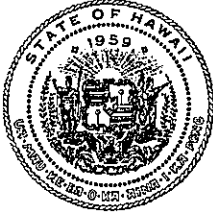


**SB 1493**



NEIL ABERCROMBIE  
GOVERNOR

RICHARD C. LIM  
INTERIM DIRECTOR

## DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

No. 1 Capitol District Building, 250 South Hotel Street, 5th Floor, Honolulu, Hawaii 96813  
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804  
Web site: [www.hawaii.gov/dbedt](http://www.hawaii.gov/dbedt)

Telephone: (808) 586-2355  
Fax: (808) 586-2377

Statement of

**RICHARD C. LIM**  
Interim Director

Department of Business, Economic Development & Tourism  
before the

**SENATE COMMITTEES ON ENERGY AND ENVIRONMENT**

**AND**

**ECONOMIC DEVELOPMENT AND TECHNOLOGY**

Thursday, February 24, 2011

2:45 p.m.

State Capitol, Conference Room 225

in consideration of

**SB 1493**

**RELATING TO LIGHT POLLUTION.**

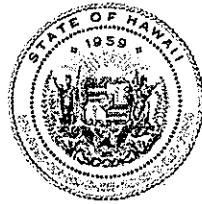
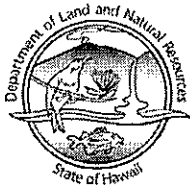
Chairs Gabbard and Fukunaga, Vice Chairs English and Wakai, and members of the Committees. The department supports the intent of SB 1493 to minimize glare and light pollution in Hawaii's night skies.

Our department convened a Starlight Reserve Committee in July of 2010 to study the impacts of nighttime light pollution statewide and provide recommendations for a Starlight Reserve Strategy that would address these issues. The chairman of this committee, Dr. Richard Wainscoat, is providing testimony today on SB 1493, and we defer to the recommendations in his testimony with regard to this measure, with the additional requests that (1) "nighttime film production

activity” be added to the lighting exemptions listed under section 2, part “b” of this measure; and  
(2) care be taken to ensure that this bill does not weaken existing county ordinances that mandate full shielding of outdoor lighting.

Thank you for the opportunity to testify on this bill.

NEIL ABERCROMBIE  
GOVERNOR OF HAWAII



**STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES**

POST OFFICE BOX 621  
HONOLULU, HAWAII 96809

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INTERIM CHAIRPERSON  
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KAHOOLAWE ISLAND RESERVE COMMISSION  
LAND  
STATE PARKS

**Testimony of  
WILLIAM J. AILA, JR.  
Chairperson**

**Before the Senate Committees on  
ENERGY AND ENVIRONMENT  
AND  
ECONOMIC DEVELOPMENT AND TECHNOLOGY**

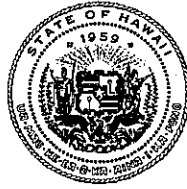
**Thursday, February 24, 2011  
2:45 PM  
State Capitol, Conference Room 225**

**In consideration of  
SENATE BILL 1493  
RELATING TO LIGHT POLLUTION**

Senate Bill 1493 proposed to require the use of shielded lights for all new outdoor lighting fixtures. While the Department of Land and Natural Resources (Department) supports the intent of this bill, the Department nonetheless defers to the Department of Transportation on its implementation.

The use of artificial lighting serves the essential purpose of providing safety and security, and facilitates many of the routine activities of society. However, artificial lighting also affects biological and cultural resources by impacting wildlife populations and interfering with night sky viewing. The excessive use of artificial lights also contributes to wasted consumption of energy resources and exacerbates global climate change.

Adoption of this measure is an important step to reduce the negative impacts of artificial lighting on cultural and natural resources. This legislation is one of the initial recommendations of the Starlight Reserve Advisory Committee, which was established by Act 161 of the 2009 Legislature to examine issues related to artificial lighting and recommend workable solutions to reduce the negative impacts of lighting on natural resources and related activities.



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
869 PUNCHBOWL STREET  
HONOLULU, HAWAII 96813-5097

February 24, 2011

TESTIMONY OF THE DEPARTMENT OF TRANSPORTATION

SENATE BILL NO. 1493

COMMITTEE ON ECONOMIC DEVELOPMENT & TECHNOLOGY  
COMMITTEE ON ENERGY AND ENVIRONMENT

The Department of Transportation opposes the bill in its current form.

The Department, as it testified earlier before House Committees, has already taken steps, over the past years, to provide the higher or more stringent lighting fixtures in counties within the State but those efforts were and have been done over time under planned and programmed projects.

The Department's actions reflect our effort to meet the intentions of the bill. However, we have several concerns and reservations on the present bill.

To implement new lighting projects and change outs through maintenance or repairs, the Department believes it should be done in a well coordinated and consistent program, within the State and among and between the counties that is be properly planned and budgeted, especially because of the constrained resources and funding now facing the Department.

Such coordination may even include involved scientific and environmental parties that have knowledge and expertise of locations where special considerations for priority of lighting needs may be needed, such as for astronomy or natural habitats purposes. These considerations need to be balanced with the needs for maintaining or improving transportation safety in the three principal modes the DOT is responsible for – Airports, Highways and Harbors.

Name  
Date  
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Letter Number

The views of the public may also be desired. Committee members may want to recall the experience the City and County of Honolulu had with the outcry from Hawaii Kai residents when the community found out that many more light poles were being installed on the streets because of new lighting fixtures.

The bill's effective date imposes an immediate and sooner compliance on the entire and all of DOT's airport, highway and harbor facilities and does not provide a window to effectively plan, program and budget the change outs.

