historically, relatively new, corresponding with the development of the electric light source. Prior to that, lighting was either sunlight or rudimentary at best. Let's take a look at some options.

- Incandescent: While opening opportunities to develop exhibitry presentations, the limitation of incandescent to the warm parts of the lighting

spectrum also brought limitations to the animal markets, particularly water environments. Water absorbs the warm spectrum of light first, which can cause a muddy appearance in water environments of any depth.

- Fluorescent: This source adds the ability to reproduce the colder spectrums of light but at the expense of directional lighting for large environments, in particular.
- HID: These provide increased control of lighting at multiple spectrum offerings but at the reduced control of lighting and require large fixtures that are often at odds with space limitations and/or visibility issues.
- LEDs: While LEDs have been around for some time, they have only been commercially viable for about the last decade. The versatility that LEDs bring to the table is exciting, offering a large range of commercially available lighting spectrums (or the ability to custom order for the needs of a project) and the ability to use the project's control system to program and tune the lighting for particular exhibitry needs or for dramatic or theatrical effects.
- Controls: Different sources, changing timelines, and a variety of animal requirements necessitate a controls system that can handle all these variables. In the past, I have worked with ETC and its Paradigm system to juggle the different parameters—including multiple timelines, astronomical calendaring, plus different power and dimming demands.

Photo: Patrick Gallegos

At Colorado Ocean Journey, aiming fixtures away from the main viewing area allows for an enhanced guest experience.

Lighting Outdoors at Night

In general, the historical approach to lighting animal environments—in particular, in zoo environments with many large, open enclosures with birds and mammals—the lighting approach is very short: don't light. At night, most animals are either sleeping or are awake for foraging and hunting. As a result, lighting has historically stayed away from lighting animal environments at night due to concerns about animal needs. But the high degree of guest and visitor interest in viewing animals in their natural state has resulted in a re-evaluation of the possibilities for guest nighttime experiences. This has been made possible (or at least easier and more cost effective) with the parallel development of the tunable LED light source and flexible and programmable project-wide control systems. Among the most effective innovators and users of animal habitat nighttime lighting at a large scale are the Singapore Zoo, Disney's Animal Kingdom Safari at Walt Disney World, and the proposed New Doha Zoo in Qatar. The last project, one designed by our team, has an extensive drive-through nighttime safari experience that involves custom low-level pathway illuminance for vehicle guidance (creating interesting questions to ask lighting manufacturers, like "Will your fixture be okay if a rhino steps on it?") as well as broad washes and focal spot lighting for the free-roaming animals. This involves close collaboration with the exhibit designers and curators regarding the selected animals' lighting needs.

In summary, lighting for animal environments can be quite a satisfying experience for all concerned if the design team understands that the "all concerned" includes not only your typical guest/visitor to the space but also the special lighting needs of the critters. Modern developments in light sources and control have finally given lighting designers the ability to work with the design and curatorial teams to create environments that are not just pleasant to view but also support the comfort and essential needs of the animals presented. ◎

THE AUTHOR | Patrick Gallegos is a principal designer at GXU Lighting Design. He has been designing lighting for immersive environments in the themed entertainment, aquarium and zoo, science center, retail, restaurant, hospitality, and commercial architecture markets for more than 40 years.

Photo: Guy Peterson Office for Architecture

SEE TURTLES

Illumination, marine turtles, and the state of play

By Thomas Paterson

One of the current, and more interesting, corners of lighting is its interaction with nature. As we discuss the anthropogenic impacts of light on animals, it's worth looking at marine turtles, which are easily one of the most-studied interactions, and, unfortunately, one that remains poorly understood, poorly delivered, and poorly regulated.

The basic biology of turtle vision is unusual because of where turtles use their eyes. Marine turtles are, technically speaking, amphibious mammals. This is to say, they hatch on land and race to the sea before predators can get them—and many years later, the females return to shore to nest. Essentially, the rest of their lives are lived in water, occasionally poking their heads out to breathe and, one presumes, look around. As a result of this dominant in-water life, turtles' vision is optimized for life underwater. As every diver (and any avid adventure movie watcher) can tell you, it's pretty blue down there. As one dives down through the first ten meters (~33 ft), most of the red and orange light is absorbed by the water. By 20 meters (~66 ft), the limit of recreational open water diving, the world is dominated by the short end of the spectrum, blue and green wavelengths. Turtles' eyes are optimized for this, and they're essentially blind to red and amber light, sensitivity they simply don't need.

This has been well established for many years and demonstrated in the wild by Blair Witherington and others in tests where beaches were lit with different wavelengths of light. In the sodium-lit areas, turtle behavior was unaffected as compared to unlit beaches.[1]

That is what is popularly known, but there are other factors that are less studied. For example, another factor in the turtles' environment is that they have minimal exposure to direct solar glare. Their eyes are optimized for life underwater, where the Sun's rays are very much moderated. There is little research on the effects of glare on turtle vision and its ability to cause disorientation, but the precautionary principle would suggest that as lighting professionals, we should assume that turtles are distinctly vulnerable to glare.

Within the scientific community, there is a consensus that turtles are also disoriented at night by skyglow. The evidence for this appears solid on the surface, due to massive research by Florida Fish and Wildlife,[2] including surveys coordinated by Mote Marine Biology Laboratory[3] and its volunteers and allied organizations. This appears to demonstrate that the majority of turtle disorientation events are due to skyglow. Unfortunately, this evidence is inferential and poorly collected. Without going into great detail, volunteers combing beaches every morning during the hatching season survey each disorientation event that happened during the night and fill in surveys that include presumed cause. It is unclear how volunteers might know whether skyglow was notably present the night before or whether it caused the disorientation; instead, it functions simply as a catch-all that cannot be proven. In contrast, there are also studies suggesting that the glow of clouds under moonlight and stars may be beneficial to turtle hatchling navigation; the still silhouette of tree lines and topography against the sky is actually used for navigation.

Turtles are nocturnal animals on land—they both nest and hatch during nighttime hours and are undoubtably vulnerable during that time. They are often demonstrably disoriented by street and house lights along beaches; the threat from artificial light is real. Though I have identified both understudied and overstated aspects of their engagement with light, one should assume (in absence of evidence

to the contrary) that all light in their range of spectral sensitivity, to which they are exposed, is harmful.

Examining the State of the Art

The state of the art for turtle lighting exists in three parts. Source technology in daily practice now consists essentially of LEDs—there's no need to explore legacy fixture types. Native red and amber LEDs are monospectral and exist entirely outside of turtles' spectral sensitivity. In principle, these sources can be used profligately without harm to turtles. That said, profligate use of light is rarely the right solution, and we should note that there may be other non-turtle species that are specifically sensitive in these ranges. Some reptiles, for example, have sensors in the near-infrared, and I'm unaware of studies demonstrating that their sensitivity doesn't overlap with red LEDs. As such, the usual discretion should be applied in lighting with these sources.

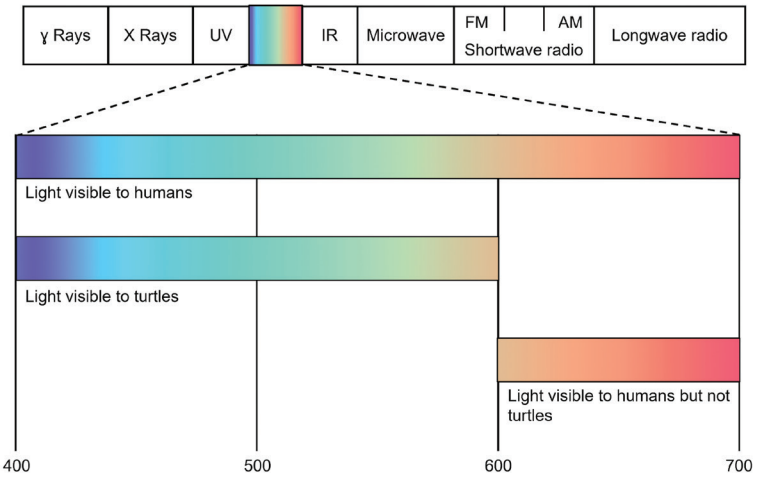
From a design-aesthetic point of view, both red and amber LEDs have their downsides; being monospectral, they render the world in their own tone, black-and-amber or black-and-red, like a 1980s computer monitor. Blending the two can occasionally generate interesting results. Unfortunately, low CCT whites, which are occasionally mooted as options, cannot be considered as both contain shorter wavelengths that are visible to turtles.

