

NOTES:

Light Pollution in the United States: An Overview of the Inadequacies of the Common Law and State and Local Regulation

I. INTRODUCTION

“[T]he typical urban or suburban observer might only see a few hundred of the brightest stars, and none of the more elusive objects. We have abused the darkness. We have lost the faint lights.” – Chet Raymo¹

In the late nineteenth century, Thomas Alva Edison and other scientists engineered what could possibly be one of the greatest inventions of all time – the electric light bulb.² Today, the options available in electric illumination have advanced significantly since the first rudimentary bulb.³

1. CHET RAYMO, *THE SOUL OF THE NIGHT: AN ASTRONOMICAL PILGRIMAGE* 24 (1985).

2. See COLLIER'S ENCYCLOPEDIA 719, 722 (MacMillan Educational Co., 1992). “When Edison invented the first practical electric light bulb in 1879, he could hardly have anticipated its transformative effect on American life in the 20th century.” Joe Rey-Barreau, *Illuminating America's Century*, HFN THE WEEKLY NEWSPAPER FOR THE HOME FURNISHING NETWORK, May 31, 1999, at 65. The Chairman and CEO of General Electric, Jack Welch, believes “it is impossible to imagine a world without the electric light bulb [and] street lights ...” Ann Chambers, *GE Backs Edison Preservation Effort*, POWER ENGINEERING, Mar. 1, 2000, at 16. More than 100 years ago in 1893, the newly established General Electric Company boasted that “its lamps extended ‘in an unbroken line around the earth; they shine in the palace of the Mikado as well as in the Opera House of Paris.’” THOMAS F. O'BOYLE, *AT ANY COST: JACK WELCH, GENERAL ELECTRIC AND THE PURSUIT OF PROFIT* 23 (1998). Even today, General Electric manufactures more than fifty percent of the lightbulbs sold in the United States. See *id.* at 57. As this Note will argue, Mr. Welch's cast of a rosy glow on the lighting industry may not be as harmless as he and his company portrays it to be. See *infra* notes 44-94 and accompanying text.

3. See COLLIER'S ENCYCLOPEDIA, *supra* note 2, at 722-25.

The various modes of lighting are of crucial importance because electric illumination is used in virtually all areas of daily life, including in the home and automobile, for commercial purposes, and within the community.⁴

The proliferation of outdoor light use, particularly that light projecting into the night skies, has developed into a relatively new area of environmental degradation – light pollution.⁵ Astronomers first noticed light pollution approximately one century after Edison's historical accomplishment.⁶ Often described as “the presence of excessive illumination in locations where it is not desired,”⁷ light pollution has been discovered to have

4. See *id.* at 720.

5. See April Reese, *Take Back the Night*, E MAGAZINE, May 2000, at 22. See also Penny Jewkes, *Light Pollution: A Review of the Law*, J. PLAN. & ENV'T L., Jan. 1998, at 10 (describing the non-legal treatment of light pollution in England). “In law, however, the term ‘light pollution’ is not recognised, although the potential and actual consequences of inappropriate lighting may be subject to various legal responses.” *Id.* Across the United States, there is a growing awareness of and reaction to light pollution as an environmental problem. See, e.g., Doug Irving, *Mayor Wants to Tone Down Glow*, THE OREGONIAN, Nov. 21, 2000, at D2 (Portland, Oregon); Graeme Zielinski, *Astronomers Try to Illuminate Region on Threats to Night Skies*, WASH. POST, Sept. 25, 2000, at B1 (Washington, D.C., Virginia, and Maryland); Jay Apperson, *Dim View of Life's Bright Lights*, THE BALT. SUN, Sept. 17, 2000, at 1A (Maryland); *Dimming Light Pollution*, PROVIDENCE J.-BULL., Dec. 18, 2000, at 4B (Block Island, Rhode Island); Terri Williams, *Astronomer Fights for 'Good Sky,'* THE DALLAS MORNING NEWS, Dec. 22, 2000, at 1M (Mesquite, Texas); *Dark Crusade: Flower Mound Urged to Curb Light Pollution*, THE DALLAS MORNING NEWS, Aug. 10, 2000, at 1H (northern Texas); Chris Reynolds, *Bright Lights in Need of Dimmer Switch*, THE ATLANTA J. & CONST., Nov. 9, 2000, at 9 (Atlanta, Georgia and surrounding areas); Juliet V. Casey, *Report Critical of Night Lighting*, ALBUQUERQUE JOURNAL, Aug. 26, 2000, at 1 (New Mexico); Arthur H. Rotstein, *Stargazers Call for Lights Out*, THE DETROIT NEWS, Sept. 1, 2000, at 12 (reporting on developments in Arizona); Mary Giunca, *Glaring: We're Being Blinded By Our Own Light*, WINSTON-SALEM J., Oct. 22, 2000, at 1 (North Carolina); *Let There Be Less Light*, THE CAP. TIMES, Oct. 15, 1999, at 10A (editorial describing light pollution in Wisconsin); Joe Bauman, *Active Group in Utah Valley Scans the Skies*, DESERET NEWS, July 5, 2000, at B2 (Utah); Keri Buscaglia, *Light Pollution is a Glowing Concern*, CHI. TRIB., Jan. 31, 2001, at 4 (noting light pollution concerns of suburban Chicago residents, elected government officials and community planners).