The bill does provide some exemptions but does not reflect full consideration of all the other various types of outdoor lighting the DOT is obligated to have at or required to impose on users and occupants of its transportation facilities.

The bill needs to be coordinated and in synergy with the lighting bills now being heard in by certain House Committees.

There is also a need to have some form of uniformity in terminology and nomenclature in any state law or county ordinance that is consistent within the State and between the counties, as well as with engineering society and industry language and standards, to avoid misinterpretations and difference of opinions. For example, the County of Hawaii uses the term "shielded." The City & County of Honolulu prefers to use the term "cut-off".

The bill relies on the recommendations from International Dark Sky Association (IDA) and the Illuminating Engineering Society of North America (IES) used in supporting the night sky efforts. However, we are under the impression that the positions taken have not been vetted with the American Association of State Highway Transportation Officials (AASHTO) and federal airport and harbor transportation agencies. If the IDA and IES positions and recommendations have not been discussed with these transportation entities, then we feel they should. Because our Department is obligated to follow and adhere to the guidelines and regulations promulgated by these transportation organizations, the DOT recommends that such discussions take place so that the DOT will not be caught in the middle. For example, our earlier testimony was reinforced in House testimony by the City & County of Honolulu which stated that more restrictive lighting

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could require changing the spacing of lighting poles that would be “impractical and prohibitively expensive.”

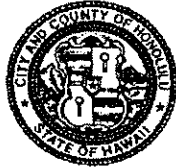
There are more technical engineering and scientific standards and specifications that need to be shared, discussed and collaboratively worked on by the affected parties to make progress in applying the night sky lighting effort to the existing transportation systems. Such collaboration allows for new and emerging technical advances in lighting to be reviewed and discussed before being used in the field and permanently installed.

The Department understands that the Starlight Reserve Committee may not have completed all of its work as only three or four meetings were held, and that there is a bill now in the Senate to extend the Committee to the year 2013. We believe this extension presents an opportunity to clarify and resolve such matters we have just described, and gives time for the Committee to do the various inter-agency coordination needed to develop a night sky strategy.

The Department of Transportation stands ready to continue its participatory work with the Starlight Reserve Committee. The Department also is committed to provide proper lighting, but recommends that the process to address improvements to the night sky conditions and requirements be done with further coordination and discussions among all the affected parties and agencies.

**DEPARTMENT OF DESIGN AND CONSTRUCTION  
CITY AND COUNTY OF HONOLULU**

650 SOUTH KING STREET, 11<sup>TH</sup> FLOOR  
HONOLULU, HAWAII 96813  
Phone: (808) 768-8480 • Fax: (808) 768-4567  
Web site: [www.honolulu.gov](http://www.honolulu.gov)



PETER B. CARLISLE  
MAYOR

COLLINS D. LAM, P.E.  
DIRECTOR

LORI M. K. KAHIKINA, P.E.  
DEPUTY DIRECTOR

February 22, 2011

The Honorable Mike Gabbard, Chair  
and Members  
Energy and Environment Committee  
The Honorable Carol Fukunaga, Chair  
and Members  
Economic Development and Technology Committee  
State Capitol  
Honolulu, Hawaii 96813

Dear Chairs Gabbard and Fukunaga, and Members:

Subject: Senate Bill No. 1493, Relating to Light Pollution

The Department of Design and Construction (DDC) supports the intent of SB1493 and respectfully offers the following comments to improve the clarity of the bill and the practicality of implementing it:

1. The proposed bill indicates that, "Every new and replacement outdoor light fixture, whether commercial or residential shall be fully shielded..." It is unclear whether or not the bill would apply to City facilities that are neither commercial nor residential. The bill should explicitly state that it applies only to residential and commercial facilities on private property if this is the intent, and that government facilities that are neither commercial nor residential are exempt.
2. We recommend the term "fully shielded" be revised to "full-cutoff" for consistency with the terminology defined in the Illumination Engineering Society (IES) illumination standards, which are used by the City (excerpt enclosed).
3. A qualification to replacement of outdoor light fixtures with full-cutoff ("fully shielded") fixtures is needed to specify that an inoperable lighting fixture shall be replaced with a full-cutoff lighting fixture that provides equal or better illumination and uniformity as recommended by the Illuminating Engineering Society of North America (IES). If such fixture is not available for the existing light pole spacing, a non-complying fixture that meets the IES illumination and uniformity design criteria shall be allowed. At some locations, full-cutoff light fixtures may not be capable of providing the IES standard of illumination, used by the City & County of Honolulu, with the existing light pole spacing. Replacement of existing light poles with more closely spaced light poles in order to satisfy both the illumination and shielding requirements due to a single inoperable fixture would be impractical and prohibitively expensive.



The Honorable Mike Gabbard, Chair  
and Members  
Energy and Environment Committee  
The Honorable Carol Fukunaga, Chair  
and Members  
Economic Development and Technology Committee  
Page 2  
February 22, 2011

4. An additional exemption should be provided for athletic facilities, such as ballparks. At City baseball and softball fields, balls can typically be hit higher than the elevation of light fixtures. With full-cutoff light fixtures installed, such balls would disappear into the night sky until they fell at high speed back into the lit space. This could result in a difficult and hazardous situation for ballplayers that would lose sight of balls hit high in the air and be unable to track them.

Thank you for the opportunity to testify.

Very truly yours,

  
for Collins Lam, P.E.  
Director

CDL:WB:hm

Enclosure

RP-8-00  
Reaffirmed  
2005

# Roadway Lighting

IES

The  
LIGHTING  
AUTHORITY



Upward light from a luminaire or lighting system must be evaluated. Such light generally adds to sky glow and wastes energy. Unless it is desirable in an urban area, it should be minimized.