I was involved with a project on which our team provided both proposed regulation and expert-witness work. We were peer reviewed by a large UK consultancy that claimed that RGB could also be used, if toned to warm colors—alas, this is incorrect. Any content in green or blue would be entirely visible to turtles, and the use of RGB fixtures set only to provide red would provide a point-of-failure should color settings be messed up, and no advantage over pure red.

The light that disorientates comes in essentially three groups. The first is direct source exposure—clearly this is unnecessary and harmful—shielding of all direct source views should be considered essential around marine turtle nesting grounds. Heck, it should be considered baseline around humans! The second type of light exposure is the visibility of lit surfaces by turtles—that is to say, if one washes a wall with light, uplights a tree, or otherwise lights a surface, it potentially disorients a turtle, if in their visible spectrum.

Finally, skyglow or indirect atmospheric scatter such as fog, mist, clouds, and rainfall are potential sources of view to light sources from turtles. As previously noted, the evidence that this is problematic is marginal at best. On the other hand, skyglow is harmful to many other species including insects, birds, bats, and humans, so we should be careful to control and manage skyglow whatever the level of certainty of impact on turtles.

The shielding and management of mounting heights is very low-tech but is a key part of any solution to turtle lighting. Simply orienting all lighting away from the beach and using honeycomb louvers, deep snoots, and beach-side shields is easy to do and provides an immediate payoff.



Seeking the light—what humans can see, and turtles cannot.

The State of the Law Versus Turtle Needs

The state of the law is a vast distance from the real needs of turtles. Regulations fall into three buckets, all of which fail to be fit-for-purpose. They are written by turtle experts, not lighting experts, and it shows.

- **The State of Florida Model Lighting Ordinance (FMLO) for Sea Turtle Protection:** The FMLO[4] in its many adoptions in Florida counties, and far beyond, is a mess. The document was written by marine biologists with little understanding of lighting, less of code compliance, and a complete failure to look at the turtles' umwelt. It treats all downward-facing lighting as better, but almost every source it recommends is essentially directly visible from a turtle's eye at 6 in. above the sand or water. Turtles' eyes are down from any source other than an uplight. Due to the extreme height constraints applied in this code and the options it permits, it regularly leads to massive over-lighting—not because it requires it, but its interaction with egress and emergency lighting requirements become onerous. It also encourages horizontal-throw

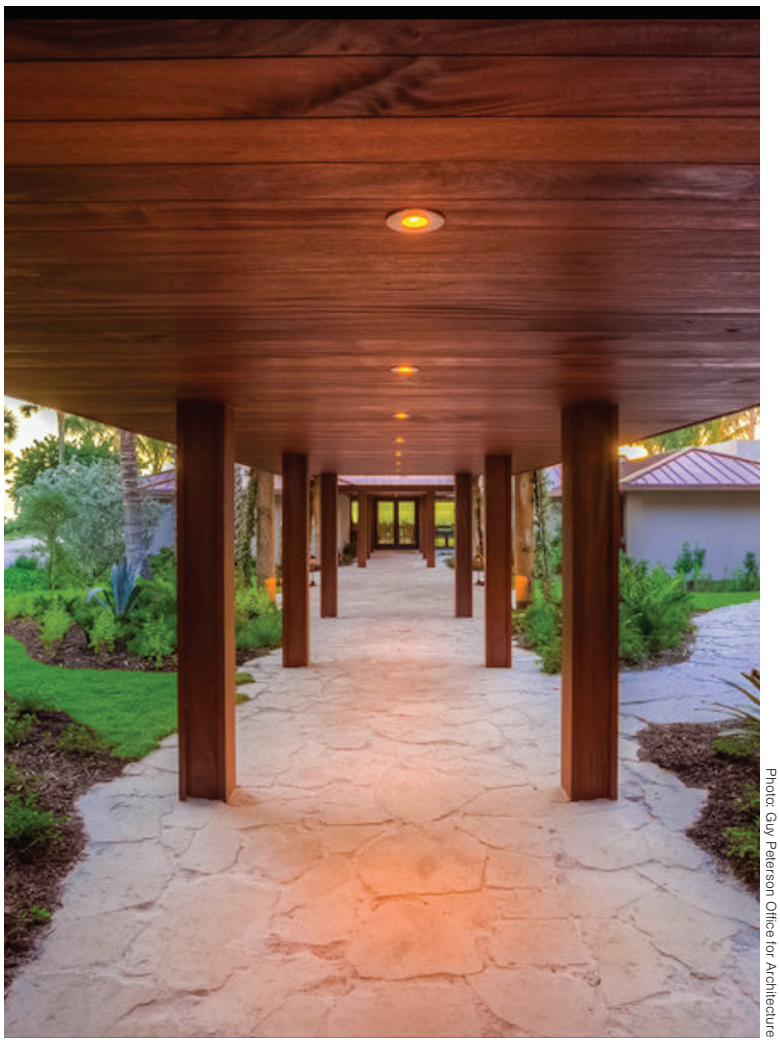


Photo: Guy Peterson Office for Architecture

Observing the FMLO for Sea Turtle Protection with all-amber LEDs at a private residence in Longboat Key, FL.

luminaires, which essentially puts light on the turtles' eyelines and throws long distances. For example, to light to 3 footcandles around a hotel swimming pool by the beach, from a few inches above the deck surface, an enormous density of fixtures is required—similarly with path lighting.

The document is not fit-for-purpose, but no substantive review has been performed involving serious lighting designers positing viable solutions. As such, assume that such lighting will be problematic. My advice within variants of this law is simple: follow it and do it the least-worst you can. Over-light as needs to meet code, then pare back after your inspections, where professionally judged appropriate. Circuit 80% of the light as emergency-only in reality, if not on drawings.

- **Australian Regulations:** Australia has been leading the way on appropriate models of turtle lighting.[5] In my professional practice, I have not had the opportunity to apply or review such lighting. I'm excited to do so on forthcoming projects, but for now, my advice is to read these regulations and understand their purpose and methods.
- **European Legislation:** European legislation is a hodgepodge of national standards (and their absence) under an overarching principle that anthropogenic lighting should be mitigated where it impinges on the natural environment. In principle, this gives a lot of freedom to designers to use their own initiative to develop site-appropriate solutions that appropriately mitigate the impact on sea turtles. In practice, it's nebulous, hard to deliver, and harder to demonstrate. European legislation is particularly vulnerable to nuisance assertions of insufficient mitigation by third parties since the question of what is sufficient mitigation is left to judgment.
- **DarkSky:** DarkSky recently published a new model ordinance[6], which replaces its old collaboration with the IES. The ordinance is often mooted as appropriate for turtle environments, however, the main document is primarily focused on fugitive light upwards, rather than addressing the experience of the eye below that level. In the past, we often cherry-picked useful parts of the previous version for turtle protection, but the new version is lightweight with regard to downward light and contributes little to a problem that is primarily downward-facing. The supplementary text that DarkSky proposes for its model ordinance in the context of turtles is insufficient, unclear, and ineffective in providing deliverable direction for lighting. The general guidelines limit downward fugitive light, treating it as a question of quantification of glare (BUG rating) rather than a concealment problem. We must assume that for turtles' eyes, any glare/source view of a spectrum they can see is too much. DarkSky's goal of warm-white light is appropriate for humans but is not specific enough for sea turtles—the low CCT may be heavy on long spectra, but the source-view contains shorter wavelengths, too—and from typically compact, glary sources for turtles' eyes. The addition of the turtle supplement then limits light to 0.1 lux, irrespective of wavelength. This last term is odd, as it creates impossible implications for egress lighting from properties by the beach, for example—or nearby parking lots. The pole height requirements are arbitrary and allow luminaires to be located well over turtles' heads but

Photo: Pedro Hurtado

Here, 8-in.-high cane rails provide 3 fc at the center of travel with low-level, long-wavelength light.

still limits the ability to use structure-mounted lights oriented away from the beach to best light areas. Strangely, it emphasizes low-pressure sodium as a reference source, where amber and red LEDs would be more realistic and appropriate in 2025. My practice has a policy of observing DarkSky in environmentally sensitive environments, but it is not fit-for-purpose as a catchall for turtles. More specific text is required.

Questions and Context

Unfortunately, there is a structural problem in the application of environmental laws to turtle protection. Specifically, we have seen that organizations protesting a development, in general, can simply assert that lighting methodologies are not sufficiently mitigating of lighting for turtles, thereby blocking the whole development. What is mitigation regarding impact on turtles? What is considered sufficient? Where are the limits to which it applies? These questions are too vague for effective evaluation by courts that do not include sufficient professionals in their judging panels. We have seen several projects entirely frozen by turtle-related complaints, and it's become increasingly clear that it's simply the easiest stick with which to beat the project, even when disingenuous.