6. See Joe Bower, *The Dark Side of Light*, AUDUBON, Mar.-Apr. 2000, at 94 (one of the more recent articles published about light pollution, this featured article provides general light pollution information as well as specific data related to how birds are affected by lights).

7. Michael J. Brown, *Light Pollution*, ENVTL. L. N.Y., Apr. 1998, at 49. The British Astronomical Association and other organizations in England have identified three categories of light pollution: sky glow, glare and light trespass. See Jewkes, *supra* note 5, at 10. In addition to the three aforementioned problems associated with light pollution, energy waste is considered a fourth problem. See Brown, *supra* this

negative effects on many things, including humans, wildlife, the environment and energy consumption.⁸ As a result, some states and several cities and towns are beginning to react with legislation aimed to curb light pollution.⁹

In Part II, this Note will outline the development of electric light and its uses.¹⁰ Despite the benefits of electric lighting, Part III will address the harmful impacts of light on our natural environment.¹¹ Part IV discusses the history of early and more recent common law claims of excessive lighting, argued as either trespass or nuisance claims.¹² Part V surveys the recent developments in state statutory legislation and local ordinances that have begun to alleviate the problem of excessive light.¹³

Since the results and remedies of light as trespass or nuisance claims under the common law have been inconsistent and insufficient, and state and local regulations have been relatively slow to react to the growing problem of light pollution, this Note will argue that many of the issues associated with excessive light will increase and persist without more uniform and more stringent legislation across jurisdictions. Part VI of this Note suggests that because results and remedies in the more familiar types of pollution cases argued under the common law will not likely be sufficient, and that because state and local regulations for light pollution are too inconsistent among jurisdictions, there may soon be a need for federal legislation regarding light pollution similar to some provisions of the Noise Control Act of 1972.¹⁴ Minimally, federal legislation should (1) aim to study more adequately the effects of light pollution as it relates to humans, wildlife, and dark skies as a natural resource,¹⁵ and (2) provide for a more

note, at 49.

8. See Marina Murphy, *Revealing the Dark Side of Light: Artificial Light*, CHEMISTRY AND INDUS., Oct. 2, 2000, at 627 (stating that “[e]xcessive artificial lighting squanders resources, fouls the air, blocks our view of the night sky and has adverse effects on both animal and human health”). See also Reese, *supra* note 5, at 23; Bower, *supra* note 6, at 94-96 (highlighting some bird species, such as passerines and an endangered Hawaiian seabird, that have been negatively affected by light pollution).

9. See, e.g., *infra* note 188-89 and accompanying text. See also Daniel M. Nonte, *Summerfield Decides to Turn Down Lights, Keep Small-Town Feel*, GREENSBORO NEWS & RECORD, Sept. 6, 2000, at B7 (announcing a recently enacted Summerfield, North Carolina ordinance aimed at curbing light pollution).

10. See *infra* notes 17-43 and accompanying text.

11. See *infra* notes 44-94 and accompanying text.

12. See *infra* notes 95-184 and accompanying text.

13. See *infra* notes 185-262 and accompanying text.

14. See *infra* notes 263-304 and accompanying text. See also 42 U.S.C. §§ 4901-4918 (1999) (Noise Control Act).

15. See *infra* notes 295-300 and accompanying text.

uniform system of regulating light pollution, which will be crucial as it relates to reducing harm to humans and the environment around the nation and the world.¹⁶