**2.4.2 Luminaire Cutoff Classifications.** Luminaire distribution (see Figure 1) is described by the following terms:

**Full Cutoff:** A luminaire light distribution where zero candela intensity occurs at or above an angle of 90° above nadir. Additionally the candela per 1000 lamp lumens does not numerically

exceed 100 (10 percent) at or above a vertical angle of 80° above nadir. This applies to all lateral angles around the luminaire.

**Cutoff:** A luminaire light distribution where the candela per 1000 lamp lumens does not numerically exceed 25 (2.5 percent) at or above an angle of 90° above nadir, and 100 (10 percent) at or above a vertical angle 80° above nadir. This applies to all lateral angles around the luminaire.

**Semicutoff:** A luminaire light distribution where the candela per 1000 lamp lumens does not

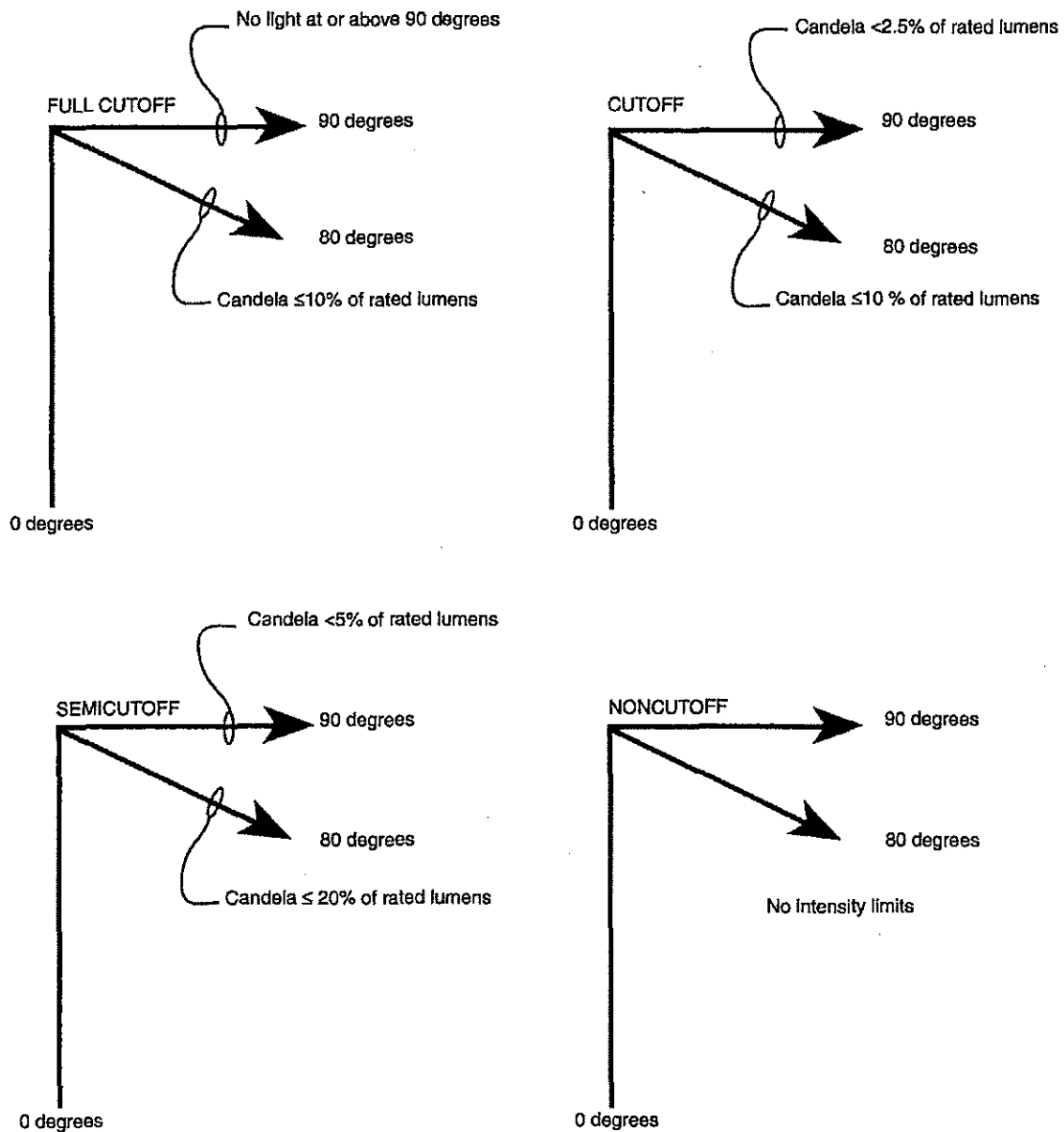


Figure 1. Four different cutoff classifications.

numerically exceed 50 (5 percent) at or above an angle of 90° above nadir, and 200 (20 percent) at or above a vertical angle 80° above nadir. This applies to all lateral angles around the luminaire.

**Noncutoff:** A luminaire light distribution where there is no candela limitation in the zone above maximum candela.

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### 3.0 DESIGN CRITERIA

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This Standard Practice includes three different criteria for use in continuous roadway lighting design. These are illuminance, luminance, and STV. The designer should be familiar with all of these criteria in order to decide which one best addresses the needs of the particular project. Calculation procedures and additional information about these methods are included in the **Annexes**. Consideration should also be given to glare and sky-glow issues stated in **Section 4.6**. For issues about light trespass see IESNA TM-10, *IESNA Technical Memorandum Addressing Obtrusive Light (Urban Sky Glow and Light Trespass) in Conjunction with Roadway Lighting*.