Working in this context, it is important to provide not only effective solutions but also graphical and analytical methodology statements that can be communicated to interested parties. Putting turtle protection strategies into the public domain and showing how easily their success can be demonstrated becomes key. I recommend some simple language to be used wherever true and appropriate: "The proposed lighting shall be subject to final evaluation by eye. Any viewer, on the beach up to the first dune or in the water approaches, shall be unable to see any light source or substantially lit surface in any light source other than amber or red. Should this be breached, the owner shall be liable for immediate rectification."

Now you need to design to meet it.

What Should We Do?

A simple thought experiment should help you work out genuinely turtle-appropriate lighting. Always remember that turtles' eyes are rarely more than 6 in. above the sand, and less than that above the water. Consider everywhere a turtle might be: wavetop at high tide or crawling up to the first dune. From those vantage points, what can they see? If they can't see a surface you're lighting or the light source, then you're well sorted. Even better is if you can do everything that might light mist, rain, fog, etc., in the visible area above your site in amber or red LEDs—then you've really addressed the turtles' needs. So, shield heavily, select lit surfaces carefully, spectra with care, and the turtles will be fine.

I also suggest installing fixtures higher rather than lower since they will be more effective and more easily shielded/directed—every time you use an 18-in. path light, to get egress coverage, you'll

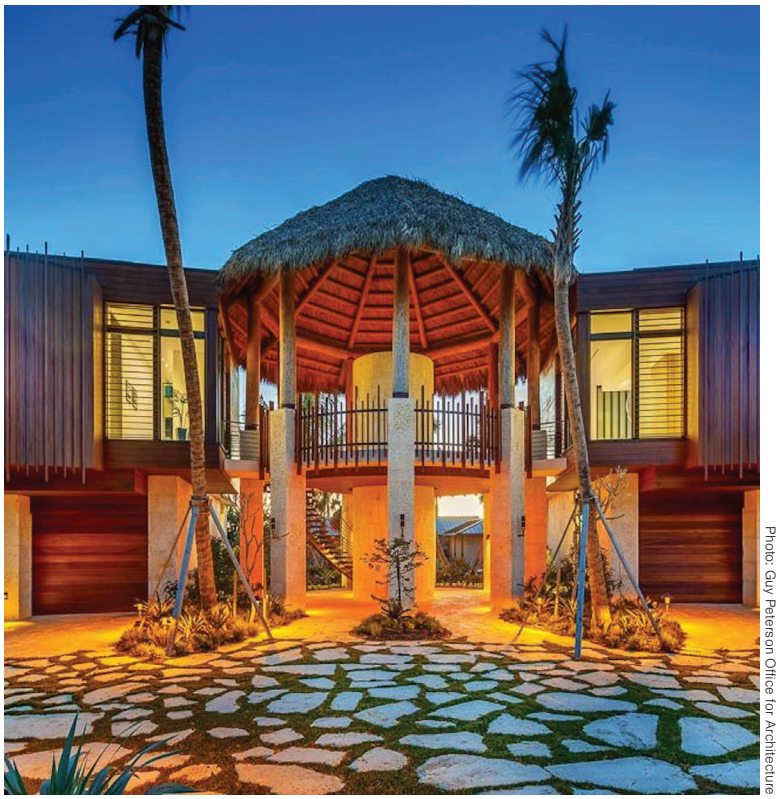


Photo: Guy Peterson Office for Architecture

All-amber LEDs employed at a private residence in Longboat Key, FL.

either be throwing as wide as you can (near 180-deg/batwing) or have a huge density of sources—all of which the turtles' eyes are looking up and across into. Don't be afraid to pole/façade mounts and light down with carefully selected and shielded area lights, spot lights, accents, and under-handrail lights. Be sure to throw away from the beach wherever possible, to conceal the faces of luminaires.

Circuit everything for seasonality. Having a nesting/hatching season turn-down for your lighting, inside and out, is a great way to genuinely benefit the turtles, while limiting human use of the space only during certain seasons.

We often offer portable lighting to our clients for their beachside landscapes. In the past, we've done this with kerosene torches, battery lamps, or in one spectacular case, interior sconces at exits that can be lifted off their mounts and converted into battery lanterns.

What to Avoid?

Path lights, floodlights, step lights, and stair nosings all have their problems. Though a stair nosing light might seem clever, one typically illuminates the riser heavily, and that's a lot of light if you are reaching egress standards even one tread out from the source. Use your imagination about where there will be hotspots. Area lights such as pole fixtures are fine—great, if you can use house-side-shields to shield through greater than 180 deg toward the beach. But avoid anything in white, that which can't be heavily shielded, and anything that is self-lighting—white or metallic poles that catch light from the head, for example.

Balconies on buildings really don't need a lot of light, and downlights, sconces, or step lights must appear phantasmagorical to hatching turtles, hovering 15 stories over Miami beach. If you really need to light these areas, put the fixture in the handrail lighting 100% inwards; if anyone is going to feel the glare, it can be the owner. Interior lighting isn't covered by most codes, and you can't really tell clients that you are not going to light their interiors, so do light them. I recommend having blackout shades that automatically close after sunset; they can always be opened manually, if need be, but if you have an entire hotel façade blacked out and 5% decide to open their shades, that's a huge benefit.

Is it worth all the cost and complexity of lighting for turtles? And does it work? Absolutely. The Florida west coast, where turtle lighting ordinances have the longest track record and strongest enforcement, is now seeing nesting populations bouncing back after a quarter century of dedication. This does work. It can get better. Join me in protecting the turtles. ◎

THE AUTHOR | Thomas Paterson is the founder and director of Lux Populi.

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BIOPHILIC DESIGN AND THE NATURE OF LIGHT

What is the ideal human habitat?

By Nicole Craanen and Lauren Schwade

In our surveys, 90% of individuals identify natural landscapes as their preferred environments, free from any built structures. The remaining 10% favor outdoor areas with built elements like patios, surrounded by nature. Why? As the biophilia theory explains, we are not just intertwined with nature, we are nature. Human biology and psychology evolved to interact with natural environments and each other. Biophilia explains why we like similar landscapes all over the world, no matter the cultural background. It explains the views we prefer, as well as how we interact with natural or electric light.

Research shows deeper connections to nature improve mental health.[1] Like all species, we have an ideal habitat that we understand through all our senses. These habitats make us feel safe, and orient us toward shelter, food, and water.

When we design these ideal habitats, we are able to increase comfort, happiness, and feelings of restoration. This can provide measurable benefits including stress reduction, increased recruitment and retention, improved productivity, higher learning and healing rates, increased retail dwell time, higher hospitality daily room rates, and even increased public safety and lower crime rates.[2]

This approach to creating ideal spaces is known as biophilic design—an intentional integration of natural elements into built environments to foster a stronger connection between people and nature. Biophilic design helps us understand what that ideal habitat looks and feels like. Renowned biologist E.O. Wilson said, “The crucial first step to

The Sun peeking through rain clouds at Cherry Creek State Park, CO.

Photo: Nicole Craanen

survival in all organisms is habitat selection. If you get to the right place, everything else is likely to be easier."

Ideally, biophilic design fosters our connection to nature through access to sensory-rich outdoor spaces. However, we spend, on average, 90% of our time indoors, so how do we best create indoor environments that help us thrive? It's not about isolated features, like plant walls (though that can be an aspect of a holistic approach), but designing spaces that align with our biological and psychological needs. Think of biophilic design as a progression—the more sensory-rich and biodiverse a space, the greater its impact on well-being.

Light in Our Environments: A Biological and Psychological Experience

There are three key main categories of biophilic design: natural elements and our sensory experience of them, indirect experience of nature, and experience and place. Let's examine each of these categories with an eye on illumination.

1. Natural elements and our sensory experience of them comprises our direct connection to nature, which provides a full multi-sensory experience. It includes actual natural elements and systems, such as plants, water, animal contact, weather, time of day, light changes and intensity, and geology.

Light-specific experiences:

- *Biological:* Humans evolved under the Sun and stars. The warmth from fire at ground level was our first source of human-made light. It explains why conversations feel more intimate around a fireplace and the desire to use the lower placed light of table lamps in the evening in our homes versus overhead lighting. Our circadian rhythms were built from the natural locations, the horizon and intensities of light in our environment, and allowing access to this keeps us connected to nature.
- *Psychological:* The presence of light outdoors offers us opportunities to experience warmth and coolness on our skin as we move through bright and shadowed spaces. We might watch shadows play through the dappled light of trees. We orient ourselves to the time of day, season, and local ecology through the quality and strength of light, knowing when to seek protection and where to find restoration.