II. DEVELOPMENT OF ELECTRIC LIGHT

Society has used light in various forms including fire, torches, candles and oil lamps for many millenniums,¹⁷ but it was not until the latter part of the nineteenth century that scientists began having success with electrical means of illumination.¹⁸ Although the first incandescent lamps were rudimentary and unsuitable for commercial use, in 1879 Thomas Alva Edison pioneered a practical incandescent light bulb that has served as a model for modern lighting.¹⁹ Today, the three major sources of electrical illumination are the incandescent, electric-discharge and fluorescent lamps.²⁰

16. See *infra* notes 301-03 and accompanying text.

17. See DAN RAMSEY, *EFFECTIVE LIGHTING FOR HOME & BUSINESS* 4-5 (1984) (providing a brief history of lighting). See generally NADJA MARIL, *AMERICAN LIGHTING: 1840-1940* (1989) (providing a detailed history of the various lamps used, both before and after the development of electric lighting, particularly for indoor use).

18. See COLLIER'S *ENCYCLOPEDIA*, *supra* note 2, at 719, 722. In 1802, Sir Humphry Davy first demonstrated that electric current passed through strips of metal could create incandescence from the heat created. See *id.* At that point in 1802, however, there was no efficient way to utilize this source of light. See *id.*

19. See MARIL, *supra* note 17, at 73-74. "October 21, 1879 is cited as the date of the invention of the first successful incandescent light bulb." *Id.* at 74. Interestingly, the light bulb was looked upon as a novelty item which was to be seen and admired but not to be taken seriously. The earliest electric fixtures either used broad flat shades which did nothing to shield the bulb's glare, but rather either framed the light or prevented it from escaping towards the ceiling. Some used no shades at all. The major difference in the light offered by the electric bulb was that it focused downward, rather than upwards like the gas fixtures and the kerosene fixtures generally in use.

Id. This is somewhat ironic given that we appear today to be in the predicament that too much light is, in fact, still shining upwards. See *infra* notes 44-94 and accompanying text. For an interesting account of one modern day historian's attempt to study pre-industrial age, pre-electric light nighttime hours, see Joyce Wolkomir & Richard Wolkomir, "When Bandogs Howle & Spirits Walk": *Studying the Nighttime Hours Across the Centuries, Says Historian Roger Ekirch, Sheds Light on Preindustrial Society*, SMITHSONIAN, Jan. 1, 2001, at 38. In his studies, Ekirch has discovered the meaning of a dark, light-free night to people throughout history, including the consideration of night as a separate season or a time when spirits did evil things. See *id.* at 40-41.

20. See COLLIER'S *ENCYCLOPEDIA*, *supra* note 2, at 722-24. Incandescent lighting is the primary source of light for residential use. See *id.* at 720. See also Energy Efficiency and Renewable Energy Network (EREN), U.S. Department of Energy, *Energy Efficient Lighting*, available at <http://www.eren.doe.gov/erec/facsheets/eelight.html> (last visited Apr. 19, 2002). This type of lighting is the least expensive to buy, most expensive to operate and is more inefficient than other types. See *id.* In

The development of electric illumination has allowed individuals, communities, and commercial entities to conduct activities that were once restricted to daylight hours.²¹ Personal use of electric lighting includes indoor and outdoor residential use, as well as interior and exterior lighting of automobiles.²² In fact, residential consumption of electricity for lighting has increased forty percent since 1970.²³ Additionally, communities use lighting on streets and buildings to help provide for additional safety at night.²⁴ Lighting roadways aims to minimize dangers to drivers and pedestrians,²⁵ while lighting buildings, parking lots and other outdoor areas is intended to increase safety at night by discouraging crime.²⁶

commercial use, indoor lighting is primarily comprised of fluorescent lamps. *See id.* Outdoor lighting for safety and commercial use is largely attained through high-intensity discharge and low-pressure sodium lamps. *See id.* Many of today's lighting regulations designate what kind of light bulbs and fixtures may be used. *See, e.g.,* N.M. STAT. ANN. § 74-12-6 (Michie 2000) (“[n]o new mercury vapor outdoor lighting fixtures shall be sold or installed after January 1, 2000”); ARIZ. REV. STAT. ANN. § 49-1104 (West 1999) (“[n]o new mercury vapor outdoor light fixtures shall be installed after the effective date of this section. No replacement equipment other than bulbs for mercury vapor light fixtures shall be sold . . . after January 1, 1991 and the use of mercury vapor light fixtures is prohibited after January 1, 2011”). “A main component of new legislation is the elimination of mercury-vapor lamps – which used more energy and added more glare – vs. the newly mandated high-pressure sodium lamps” Phaedra Haywood, *New Lights Installed to Keep Skies Dark and Stars Bright*, SANTA FE NEW MEXICAN, Jan. 17, 2001, at P1.