The recommended design values, as well as the uniformity ratios as shown in **Tables 2, 3, and 4**, represent the lowest maintained values for the kinds of roadways and walkways in various areas. Numerous installations have been made at higher values. Furthermore, the design values can be made using different combinations of luminaire light distribution, lamp sizes, mounting heights, spacings, and transverse locations. These figures do not represent *initial* readings, but the lowest *in-service* values of systems designed with the proper light loss factor. When design values for continuous roadway lighting vary due to changes in the road or area classification no special transitions are necessary.

This document follows the guidelines of IESNA LM-67-94, *Calculation Procedures and Specification of Criteria for Lighting Calculations*.

#### 3.1 Illuminance Criteria

The illuminance method of roadway lighting design determines the amount of light incident on the roadway surface from the roadway lighting system. Because the amount of light seen by the driver is the portion that reflects from the pavement towards the driver, and because different pavements exhibit varied reflectance characteristics, different illuminance levels are needed for each type. The illuminance criteria gives recommendations for average maintained lux for various road and area classifications depending on the pavement

type used. The recommended illuminance values and the uniformity ratio are in **Table 2**. Veiling Luminance Ratios, derived from the luminance calculation method, must also be determined to avoid a lighting system that produces disability glare. (See **Table 2**.)

#### 3.2 Luminance Criteria

The luminance method of roadway lighting design determines how "bright" the road is by determining the amount of light reflected from the pavement in the direction of the driver. The luminance criteria is stated in terms of pavement luminance, luminance uniformity, and disability veiling glare produced by the lighting system. **Table 3** provides the recommended luminance design requirements, uniformity and the relationship between average luminance ( $L_{avg}$ ) and the veiling luminance ( $L_v$ ).

#### 3.3 Small Target Visibility (STV) Criteria

The STV method of design determines the visibility level of an array of targets on the roadway considering the following factors:

- (a) The luminance of the targets
- (b) The luminance of the immediate background
- (c) The adaptation level of the adjacent surroundings
- (d) The disability glare

The weighted average of the visibility level of these targets results in the STV. The values of STV are included in **Table 4** as well as uniformity ratios and luminance requirements for mitigating the effect on approaching headlights. The veiling luminance ratio component is included in the STV calculation methodology.

#### 3.4 High Mast Lighting

Ordinarily, conventional lighting along streets and highways involve mounting heights of 15 meters (49.2 ft.) or less. Poles of 20 meters (65.6 ft.) or greater height have been utilized in several situations:

- Large parking lots - such as regional shopping centers, and stadiums
- Interchanges and complex intersections in both urban and rural areas and tangent sections with more than six lanes

Opinions differ on whether light levels can be lower when high mast lighting is used, compared with the use of conventional poles of 15 meters (49.2 ft.) or less. Typically, the surround conditions are more uniform with the high mast design and, seeing is easier. Prior editions of ANSI/IESNA RP-8 have allowed lower



# UNIVERSITY OF HAWAII SYSTEM

## Legislative Testimony

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Written Testimony Presented Before the  
Senate Committee on Energy and Environment  
Senate Committee on Economic Development and Technology  
Thursday, February 24, 2011 at 2:45 p.m.

by

Virginia S. Hinshaw, Chancellor

and

Richard J. Wainscoat

Astronomer, University of Hawai'i at Mānoa

Chair, Light Pollution Working Group, International Astronomical Union

### SB 1493 – RELATING TO LIGHT POLLUTION

Chairs Gabbard and Fukunaga, and members of the Committees. My name is Richard Wainscoat and I am here today to submit this testimony on behalf of the University of Hawai'i. The University of Hawai'i strongly supports this bill that will require full shielding of new and replacement bright lights in Hawai'i.

Mauna Kea on the island of Hawai'i, and Haleakalā on the island of Maui, are two of the best astronomy sites in the world. Dark night skies are essential for these observatories to continue to operate. However, increasing urban lighting is threatening the dark night skies over these observatories. Light pollution extends well beyond county boundaries; lights from O'ahu have a major and growing impact on Haleakalā, and also affect Mauna Kea. Statewide legislation is needed to protect the observatories.

Astronomy in Hawai'i has a major economic impact. The present economic impact of astronomy is estimated to be \$150 to \$200 million per year.

Full shielding of lights is one of the most important techniques for protecting astronomical observatories from light pollution. Light emitted from poorly shielded fixtures at small angles above the horizontal travels enormous distances through the atmosphere, and is a major contributor to light pollution — it increases sky glow at remote locations, making it difficult or impossible to see faint objects. Fully shielded light fixtures emit no light above the horizontal, and therefore have much less impact on remote locations.

Full shielding also reduces glare, which is a very important safety factor, particularly for older drivers, and greatly reduces the impact of nighttime lighting on species that are affected by light at night, including endangered birds and turtles.

The University recommends that the scope of the bill be extended to cover all lighting in Hawai'i. The present wording mentions only private and business lighting. Poorly designed and improperly shielded lights continue to be installed by government agencies, and a quick inventory of nighttime lighting shows that some of the worst lighting is county and state lighting.

The University recommends that an exemption be added that allows a small amount of direct uplight from recreational lighting when use of fully shielded lighting is impractical. Illumination of some recreational facilities, such as Aloha Stadium, would be very difficult using fully shielded fixtures; this exemption will result in long-term reduction in light pollution produced by facilities such as Aloha Stadium. When lights need to be replaced, they will be replaced by new more energy efficient and better shielded fixtures, resulting in energy savings of approximately 40%.