2. Indirect experience of nature involves nature representation through shape, form, and patterns. It may include materials that show our connection to time and place, as well as natural colors and materials that reflect a place's specific ecology. These elements work best when they balance complexity and simplicity. Our brains are designed to thrive on the richness of information in natural environments, interpreting patterns and details as we engage with them. For example, as we move closer to an object, finer details are revealed.[3]

Light-specific experiences:

- *Biological:* As humans, we understand the aging process, see the world changing around us, and crave detail and the patina of time. The human eye has evolved to process that detail within our retina, sending light information through the optic nerve to our brain, creating images that guide our lives. We use that information to make decisions, process our surroundings, discern facial expressions, and more.[4]
- *Psychological:* The indirect experience can be found through art, finishes, and shapes that mimic or represent those in nature. Art or finishes that offer layers of complexity, such as exposure to increased detail as one

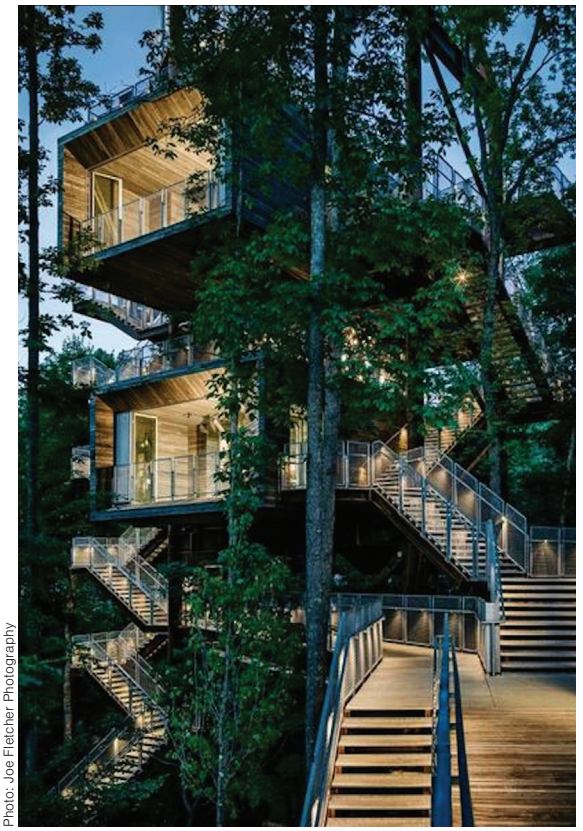

Photo: Joe Fletcher Photography

Photo: Lake Flato Architects

moves closer to the object, can feel engaging. Artwork of landscapes is generally calming. Many buildings are designed without the sensory complexity humans crave, and the indirect experience works to correct this.

3. Experience of space and place focuses on how we've adapted to prefer specific layouts of spaces. Concepts like prospect and refuge balance open views with areas of protection, while mystery and awe invite curiosity and connection. Fostering cultural and ecological attachment to places helps create spaces that feel alive, meaningful, and deeply rooted in their surroundings.

Light-specific experiences:

- *Biological:* The eye's ability to perceive light and shadow helps create depth and texture, layering our environment with information. Within our natural or architectural spaces, we can start to perceive foreground and background and piece together which areas may feel safe or threatening.
- *Psychological:* Mystery and awe are important components of how we engage in our world to bring meaning. Mystery entices us to explore, and awe can make us feel as though we are part of something larger. When we experience awe, regions of the brain associated with ego—including self-criticism, anxiety, and depression—quiet down.[5] Light offers many opportunities to experience awe—the way the Sun shines through the leaves creating new pathways, the glistening of light on rippling water giving it life, and sun rays peeking through clouds on a cloudy day to touch the earth below.

Left: This 120-ft-tall treehouse reaches high into the tree canopy, allowing visitors to experience the forest from a different perspective where daylight is the primary source.

Right: Marfa Ranch connects to nature by using natural materials, keeping ambient light sources minimal and warm, and allowing the scenic views to dominate.

Why Does Biophilic Design Matter?

As lighting design pioneer Richard Kelly stated, we need "ambient luminescence, focal glow, and the play of brilliance" in our designs. The play of brilliance—or sparkle—occurs when a person turns a corner and sees something magical that reconnects them to nature. At its root, this is biophilia and a powerful way to create awe in our lighting designs and architectural habitats. By engaging with light, we can create safe, comfortable spaces rather than simply illuminating them.

Photo: Lake Flato Architects

Confluence Park transforms a former industrial yard into an interactive learning and recreational space.

Natural light influences our sleep-wake cycles and regulates hormones like cortisol, serotonin, and melatonin, which are vital for overall health. The circadian rhythm controls many bodily functions, including those that support recovery during sleep.

Advances in lighting and controls technology now allow the design community to tailor lighting systems to individual needs, even customizing equipment and spectra of light. Coordinating other devices, equipment, monitors, windows, and even staff schedules can conflict with lighting design and should be coordinated with the design team throughout the project.

In architectural design, it's critical to consider how individuals experience light, as factors like age, eye health, and light sensitivity can affect perception. For instance, conditions such as cataracts can alter how light is perceived, and what may seem like inadequate lighting might be related to an individual's vision, not their surroundings. When thinking about a person's immediate habitat and safety, an understanding of the eye and light-level needs are crucial in design.

Incorporating Biophilic Lighting Into Everyday Spaces

When setting up our home offices, we came to the realization that a direct connection to nature is essential for well-being. Initially, lightwells and electric lighting seemed sufficient, but experiencing the outdoors—birds on the fence, trees moving in the wind, and seasonal changes—proved invaluable.

To support focus and reduce eye strain, we take regular 20-20-20 micro-breaks, looking at something 20 ft away for about 20 seconds, every 20 minutes. This simple habit is easier when desks are positioned facing or perpendicular to a window. Being near natural light also allows us to observe shifting weather patterns and feel the warmth of the sun throughout the day. In the evenings, adjusting indoor lighting to a softer, warmer glow creates a more relaxing atmosphere. By making these small adjustments, we've improved focus, reduced fatigue, and found a greater sense of connection and joy in our workdays.

Enhance Sensory Experiences

The time of day and natural light movement are key considerations in biophilic lighting design. Beyond static sunlight, incorporating dynamic layers of light, patterns, and reflections can create a more natural and engaging environment. Lighting controls are integral and allow designers to enhance sensory experiences.

Incorporating a sensory experience into design goes beyond adding a plant or custom light fixture; it's about observing growth and experiencing the time of day through light. Light intensity is not always the focus—diffused light, like moonlight, plays a role in how we feel and connect with nature, at an evolutionary level. ◎

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Lauren Schwade, LC, EDAC, Member IES, IALD, is associate principal and the Healthcare Lighting lead at Mazzetti, with over 18 years of expertise in the field. She is dedicated to crafting innovative, patient-centered solutions that elevate the health and well-being of patients, families, and healthcare staff.

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Photo: Image generated by AI/Microsoft Copilot and Microsoft Designer

IS MORE LIGHT SAFER?

Addressing the question that ruins conversations

By Jane Slade

Since I began advocating for natural darkness, there is one question that has been an incredible obstacle to awareness-creation, like a record scratching to a halt. This one question thwarts our collective thought process and subsequent understanding by immediately creating a lens of fear: *Is more light safer?*

As we struggle to create understanding of light pollution, climate change is becoming more extreme. This year, the world recorded the warmest January ever. Simultaneously, the U.S. recorded the coldest January since 1988. This radicalization of temperatures on Earth is a symptom of global warming and the melting of ancient ice caps: more water, more weather.

Not only are global temperatures breaking records, it has also never been brighter on the planet. We are currently experiencing a 9.6% year-over-year increase in sky brightness.[1] As humans have become comfortable with light and light-driven information at all hours of night, we have pushed darkness to the edges of existence, both for ourselves and wildlife.

In our own self-poisoning, we have lost sight of experiences in darkness altogether. Most of us no longer create memories underneath the night sky, which is now doubling in brightness every eight years.[1] One could perhaps think of the data bits of light-driven information as having the same impact that water has on weather: more light-driven information, more light pollution. If we cannot remember it, we can neither protect it nor cultivate it. Therefore, it is imperative that we combat our amnesia by cultivating awareness in the collective understanding of light pollution and how to solve it.

Yet there is a very specific stumbling block in our discourse around light pollution that has created chronic confusion and disagreement about best lighting practices. In my experience in project meetings with the public, planning boards, and municipalities, the question “Is more light safer?” has been a continual driver of light pollution and lower-quality lighting installations in the zeitgeist.