21. *See* Rey-Barreau, *supra* note 2, at 65. “Notions about how and when to work or socialize changed. Any event that was possible in the day could now take place at night.” *Id.*

In order to demonstrate to the public that electric lighting was practical, Edison developed the first power company to provide current for lights installed in New York City in 1882. Electric incandescent light spread through the country. The demand for light encouraged the formation of power companies, and the availability of current encouraged greater use of electric light.

RAMSEY, *supra* note 17, at 5.

22. *See* Bower, *supra* note 6, at 96. “The average single-family home currently consumes 1,500 kilowatt-hours a year for lighting” *Id.*

23. *See id.*

24. *See* COLLIER'S ENCYCLOPEDIA, *supra* note 2, at 722. There are an estimated fifteen million street lights in the United States, and over sixty million worldwide. *See* Andrew Meadows, *Street-Light Device Company to Relocate to Lexington, S.C.*, THE STATE, July 9, 1999, at CS.

25. *See* Brown, *supra* note 7, at 58. However, “[m]unicipalities often install numerous street lights without clear criteria for how much lighting is warranted. A major goal of increased light is typically enhanced traffic safety, but safety can actually be compromised by glare” *Id.*

26. *See id.* at 58-59. Generally, people feel that increased light means increased safety, and as a result municipalities are often asked to provide additional lighting in the community. *See id.* at 59. However, there does not appear to be an increase of

Commercial entities also use electric lighting for various business-related purposes such as safety, advertising and emphasizing architectural features.²⁷ Certain entities, such as airports,²⁸ sports arenas,²⁹ parking

crime at night when it is dark. *See id.* *See also* U.S. DEPT. OF JUSTICE, CRIMINAL VICTIMIZATION IN UNITED STATES, 1998 STATISTICAL TABLES: NATIONAL CRIME VICTIMIZATION SURVEY, NCJ 181585 at Tables 59-60 (2000). (reporting that of the incidents for which there is known data, 54.6% of violent crimes occurred during the daytime while only 44.2% occurred at night, and 37.2% of property crimes occurred during the day while only 36.8% occurred at night); Reese, *supra* note 5, at 23 (A representative of the International Dark Sky Association (IDA) pointed out that “overly bright security lights can actually force neighbors to close shutters, which means that if any criminal activity” occurs, it will go unnoticed). Further, glaring lights can prevent drivers from seeing clearly, thus diminishing safety on the roads. *See Brown, supra* note 7, at 49.

27. *See* COLLIER’S ENCYCLOPEDIA, *supra* note 2, at 722. Ironically, Discovery Communications, the parent company of a cable television channel that airs science programs, will build its new global headquarters near Washington, D.C. with a 300-foot tower shooting a strong beam of light into the evening sky. *See* Bill Triplett, *Astronomers Fume Over Night Light*, 405 NATURE 987, 987 (June 2000) (discussing how the addition of Discovery Communications’ light shooting tower will only add more light pollution to the already overlit Washington, D.C. area).

28. *See, e.g., Ivanpah Valley Airport Public Lands Transfer Act: Hearing on S. 930 Before the Subcomm. on Forests and Public Land Management of the Senate Comm. on Energy and Natural Resources*, 106th Cong., (1999) (statement of John Reynolds, Regional Director, Pacific West Region, National Park Service, U.S. Department of the Interior). Mr. Reynolds, in his testimony to persuade the subcommittee to veto a bill that would allow an airport on certain public lands, stated that, among other things,

Another potentially significant impact to the Mojave National Preserve from the proposed airport is the deterioration of the natural quiet and the current night sky darkness that visitors enjoy at the park. Light pollution is becoming a recognized problem to many rural and rustic areas, such as the Mojave Desert. Currently, opportunities to enjoy natural quiet and the natural darkness of the nighttime are being slowly impacted by development . . . a nearby airport with runway lights, tower lights, and other lighting requirements would adversely change the dark night landscape and quiet character of the Mojave National Preserve.

Id.