# Sierra Club Hawai'i Chapter

PO Box 2577, Honolulu, HI 96803  
808.538.6616 hawaii.chapter@sierraclub.org

## SENATE COMMITTEE ON ENERGY & ENVIRONMENT SENATE COMMITTEE ON ECONOMIC DEVELOPMENT AND TECHNOLOGY

February 24, 2011, 2:45 P.M.  
(Testimony is 1 page long)

### TESTIMONY IN SUPPORT OF SB 1493

Aloha Chair Gabbard, Chair Fukunaga, and Members of the Committees:

The Hawai'i Chapter of the Sierra Club, with 8,000 dues-paying members and supporters, **supports** SB 1493. This measure requires most new lighting fixtures to be full-cutoff or semi-cutoff fixtures.

While this measure appears primarily geared toward reducing energy consumption, reducing unnecessary light pollution will also have an environmental benefit. Artificial lighting can adversely impact the nesting and feeding behaviors of birds and marine life.

Every year, thousands of baby birds (fledglings) leave their nests for their first flight to the ocean. Many of them are disoriented by bright night-time coastal lights, often scenic ocean spotlights in residential coastal communities but also airport and facility lights. After flying to exhaustion (or collision) and falling to the ground, exhausted fledglings are extremely susceptible to predation.

Adult seabirds, including the endangered Hawaiian petrel (*Pterodroma sandwichensis*) and the threatened Newell's shearwater (*Puffinus auricularis newelli*), also suffer the negative impacts of artificial night lighting. The wedge-tailed shearwater (*Puffinus pacificus*), while not yet listed as threatened or endangered, is protected under the Migratory Bird Treaty Act and adversely impacted by artificial night lighting. These protected seabirds are found in many areas throughout the State and transit coastal areas that are fully developed. In addition to protecting Hawaii's native and endangered species, residents and visitors alike share a great appreciation of dark Hawaiian skies for stargazing—and romantic walks along the moonlit beach.

Thank you for the opportunity to testify.



## International Dark-Sky Association

*"...to preserve and protect the nighttime environment and our heritage of dark skies through environmentally responsible outdoor lighting."*

3225 North First Avenue  
Tucson, AZ 85719, USA  
tel +1.520.293.3198  
fax +1.520.293.3192  
www.darksky.org  
ida@darksky.org

To Whom it Concerns:

**Executive Director**  
Bob Parks

**Emeritus**  
David L. Crawford, PhD

The International Dark-Sky Association asserts its strong support for Hawaii S.B. 1493: A Bill for an Act Relating to Light Pollution. The State of Hawaii is custodian to one of the most pristine astronomical viewing locations in the world and the Hawaiian archipelago supports unique or endangered species found nowhere else on earth. Both conditions are directly affected by the use of excessive artificial light at night. The establishment of legislation to shield outdoor private and commercial outdoor lighting fixtures and direct light below the horizontal plane is vital to protecting Hawaii's dark night skies and the undeniable cultural, economic, and environmental benefits associated with them.

The International Dark-Sky Association is a 501 (c)(3) non-profit organization founded in 1989 to preserve and protect the nighttime environment and our heritage of dark skies through environmentally responsible outdoor lighting. Considered the foremost authority on light pollution in the United States, IDA works with leading astronomers, ecologists, lighting designers, and energy experts across the globe to assess and distribute the most current information on ways to control and reduce excess outdoor light at night. IDA shares information with the U.S. National Parks Service, the U.S. Congress, the U.S. Department of Energy, and works with numerous local and state governments to create legislation that will save energy, reduce impact to nocturnal species, and protect the dark night sky for scientific and cultural pursuits. The 2010 study "The Spectrum of the Night Sky Over Kitt Peak: Changes Over Two Decades," by Lowell Observatory astronomers Kathryn Nugent and Philip Massey shows that enforceable lighting ordinances are effective in reducing sky glow, controlling excess and inappropriate light at night, and maintaining the astronomical integrity of a site.

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The remote Pacific Island location of the Hawaiian archipelago ensures that no external development will threaten its pristine darkness. All light pollution is generated within Hawaii. This fact makes Hawaii's light pollution relatively easy to control but reinforces the imperative of creating a means to do it. City light is visible up to 200 miles away, so light generated by one island can easily affect the others. S.B. 1493 provides the means of uniformly controlling light pollution and providing statewide protection for its invaluable night sky.

Please see Appendix A: Points in Favor of S.B. 1493 for additional reasons to pass the legislation in question.

Sincerely,

Bob Parks

### IDA Offices

Washington, DC USA | Hever, Belgium | Turrumulla, New South Wales, Australia



## Appendix A: Points in Favor of S.B. 1493

Author: International Dark-Sky Association

### Astronomy:

Astronomy in Hawaii generates between \$150 to \$200 million annually. Its economic value alone provides reason enough to protect this industry with S.B. 1493. However, the true value of astronomy as a revenue source exceeds numerical calculations.

Where tourism and agriculture can degrade the state's delicate environment, astronomy provides a truly sustainable source of revenue. It is also an industry based on the pursuit of information and supported by a highly technical sub-industry, exactly like the type of industry declared necessary to move the United States forward into the age of technology by President Obama in his 2011 State of the Union address.

The Mauna Kea summit houses the world's largest astronomical observatory. The quality of observatory sites is determined by a number of factors, including atmospheric stability, air quality, and darkness. Around the world, only a handful of sites meet these criteria; yet Mauna Kea offers these conditions and a temperate environment which allows viewing throughout the year. It is one of a kind. Its thirteen telescopes operated by eleven countries create a cultural and scientific hub. The observatory attracts international investment and promotes international cooperation.