When posed to a diurnal species with an innate propensity to feel safety and comfort in lit environments, the question is leading. More often than necessary, it funnels out a “yes.” In addition, this nearly omnipresent question has disproportionately framed our conversations around light at night, often rerouting our thought process to unhelpful places.

The question then begs us to ask, safe from what? Immediately, we are set out on a line of inquiry based in fear, and much less to do with lighting. The mind is provoked to populate potential threats of danger, so it becomes easy to suggest adding light as a harmless solution, as framed by the question itself. Studies show that when stressors are introduced, subjects are unable to think as clearly or creatively and generally fall back on habit and intuition.[2]

A Betrayal of Intuition

This is an issue because best lighting practices are often counter-intuitive. Right now, many lighting projects default to adding more light simply because it feels safer to do so. Yet a dive into the research reveals no such simple conclusion.

Studies often show reasons why more light is not safer.

For instance, a 2015 study on street lighting in England and Wales showed that a reduction in light levels held little correlation to increases in crime or traffic accidents.[3] Furthermore, a study in Chicago revealed that when city lights went out, crime shifted to where the lights remained on.[4] Both of these examples show how our intuition has often misguided our understanding of the role of light upon safety.

Our intuition has also betrayed us to believe that light at night is innocuous. Sadly, it is not yet common knowledge that exposure to artificial light at night is abjectly not safe for many other living things. One of the most glaring omissions in the thought process created by the question "Is more light safer?" is the heartbreaking impacts upon wildlife. From impeding nocturnal pollination to contributing to the decline of a staggering 49% of bird species on the planet,[5] the lack of consideration for wildlife in our thought process is evident.

Yet light pollution is harmful for humans, too. Recent studies have shown that exposure is not only linked to cancer but also neurodegeneration and diseases like Alzheimer's.[6] When we overuse safety as a lens for lighting design strategies, we also dupe ourselves out of our own well-being. Therefore, perhaps it is the question itself that is confusing us.

More light does not always mean more visibility. This question eclipses our understanding of dark adaptation of the eye. More light than necessary interrupts this process, which can take up to an hour. Moreover, the lighting designer has many tools and strategies to create nighttime environments that build harmony with both ourselves and the natural world, even some we have not thought of yet. By constantly over-lighting, we prevent innovation in design to find better strategies that work with the eye's ability to see in lower light levels.

Currently taking place on Earth are large swaths of empty parking lots being illuminated night after night for few to zero occupants. Satellite data revealed that continuously lit spaces across the surface of Earth increased in brightness by 2.2% per year between 2012 and 2016.[7] Yet modern controls systems can easily create lighting plans with intricate dimming schedules down to a single fixture. What keeps these spaces illuminated unnecessarily, causing untold harm to ecosystems, is not an obstacle with technology. It is the thinking behind it.

Destroying the Question

Susan Sontag once said, "The only interesting answers are those which destroy the questions." If our own research reveals that adding light just to increase safety is often harmful and costly with little to no benefit for humans, then why are we letting this question inform our decisions so consistently? We could be designing spaces with much less light in terms of both intensity and duration, while creating feelings of safety and gaining back periods of essential ecological darkness. Therefore, we must ask ourselves better questions to get better results.

The question "Is more light safer?" is an obstacle to higher-quality discourse. It oversimplifies the art and science of lighting into a yes or no question and narrows the mind around answers based in fear. Its flawed trajectory repeatedly gaslights us to make ill-informed and hasty design decisions. This question arrests the progression of thought and becomes a direct barrier to the wealth of knowledge currently available on how to light more sustainably for all living things. Overall, it creates confusion around best lighting practices and generates light pollution.

As designers, the quality of our methods and tools impacts the design. If some of our tools are questions themselves, we must design the questions we work with to create the quality of discourse we need, faceted enough to hold what we already know to be true, and open enough to invite in new knowledge.

Therefore, I propose that the dangerously oversimplified question "Is more light safer?" be distilled out of our discourse in the lighting industry. When we hear this question being asked, let us actively design the discourse, redirect the question, call out how it has typically created less quality in design, and elevate the conversation with other, more open-ended and truth-seeking questions, such as:

- Is more light less safe?
- What are the downsides to more light?
- How can light decrease safety?
- How can we increase visibility?
- Is more quality lighting safer?
- What factors improve lighting quality?
- What factors improve visibility?
- Is more darkness safer?
- How can darkness increase safety?
- How can nighttime environments promote well-being?

Photo: iStockphoto/shaunl

Photo: iStockphoto/ Joshua Hochholdinger

- Does more darkness create well-being?
- What are the benefits of darkness at night?
- How can optics and controls help find balance?

Unmasking Myths

When the wrong ideas infect the collective consciousness, humanity has tried to debunk them in the past. In the 1950s, we thought that smoking was not that bad of a habit. Doctors even recommended it. Now, we maintain public outreach to constantly combat human attraction to smoking.

While the problem of light pollution is not intuitive to humans, Earth's ecosystems are not supposed to be bathed in constant light at night. When we only think in terms of safety, we completely miss the biological impacts of light. Moreover, these costly interventions of light offer very questionable improvements to safety.

It is possible to elevate our consciousness through a greater quality discourse. We must expand beyond the ideas of "more and brighter" and continually refine our dialogue based on the most current findings and strategies. The question "Is more light safer" preys upon our fears, like a tripwire within our thinking. By designing better questions, we can provoke the collective consciousness to find better answers.

Global warming is a complex issue with many contributing factors, but with light pollution, we have the unique ability to solve it right this second. As professionals in the lighting industry, we must lead the discourse so that we can lead the way out of light pollution. The irony is that reclaiming the night sky and the passive meditation it provokes would clarify our thinking and discourse too.

Left: Continuously lit spaces increased in brightness by 2.2% per year between 2012 and 2016.

Right: There remains a turning point back to the safety of the natural night.

The collective well-being is based in the ancient balance of light and darkness. The current trajectory of light pollution is haunting, but there is one blatant fact that is full of hope—Earth is still a beautiful place to inhabit here and now. There remains a turning point back to the safety of the natural night. When we think of safety, we must expand our discourse to create questions that hold more truth, and solutions that bring the most well-being for all living things. ◎

THE AUTHOR | Jane Slade, MID, LC, is a principal at Speclines in Massachusetts, a lighting manufacturer's representative agency specializing in public outdoor lighting. She is the host of the podcast *Starving for Darkness* and a recent recipient of DarkSky International's Dark Sky Defender Award.

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LIGHTFAIR 2025

PREVIEW

It's approximately one month prior to LightFair igniting the Las Vegas landscape, with global event coordinators Messe Frankfurt partnering with the IES and IALD in presenting the premier biennial architectural and commercial lighting trade show and conference. This year's event begins on Sunday, May 4 and runs through May 8, with the Exhibit Hall opening its doors from May 6 to 8.

Along with LightFair's comprehensive educational sessions and more than 200 exhibitors, the show floor will feature immersive lighting installations curated and created by lighting design studios paired with manufacturers that address the theme of "Biophilic Spaces." Each of the installations will be evaluated by a panel of judges, who will select the winners.

The Lighting Innovation Awards are open to LightFair 2025 exhibitors for products launched from May 2023 to the present and will highlight the industry's most groundbreaking products. Every submission is featured in the New Product Showcase, with awards for categories including Best Product of the Year, Design Excellence, and Technical Achievement.

LightFair will get the ball rolling with an Opening Night Reception on Tuesday, May 6, from 6 to 10 p.m. at Brooklyn Bowl. For more information about the reception, sessions, exhibitors, and awards presentations, visit *https://lightfair.us.messefrankfurt.com/us/en.html*.

THE VENUE

Photo: Las Vegas Convention Center

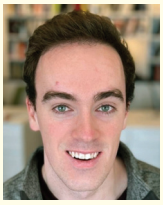
One of the largest convention centers in the world, Las Vegas Convention Center is a 4.6 million-sq-ft facility that includes 2.9 million sq ft of exhibit space and 225 meeting rooms. It sits less than 2 miles from the world-famous Las Vegas Strip, providing access to a wealth of gaming, entertainment, dining, and shopping options.

SESSION HIGHLIGHTS

This year's edition of the LightFair Conference is curated by IES Director of Education and Standards Brienne Willcock and a team of industry thought-leaders from the IES and IALD. With more than 50 sessions presented by a lineup of distinguished speakers, the conference offers opportunities to learn, ask questions, and connect with industry peers. Themes include "Industry Insights," "Light & Health," "Navigating Controls," and "Rethinking Design and Communication," among others. Below is just a sample of the highlights; the entire list of sessions is available at *https://lf2025.mapyourshow.com/8_0/sessions/#/.*

SUNDAY, MAY 4

Modern Photometric & Daylighting Software Training
Time: 9 a.m. to 3 p.m.
Presented by: Kyle Codon, AJ Gorman, and Daniel Glaser; LightStanza



An immersive all-day workshop designed to equip attendees with the skills to harness the power of LightStanza, a cutting-edge software for both photometric and daylighting analysis.