In addition, "Astrotourism" to truly dark sites is gaining popularity as skies all over the world are affected by uncontrolled artificial lighting. Astronomical pursuits are already an important component of Hawaiian tourism; the 'Imiloa and the Mauna Kea Visitor Center very popular attractions. The travel guide *Hawai'i: The Big Island* by Luck Yamamoto and Alan Tarbell, (Lonely Planet, 2005) predicted that the popularity of 'Imiloa (then known as the Mauna Kea Astronomy Education Center) as a Big Island tourist destination would be exceeded only by Volcanoes National Park.

These benefits are jeopardized by increasing sky glow among the islands. Figure 1 below depicts the visibility of city light from other Hawaiian islands.

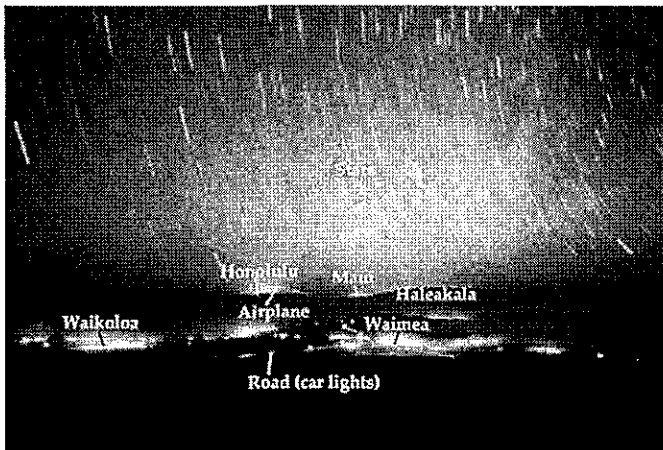


Figure 1 (Photo credit: R. Wainscoat)

**Energy:**

Hawaii's remote location has fostered innovative methods of energy generation, including geothermal, solar, and wind power. However, there is no substitute for reducing power consumption where possible. Design of shielded outdoor fixtures promotes technology that directs light more efficiently, lowering total energy output in a fixture and decreasing total energy consumption.

**Environment:**

While numerous factors including light pollution threaten Hawaiian wildlife, stray light at night is a direct source of population decline in marine birds.

Marine birds are particularly sensitive to artificial light, perhaps because many are nocturnal and are attracted to the bioluminescence of some prey species. Documented cases of resort lighting in Hawaii attracting, exhausting, and ultimately killing coastal and pelagic birds occur every year, usually upon a young bird leaving the nest on its first journey to the ocean. Many of these species are endangered or threatened, including the beloved Newell's Shearwater. In 1998, volunteers rescued 819 exhausted and disoriented young Shearwaters around resorts on the island of Kauai.<sup>1</sup>

Besides being a celebrated tourist attraction, Hawaii's particular fauna is fundamental to the islands' cultural identity. The outdoor lighting policies proposed in S.B. 1493 will help protect the welfare of this iconic species.

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<sup>1</sup> Montevecchi, William "Influences of Artificial Light on Marine Birds," *Ecological Consequences of Artificial Night Lighting*, ed. Catherine Rich, Travis Longcore, Island Press, 2006.

**BIA-HAWAII**  
BUILDING INDUSTRY ASSOCIATION

February 24, 2011

Senator Mike Gabbard, Chair  
COMMITTEE ON ENERGY AND ENVIRONMENT  
Senator Carol Fukunaga, Chair  
COMMITTEE ON ECONOMIC DEVELOPMENT AND TECHNOLOGY  
State Capitol, Conference Room 225  
415 South Beretania Street  
Honolulu, Hawaii 96813

Senators Gabbard and Fukunaga and Members of the Committees on Energy and Environment and Economic Development and Technology:

Subject: Senate Bill No. 1493 Relating to Light Pollution

I am Karen Nakamura, Chief Executive Officer of the Building Industry Association of Hawaii (BIA-Hawaii). Chartered in 1955, the Building Industry Association of Hawaii is a professional trade organization affiliated with the National Association of Home Builders, representing the building industry and its associates. BIA-Hawaii takes a leadership role in unifying and promoting the interests of the industry to enhance the quality of life for the people of Hawaii.

BIA-HAWAII provides the following comments.


Act 161, Session Laws of Hawaii 2009, formed a temporary advisory committee to assist the department to develop a statewide starlight reserve strategy to preserve the quality of the night sky and its associated cultural, scientific, astronomical, natural, and landscape-related values. The temporary advisory committee recommends the enactment of certain measures in the 2011 regular session to conserve energy and promote responsible use of light. The purpose of this bill is to implement the recommended legislation of the temporary advisory committee pursuant to Act 161.

The intent of this legislation is not entirely clear. While it mentions light pollutions in relation to observatories on Mauna Kea and Haleakala, it also mentions light pollution's impact on endangered species. We believe that both the County of Hawaii and County of Maui have laws in place to regulate lighting that may impact their respective observatories, and the U.S. Fish and Wildlife Department have regulations in place to protect endangered species from becoming disoriented by lights at night. It is unclear how this new law will supplement the existing laws and regulations and, more importantly, what is hoped to be gained by mandating compliance with this new law.

As a general policy, we are opposed to legislative mandates, especially in situations where the public benefits have not been clearly quantified. Also, the mandate does not appear to be for all land uses but restricted to commercial and residential. We would imagine that government buildings, parks, schools, facilities, as well as roadways would be a major contributors to light pollution. We question why government facilities are not included in the mandate, as well as other agricultural, industrial and non-profit users.

We would encourage more discussion on this bill with clarification to some of the questions raised be provided if this bill is to move out of committee. BIA-Hawaii is ready to participate in further discussions.

Thank you for the opportunity to share our views with you.

A handwritten signature in cursive script that reads "Karen I. Nakamura".

Chief Executive Officer  
BIA-Hawaii



Testimony of C. Mike Kido  
External Affairs  
The Pacific Resource Partnership

Senate Committee on Energy and Environment  
Senator Mike Gabbard, Chair  
Senator J. Kalani English, Vice Chair

Senate Committee on Economic Development and Technology  
Senator Carol Fukunaga, Chair  
Senator Glenn Wakai, Vice Chair

SB 1493 – RELATING TO LIGHT POLLUTION  
Thursday, February 24, 2011  
2:45 pm  
Conference Room 225

Aloha Chair Herkes, Chair Keith-Agaran, and Members of the Committees:

My name is C. Mike Kido, External Affairs of the Pacific Resource Partnership (PRP), a labor-management consortium representing over 240 signatory contractors and the Hawaii Carpenters Union.

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Testimony of C. Mike Kido  
SB 1493 Relating to Light Pollution  
Page 2

Thank you for the opportunity to comment on SB 1493 – Relating to Light Pollution and we would like to encourage more discussion on this bill with clarification to some of the questions raised be provided if this bill is to move out of committee.

**Testimony Related to**

**Senate Bill 1493**

**RELATING TO LIGHT POLLUTION**

**Presented before the**

**Senate Committee on Energy and the Environment  
and  
Senate Committee on Economic Development and Technology**

**The Twenty-Sixth Legislature**

**February 24, 2011**

**by**

**Richard J. Wainscoat**

**Chair, Starlight Reserve Committee**

Chairs Gabbard and Fukunaga, and members of the Committees. My name is Richard Wainscoat and I am here today to submit this testimony in my capacity as Chair of the Starlight Reserve Committee.

The Starlight Reserve Committee was established by the 2009 state legislature. It held its first meeting in July 2010, and has met on four occasions. The committee engaged in much fact finding during these meetings, and found a common factor that proper shielding of nighttime lighting is critically important. During its third meeting, the committee recommended introduction of legislation in the 2011 legislature that would result in shielding of new and replacement bright light sources.

Full shielding of lights has the following important advantages:

1. Light sources are not visible from above, meaning that the impact on endangered birds that are attracted to lights at night, such as the Newell's shearwater, is much reduced.
2. Fully shielded lights emit little light near the horizontal, so the impact on endangered turtles that become disoriented by lights on beaches is much reduced.
3. Fully shielded lights cause much less glare than partially shielded lights, improving safety, including on our roadways. It is particularly important to avoid glare for elderly drivers, who may have degraded vision due to cataracts or other reasons.
4. Fully shielded lights cause much less skyglow, dramatically reducing the impact of artificial lighting on Hawaii's astronomical observatories. Light emitted at small angles above the horizontal travels enormous distances through Earth's atmosphere. It does not

**Testimony Related to Senate Bill 1493**  
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**Senate Committee on Economic Development and Technology**  
**February 24, 2011**  
**Page 2**

respect county boundaries. Light from Honolulu affects both Haleakala and Mauna Kea Observatories. Use of fully shielded light fixtures is the most important technique for protecting astronomy in Hawaii.

5. Partially shielded lights emit some of their energy directly into space where it is wasted. Fully shielded lights direct their energy downwards only, where it is needed, and can therefore save energy. Substantial energy savings of up to 40% are possible by use of carefully shielded lights.
6. Fully shielded lights emit much less light at near horizontal angles, meaning that light trespass is substantially reduced. Light from adjacent properties or from streetlights entering our bedrooms is a form of light trespass. It can make it difficult to sleep at night. Excessive light at night has been linked to some forms of cancer, particularly breast cancer.
7. Use of fully shielded lights across Hawaii will result in a substantial decrease in skyglow, and restore the ability of Hawaii's residents and visitors to see the night sky. The Milky Way is no longer visible from urban Honolulu. Only about the brightest 20 stars are visible from urban Honolulu. About 2,000 stars can be seen from a dark location. The dark night sky on the island of Hawaii is slowly becoming a tourist attraction — many of Hawaii's visitors come from urban locations that have severe light pollution, and are amazed by the view of the dark night sky from the island of Hawaii. Sadly, many of our children are growing up without ever seeing the magnificent night sky. This is unnecessary, and is a direct result of irresponsible and careless use of light at night.

The Starlight Reserve Committee intended that the scope of the bill cover all lighting in Hawaii. The present wording mentions only private and business lighting. Poorly designed and improperly shielded lights continue to be installed by government agencies, and a quick inventory of nighttime lighting shows that some of the worst lighting is county and state lighting.

At its fourth meeting, the Starlight Reserve Committee discussed shielding of recreational lighting. Some recreational lighting is difficult to do using fully shielded fixtures, so the committee recommends adding an exemption to this bill for recreational lighting.

Suitable wording for a recreational lighting exemption is appended to this testimony. This wording addresses concerns raised by DAGS regarding lighting at Aloha Stadium.

The 3,000 lumen exemption recommended for this legislation is a very generous exemption. It is the equivalent of a 150 Watt halogen lamp. The Starlight Reserve Committee will discuss this exemption in future meetings and may recommend a lower limit in the future. Because lighting is on the verge of a revolution coming from rapid improvements of light emitting diodes, the committee felt that it was important to make a first step at improving lighting this year, and chose the 3,000 lumen exemption in an effort to make the proposed legislation uncontroversial, while yielding meaningful results from good shielding of the brightest new light sources.