MONDAY, MAY 5

"What did you say?": Exploring the Challenges of Communicating Color Science with Others (...but especially with Building Sciences Professionals)
Time: 1 to 4 p.m.

Presented by: Kimberly Mercier, Lighting Design Innovations
Mercier will share her opinions about the likely sources of miscommunication, present ideas to smooth the communication turbulence, and suggest ways in which we can all facilitate more effective working relationships while achieving built environments that effervesce their color expression in ways that are immersive, communicative, and celebrated.

TUESDAY, MAY 6

LED Revolution Needs a Design Revolution: Replaceable Components for a Sustainable Future
Time: 12 to 1 p.m.
Presented by: Rachel Fitzgerald, Stantec; Andrea Wilkerson, Pacific Northwest National Laboratory; Anne Kustner Haser, AKLD Lighting Design



This session dives deep into data and real-world projects to advocate for a shift in LED design: prioritizing replaceable components. By embracing this shift, designers and manufacturers can solidify their reputations as responsible innovators, building trust and ensuring long-term success.

AI in Action: Successful Applications in Architectural Lighting
Time: 1 to 2 p.m.

Presented By: Shaun Fillion, RAB Lighting and the New York School of Interior Design
This course will look at realized installations that have utilized AI in architectural lighting and focus on AI's applications to adaptive lighting systems, generative

design, and predictive analysis in controls products and automated systems. It will explore where AI continues to branch into the field of architectural lighting, from calculations and analysis to generative design.

WEDNESDAY, MAY 7

Light + Materials: A Discussion on How Light Interacts with Architectural Finishes and How Other Interesting Materials Not Typically Used for Permanent Installation Might be Considered
Time: 9:45 to 10:45 a.m.

Presented by: Robert White, Illuminart
Architects and interior designers may not fully understand how lighting effects the perception of materials. Through examples from the architectural world and inspirational sources like cinema, White will attempt to broaden the comprehension of how these work together.

Energy Code Season of Change, Are You Ready?
Time: 2 to 3 p.m.
Presented by: Lee Brandt, HLB Lighting; Charles Knuffke, Wattstopper/Legrand; Harold Jepsen, Legrand



The energy codes have seen a season of change: ASHRAE/IES 90.1-2022 completed the federal termination early last spring, the International Energy Efficiency Code (IEEC) released version 2024 late last summer, and the California Energy Commission adopted the 2025 Title 24 Part 6 early last fall. This session will get you up to speed, in shape, and season ready with all the new code changes as well as provide application clarity to your lighting and lighting control project designs.

THURSDAY, MAY 8

Update: LED Lamps and Luminaires at End-of-Life
Time: 8:30 to 9:30 a.m.


Presented by: Jeffrey Schwartz, JDS1 Consulting; David Shiller, *LightNOW*
LEDs contain toxic materials such as arsenic, among dozens of others of others whose long-term effects are unknown. Despite energy savings and long life, LED lamps and luminaires are not part of a sustainable solution unless we solve the end-of-life problem. This presentation will address the problem, LED recycling progress made since the 2023 presentation, and overall efforts to make luminaires more sustainable through the use of recyclable materials.

VEGAS "LIGHT"LIFE


Photo: Fantasy Lab

The well-publicized bright lights and busyness of Sin City might seem like sensory overload, but exploring Las Vegas after dark offers the ability to witness marvels of illumination. If you're looking to scratch famous landmarks off your bucket list, consider visiting Sphere and its 580,000-sq-ft, fully-programmable LED exterior, as well as interior shows and experiences (*LD+A*, February 2024). For an experience more romantic in spirt, venture to the Fountains of Bellagio after dark to watch more than a thousand illuminated fountains sway to music, with water soaring as high as 460 ft into the air.

For those who enjoy paths less traveled, consider Fantasy Lab's 20,000-sq-ft Colors of Mexico exhibit, which is located inside the Fashion Show Mall. This experience is free to the public and immerses guests in the rich traditions of Mexico through colorful visual displays, interactive exhibits, authentic Mexican food and drinks, and a selection of artisanal Mexican merchandise.

PROJECT IN PICTURES

Bubbles and Fizz

Seductive and charming, **Perlage** is an after-hours destination on Al Maryah Island in Abu Dhabi, UAE, with cheeky cocktails like "How 'Bout Them Apples" and "Tickle Fancy." The bar takes its name from the French term for the bubbles in champagne, while the interior design by Verhaal and lighting design by **Studio Lumen** take cues from the fizzy theme. The all-LED system invites guests on a visual journey through a warmly lit hallway to a softly illuminated velveteen seating area that evokes a vintage allure while providing glare-free comfort and various photo opportunities. Partner at Studio Lumen Siddharth Mathur said, "The lighting at Perlage is more than functional—it's a storytelling element that brings depth and character to each corner of the space. We wanted to create an experience that feels both intimate and alive, where lighting interacts playfully with architectural details and decorative elements to create a visually memorable journey."

Photos: Natalee Cocks

A mirror-ball installation plays on the circular theme of bubbles and **throws diamond-like light refractions throughout the main space**.

Fixtures are carefully positioned to allow for **visual comfort and a photogenic atmosphere**.

LED luminaires enhance the venue's sustainability and **blend with the interior décor**.

Subtle illumination where guests enter the venue highlights murals and mirror walls.

IES INSIDER

Photo: Pier 27

San Francisco Gears-Up for Light! Design Expo 2025

The IES San Francisco Section's Light! Design Expo returns to Pier 27 on San Francisco's Embarcadero on June 12, 2025. The annual exposition showcases the latest in architectural lighting products, attracts a wide range of design professionals, and is the only architectural lighting products show in Northern California. The event is free for the architecture and design community and presents an opportunity to network as well as see and experience the latest architectural and decorative lighting products.

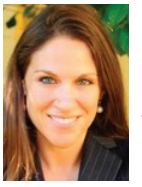
Light! Design Expo will include four free seminars that are AIA/LU-, IDECEC/CEU-, and/or IES/CEU-accredited classes. Attendees may enjoy complimentary cuisine from local food trucks, dessert carts, and coffee throughout the show floor.

A project exhibition gallery of current local lighting projects featuring the collaborative work of local designers and manufacturers will be on display throughout the event. To inquire about submitting your favorite San Francisco Bay Area project images, contact Linda@LightDesignExpo.com by May 16, 2025.

MEMBER MENTIONS

Kevin Frary has joined **HLB Lighting Design** as director in Seattle.

Patrick Mihalik has been promoted to associate principal, lead lighting designer with **Newcomb & Boyd**.



Mimi Adams has been promoted to associate product manager at Halco Lighting Technologies.

Rachel Fitzgerald has been promoted to senior principal, discipline lead, lighting at Stantec.

Timothy Huth has been promoted to senior associate with LUMA Lighting Design.

Bold = Individual or Sustaining Member

IES ILLUMINATION AWARDS

2025 CALENDAR

JAN 2-24 | EARLY SUBMISSION
Deadline 11:59pm EST (Early bird submission fee: Members $265 / Non-Members $365)

JAN 25-FEB 21 | REGULAR SUBMISSION
Deadline 11:59pm EST (Regular submission fee: Members $320 / Non-Members $420)

FEB 24-MARCH 10 | SECTION IA CHAIR PROCESSING
- Section IA Chairs will review submissions forcompliance of rules and guidelines
- Projects that comply with the rules of theprogram will move onto Merit Judging

MAR 24-APR 21 | ONLINE MERIT JUDGING
- Eligible projects receiving sufficient scores during online judging receive an Award of Merit
- Projects receiving exceptionally high scores will move to final, society level judging

EARLY MAY | LIVE FINAL ROUND JUDGING
- Eligible projects passing the online phase are judged during live, society level final judging
- Final judging determines the highest level of Society awards including Special Citation,
- Award of Excellence, or Award of Distinction
- If projects do not score high enough at this level, they retain their Award of Merit

EARLY JUNE | AWARD RECIPIENT NOTIFICATION

Local Section Judging will be conducted at the discretion of Section IA Chair timeline.