The 3,000 lumen exemption means that most residential lighting in Hawaii will be exempt — only very bright outdoor residential lights, such as high intensity discharge lamps, will be affected.

Proposed exemption for recreational lighting:

All lighting not directly associated with the athletic playing areas shall be fully shielded. Lighting for athletic fields, courts or tracks shall be fully shielded unless a registered electrical engineer certifies that fully shielded lighting is impractical. Where fully shielded fixtures are not utilized, acceptable luminaires shall include those which:

1. Are provided with internal and/or external glare control louvers and installed so as to limit direct uplight to less than 5 percent of the total lumens exiting from the installed fixtures and minimize offsite light trespass, and;
2. Are installed and maintained with minimum aiming angles of 25 degrees downward from the horizontal. Said aiming angle shall be measured from the axis of the luminaire maximum beam candlepower as certified by independent testing agency.

TO: Members of the Committees on Energy and Environment and Economic  
Development and Technology

FROM: Natalie Iwasa  
Honolulu, HI 96825  
808-395-3233

HEARING: 2:45 p.m. Thursday, February 24, 2011

SUBJECT: SB1493 Relating to Light Pollution - SUPPORT

Aloha Chairs Gabbard and Fukunaga, Vice Chairs English and Wakai and Committee  
Members,

Thank you for allowing me to provide testimony in support of SB1493, which would require fully-shielded lights on new and replacement outdoor light fixtures with a few exceptions. You may recall the news reports regarding the Lunalilo Home Road (LHR) street lighting project. The county had planned to install three times the amount of light using 40-year-old lighting technology. After residents questioned the City and County of Honolulu regarding their plans, they agreed to reduce lighting to double the amount and install fully-shielded lights. The fully-shielded lights reduce glare and are a big improvement over the old globe type of fixture.

Roadway classification is a very important component in the amount of lighting that is required to be used on our roadways. In the case of LHR, the city applied the same classification all the way from Kalaniana'ole Hwy. to Hawaii Kai Drive, even though there is no medial strip or commercial/busy pedestrian areas past Wailua Street. Please consider adding a recommendation or requirement that the counties and state not needlessly bump up the classifications as this increases the cost to upgrade as well as increases energy consumption for years to come.

Please vote "yes" on this measure.

Here are some of my opinions ala highway lighting in general and that in Hawaii in particular.

1. I have been an active member of the IESNA Roadway Lighting Committee for decades, as well as others (list on request, or Vita if needed) as well as similar ones in the CIE. I have dialoged with members, who are designers, manufacturers, governmental sorts, and others and inputted to the standards. Often I have been in the minority as many of the members are still living in the 1950s. So I have been around and heard much of what is talked about and even used. Much of it is not up to speed on technology or on common sense. There is far too much of "lighting, and lots of it. I cures everything." There is no evidence of that. The myth comes from days when energy was cheap, and when not much was known (or applied) with respect to night vision.
2. There is still far too much glare (blinding light) in present highway (and other) night lighting. Glare does not help night vision, ruins our eye's night adaptation, wastes energy, and is bad in all ways. Glare comes from older type luminaires that are not well shielded, including even the semi cutoff ones.
3. In addition, there is far too much spill light, quite wasteful of energy and not good for our night environment. Much of it can be and is obtrusive lighting as well.
4. There is also far too much continuous lighting of roadways, for no good reason. Some locales do not do it, such as California and parts of Arizona, including Tucson. Many of these are heavily trafficked roadways, and there is been no increase in accident or such. The goal should be minimal energy use. Such improved lighting (not continuous) is also good for night vision in fact (minimal glare or obtrusive or distracting light). I personally counted up such lighting once on a trip from Sacramento CA to Tucson. Essentially NO continuous lighting (contrary to what Hawaii seems to be promoting -- and some other locales, such as some highways in Virginia). There is also minimum ramp lighting, just enough for guidance. Guidance is often very well done with such reflective guidance lighting at key locales, such as exits, curves, etc. Works very well. Saves a great deal of energy and with no compromise to driver or other safety.
5. Warranting of night lighting is far too rare, and so is any good research on night accidents or such. None such show any need for continual highway lighting nor for overlighting (and especially not for glare). All show the need for good guidance systems. Today, that is "easy" due to the huge improvement in retro-reflective materials. They are often (but not enough) used to show clearly where to go, delineate curves and danger area, and used on effective signs. Very effective and very efficient. Lighting is often far from an efficient and effective approach.
6. Hawaii is truly unique in many ways. The night environment is one of them. Astronomy, energy costs, eco impacts from night lighting, culture, and so on. The night should be, must be, preserved. Good quality night lighting is an essential element of that. The ambience and ecology and beauty of the Islands demand it. To promote anything but the best quality of night lighting (and often that means no lighting at all) is almost criminal. Hawaii should strive to be the most effective and efficient and knowledgeable about such applications and hence lead the nation.
7. The present bill is a big step in that direction. It should (or be done in addition elsewhere) also address sports lighting (where great progress has been made lately), sign lighting in general, and warranting.
8. I am much interested in these issues, and have been actively promoting effective and efficient night lighting (in general, not just for dark skies) for decades locally here in the Tucson area, state wide, nationally, and globally. Hawaii is a special case, and deserves the best possible protection for the night and for its citizens. Anything but the best quality night lighting (often meaning no light at all) should be avoided. It is good for everyone, for business, for the ecosystem, for energy saving, for the cultural ambience of the night, for all -- everyone wins. It is cost effective and efficient for all the needs.