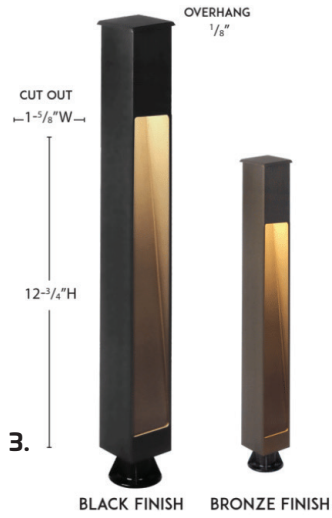
ILLUMINATION AWARDS

2024 Award of Distinction | Perelman Performing Arts Center | New York, NY USA | Lighting Design by Tillotson Design Associates | Photo © Iwan Baan

PRODUCTS

1.

2.



3.

4.

1. iGuzzini introduces the Clan Mini, a wireless and rechargeable table lamp. The aluminum, round fixture, based on the original Clan luminaire designed in the 1950s, embraces avant-garde design while providing dimmable horizontal and vertical illumination. Clan Mini offers three color temperature options including 2200K, 2700K, and 3000K.
www.iguzzini.com

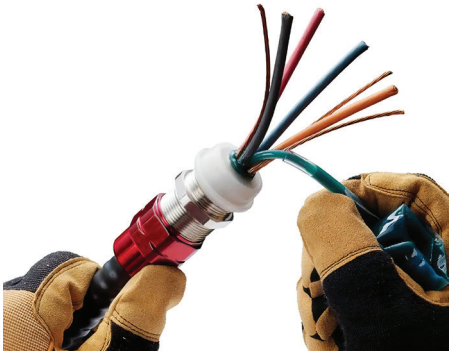
2. Ventilux announces Galaxy 2 for a modern emergency lighting solution in warehousing, data centers, residential, and educational applications. Made with a high-impact polycarbonate housing, the IP65- and IK10-rated fixtures are ready for indoor and outdoor environments and deliver 2,250 lumens regularly and 200 lumens in "emergency" mode. Galaxy 2 includes two 20-millimeter conduit side entry points for easy installation.
www.ventilux.com

3. Lightcraft Outdoor debuts a new bollard path light model: AP-318B. Made with solid brass and a high-temperature ceramic socket, the serviceable walkway bollards are 2 in. wide by 18 in. high and available in black and natural bronze finishes guaranteed not to chip or flake. A 12-in. heavy duty stake is included with the fixture.
www.lightcraftoutdoor.com

4. Acclaim Lighting introduces Unity S1, an outdoor-rated floodlight. With dynamic white light ranging from 1800K to 6000K and RGBAL color mixing, fixtures produce up to 5,800 lumens while consuming 160 watts. Available in black, grey, and white finishes, Unity S1 can perform in temperatures ranging from -40 to 125 deg Fahrenheit, is 3G-rated for high vibration and bridge applications, and is wireless and wired-project compatible.
www.acclaimlighting.com

5. Maxim Lighting unveils the Cestino Collection with hand-woven natural rattan. With an artisanal aesthetic and hand-painted metal finishes such as

5.



6.

Antique Brass to go with neutral rattan tones (pictured) and Weathered White to match rattan of the same name, pendants include 1-light, 4-light (pictured), or 5-light options. The collection additionally features 1-light flush mount and 1-light wall sconce variations. *www.maximlighting.com*

6. Appleton announces TMC2X cable glands for a cost-efficient way to connect jacketed metal clad (MC) electrical cables in hazardous industrial locations. With a two-piece construction, the accessory comes with RapidEx liquid resin sealing compound that sets in minutes and allows contractors to ground armor and seal the outer jacket in one action. An "O" ring face seal provides IP68- and NEMA 4X-rated protection in corrosive environments. *www.appleton.emerson.com*

SPOTLIGHT Luminaire LED

Luminaire LED introduces the Vandal Resistant Panel (VRP). IK10 rated to resist impact and IP66 rated for water and dust, fixtures are offered with a lifetime-rated warranty against vandalism and are ready to perform under the harshest conditions in unmonitored locations, educational facilities, and travel hubs. Fixtures with concealed tamper-resistant hardware are available in four sizes, and multiple antimicrobial finishes offer lumen outputs up to 10,000 in static white in CCT options ranging from 2700K to 5000K. VRPs comply with BAA and BABA. *https://luminaireled.acuitybrands.com*

PRODUCTS

7. DMF Lighting unveils PhaseX, an advanced tunable-white lighting solution developed for custom integration channels in residential projects of any scale. With the ability to individually control up to 64 PhaseX-enabled DMF Artafex 2-in. and 4-in. fixtures, circadian rhythms, and scenes—as well as pair with Creston Home OS—this gateway solution brings dynamic design to projects beyond ultra-high-end applications.
www.dmflighting.com

7.

8. Eureka debuts the dimmable Junction luminaire, featuring linear "arms" that pivot around a central mast to form airy chandeliers in numerous configurations. Up to five arms in 4-, 6-, or 8-ft lengths can be positioned either 6 or 12 in. apart; the final product can deliver up to 23,300 lumens of downlight or 29,600 lumens of uplight. Available in 16 colors in textured or satin metallic finishes, Junction includes a U-shaped diffuser for subtle depth.
www.eurekalighting.com

8.

9. Litetronics announces the Linear High Bay Pro for big-box retail and industrial applications. With a proprietary patent-pending, all-in-one, 120-to-480-V driver, luminaires support low-voltage and high-voltage applications and offer two beam patterns (in 45-by-100 deg and 90-by-90 deg) accessible via user-friendly lens rotation. High bays have an average life of 100,000 hours in standard settings and include a 10-year warranty.
www.litetronics.com

9.

10.

10. MechoShade System and **GO OPV** unveil a motorized, printed semiconductor shade, the ORENgE-powered ElectroShde, with NEC standards for Class 2 direct DC emission power and light absorption to reduce carbon footprint from heat gain reduction. With a semi-transparent design to enhance a project's aesthetic, the shade's self-powered semiconductor films generate enough energy to leverage 24/7 DC battery storage solutions when used alone, or it can be paired with low-voltage DC PoE for power and data distribution. Shades utilize multi-banded rollers up to 72 in. wide and 120 in. tall.
https://mechoshade.com

SUSTAINING MEMBERS

The following companies have elected to support the Society as Sustaining Members, which allows the IES to fund programs that benefit all segments of membership and pursue new endeavors, including education projects, lighting research and recommended practices.*

CHAMPION

AcuityBrands.
COOPER Lighting Solutions
signify
sonepar Powered by Difference

AMBASSADOR

Current

BENEFACTOR

HLB Lighting Design
LUMA Lighting Design/ PAE Engineers
Lutron Electronics
Musco Lighting
P2S, Inc.
Rosendin Electric, Inc.
SOSEN USA, Inc.
USAI, LLC

SUPPORTER

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A.L.P.
BK Lighting
Cannon Design
Cree Lighting
DLR Group
Duke Energy Co.
ETC, Inc.
Evluma
GE Lighting, a Savant Company
Hapco
H.E. Williams, Inc.
HP Engineering
iGuzzini Lighting USA
IMEG Corp
Integrated Design Solutions
Kenall Mfg. Co.
Kurtzon Lighting
L Design Studio, LLC
Landscape Forms
Legrand
Leotek Electronics, LLC
Lighting Services, Inc.
LMPG
LSI Industries, Inc.
LumenWerx, Inc.
Ministère des Transports du Québec
RAB Lighting, Inc.
Radiant Vision Systems
Reveal Design Group
Satco Products, Inc
Spitzer Lighting
Targetti USA, Inc.
Tresco Lighting
Visa Lighting
WSP USA, Inc.
Zumtobel Lighting

*Contributor Sustaining Members are listed at *www.ies.org*.

THE IES WELCOMES THESE NEW SUSTAINING AND UNIVERSITY MEMBERS

- ALUZ
- Sazan Group

Whether you are a manufacturer, utility company, distributor, sales agency, engineering firm, architectural firm, or any other professional or technical business that engages with lighting, each organization can pick and choose levels of benefits and discounts for their company employees directly—and in certain cases, non-employees' partners, as well—furthering the reach to a larger group of professionals. The complete new Sustaining Membership structure (including the tax deduction levels) is listed at: **www.ies.org/membership/ies-sustaining-membership**.

Education institutions that have dedicated lighting programs as well as those higher learning institutions that focus on "lighting" in their curriculums qualify for the University Membership. For more information on program benefits go to: **www.ies.org/membership/ies-university-membership**.

President's Perspective

(*continued from p. 8*)

relighting effort for my Los Angeles communities. I believe we can organize a united industry response that both benefits my neighbors' rebuilding efforts while elevating and strengthening our organizations and membership, all without being a drain on your staffs or a distraction to your core missions. This is not the first mass-loss event, nor will it be the last. Our local efforts can become a template for future community responses. In that sense, the work ahead in Los Angeles carries global importance and value that our industry can benefit from investing in.

Cy and many others who have reached out to offer a helping hand are a solid example of what our Society is all about: Bringing together experts in lighting and translating their knowledge into actions that benefit everyone. Our members' dedication in their local sections helps us build community; our section meetings and activities bring another layer of cohesion to our Society. To get involved in the relief efforts, please visit *https://www.lightforla.org.*

AD INDEX

The companies listed below would like to tell you more about their products and services. To learn more, access the websites listed here.

COMPANY	WEBSITE	PAGE #
ALUZ Lighting	www.ALUZ.lighting	2
Brandon Industries	www.brandonindustries.com	23
Elemental LED	www.elementalled.com	1
Klus Lighting	www.klusdesign.com	24
Landscape Forms, Inc.	www.landscapeforms.com	5
Meteor Illumination Technologies, Inc.	www.meteor-lighting.com	Cover 4
Quanta Light	www.quantalight.com	53
SPI Lighting, Inc.	www.spilighting.com	Cover 2
TNT Industries US, Inc.	www.tntind.us	9
UL Verification	www.ul.com/services/verification	18

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CLASSIFIEDS

Manière De Voir, a retailer bridging the gap between high fashion and streetwear, opened an over 5,100-sq-ft flagship store above the Bond Street Tube station in London with crisp lighting and a minimalist aesthetic. Linear luminaires and track fixtures with 90 CRI by Light Forms provide a look congruent with the brand's identity as well as a true reflection of the color and texture of the clothing on display.

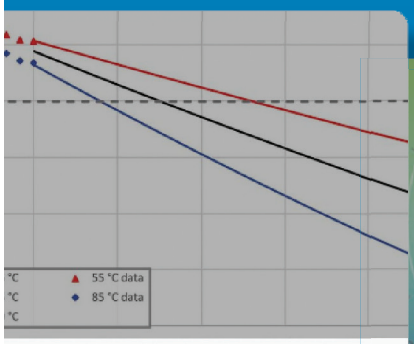
Photo: Courtesy of Light Forms

LAST LOOK

So Fresh and So Clean

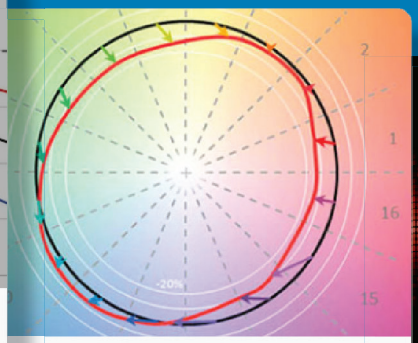
NOW AVAILABLE!

Introducing the new IES Standards Toolbox, featuring resources and tools that support your efforts to enhance your lighting knowledge, work more efficiently and stay updated on the very latest lighting standards and guidelines.



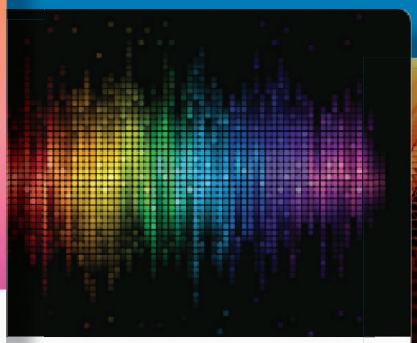
TM-21 Calculator

The official IES TM-21 calculator projects luminous flux maintenance based on the 2021 American National Standard, approved and maintained by the IES Testing Procedures Committee.



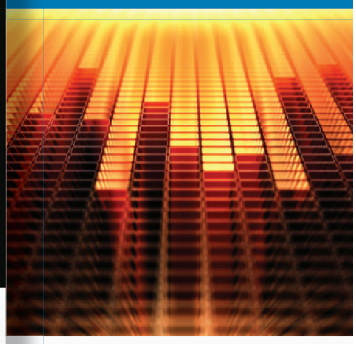
TM-30 Spectral Calculator

The official IES TM-30 calculator provides values and creates vector graphics based on the 2021 American National Standard, approved and maintained by the IES Color Committee.



The Illuminance Selector

The IES Illuminance Selector is a search tool developed to provide fast access to critical lighting criteria from over 25 tables published in ANSI/IES Recommended Practice Standards.



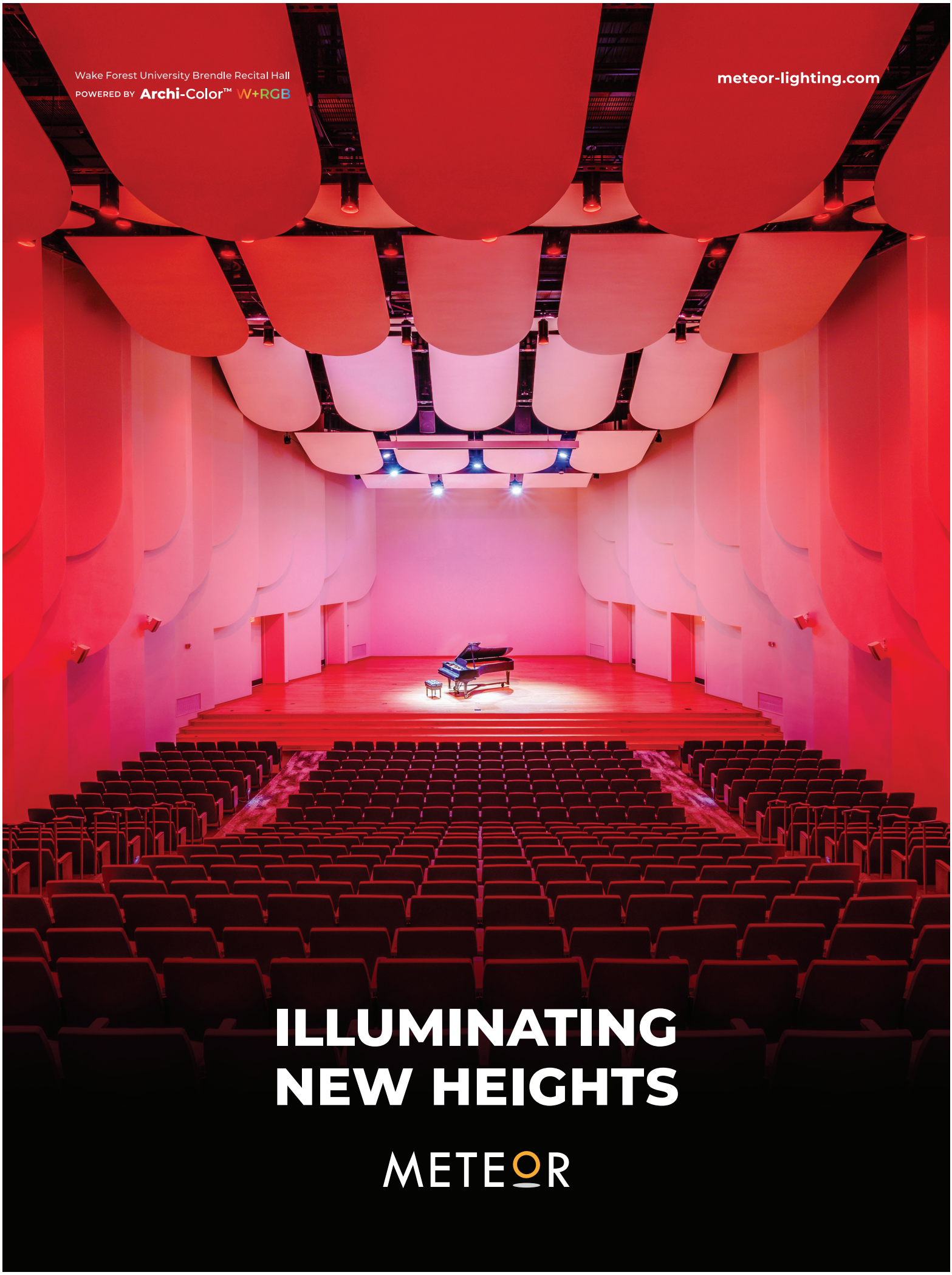
IES Reference Retriever ‡

The IES Reference Retriever is a catalogue of all documents, articles, publications and studies that are referenced throughout IES standards, searchable by title, topic, keyword, author or date.

‡ Available for IES Members only.

Illuminating ENGINEERING SOCIETY

Access the IES Standards Toolbox at **ies.org/tools**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meteor-lighting.com
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NEW HEIGHTS
METEOR