29. *See, e.g., Hansen v. Indep. Sch. Dist.*, 98 P.2d 959 (Idaho 1939) (involving night baseball games at a high school field); *Bd. of Educ. v. Klein*, 197 S.W.2d 427 (Ky. 1946) (involving night football games at a high school field); *Rhudy v. Fairfield Univ.*, 2000 WL 1269296, at *5 (Conn. Super. Ct. Aug. 18, 2000) (granting injunctive relief for individuals who lived adjacent to Fairfield University’s University Field which used lights bright enough “as though a team of searchlights [were] pointed directly at [the plaintiff’s home]”); *Amphitheaters, Inc. v. Portland Meadows*, 198 P.2d 847 (Or. 1948) (involving nighttime racing at a race track, discussed *infra* at notes 124-40, 182-84); *Fuentes v. Bd. of Supervisors*, 2000 WL 1210446 (Va. Cir. Ct.

lots,³⁰ shopping centers³¹ and gas stations,³² are notorious for using a significantly greater amount of outdoor lighting for business than other industries due to the nature of their activities. In fact, “in commercial buildings, more electricity is now used for lighting than anything else.”³³

Despite the many beneficial uses of electric light, there are some economic drawbacks. Certainly, the amount of money spent to keep the lights on is costly.³⁴ According to the U.S. Department of Energy, an estimated \$37 billion is spent on electricity for lighting annually in the United States.³⁵ This figure represents one-quarter of all money spent on electricity.³⁶ Furthermore, since many lighting structures are either poorly constructed or give off light that is aimed in the wrong direction, much of what the United States spends on outdoor lighting is wasted.³⁷ Estimates

2000) (involving up to fourteen lighted athletic fields to be built under special permit in a residential-conservation district).

30. See, e.g., *Essick v. Shillam*, 32 A.2d 416 (Pa. 1943) (involving a parking lot as part of a supermarket business in a residential area that would be illuminated at night). See also Jay Apperson, *Dim View of Life's Bright Lights*, BALT. SUN, Sept. 17, 2000, at 1A. “The lights in the Towson Place parking lot – described as the aurora borealis of Baltimore County by one government official – have brought complaints from [local residents].” *Id.* See also *infra* note 157 and accompanying text (noting the outcome in *Hansen v. Indep. Sch. Dist. No. 1*).

31. See, e.g., Richard Turcsik, *Blinded by the Light: Reducing Exterior Lighting Makes for Lower Energy Costs and Better Neighbors*, PROGRESSIVE GROCER, Aug. 1, 2000, at 57 (stating that “supermarket and mall operators are putting in lamps . . . which are completely inappropriate for the majority of parking lots,” and “some businesses – notably restaurants, gas stations and convenience stores – are now lighting their properties with [more light than they need]” for customers to feel safe).

32. See, e.g., *Indian Ref. Co. v. Berry*, 10 S.W.2d 630 (Ky. 1928) (concerning adjacent filling station's lights shining on plaintiff's property); *Sprout v. Levinson*, 148 A. 511 (Pa. 1930) (involving a filling station in a commercial area allowed to operate at night with outdoor lights); *B.J.'s Wholesale Club, Inc. v. Hutchings*, No. CA 99-00732, 2000 Mass. Super. LEXIS 430 (Mass. Super. Ct. Sept. 27, 2000) (involving abutters to a B.J.'s Wholesale Club store who were concerned that the addition of a gas station would bring several problems, including glaring lights).

33. Bower, *supra* note 6, at 96. In the mid-1990s, U.S. commercial buildings used more than 350 billion kilowatt hours per year in electricity for lighting, although the predominant use of light is indoors. See Energy Information Administration, U.S. Department of Energy, *At Home and at Work: What Types of Lights are we Using?*, available at <http://www.eia.doe.gov/emeu/cbecs/lit-type.html> (last visited Apr. 19, 2002).

34. “Lighting accounts for 20% to 25% of all electricity consumed in the United States. An average household dedicates 5% to 10% of its energy budget to lighting, while commercial establishments consume 20% to 30% of their total energy just for lighting.” See *Energy Efficient Lighting*, *supra* note 20.

35. See *id.*

36. See *id.*

37. See *Let There Be Less Light*, CAPITAL TIMES, Oct. 15, 1999, at 10A (stating

show that one-third to one-half of all light emitted in outdoor use shines somewhere other than on its intended target.³⁸ Because this light is being cast into areas where it is not needed, the United States is expending approximately one to two billion dollars a year on wasted energy.³⁹ Additionally, it not only costs the United States actual dollars to keep the lights on, but doing so also requires depletion of precious natural resources.⁴⁰ The Environmental Protection Agency⁴¹ indicates that the majority of lights are illuminated through the burning of coal and oil.⁴² Not only are these non-renewable energy sources, they also create atmospheric pollution.⁴³

III. IMPACTS OF LIGHT POLLUTION

A. Development of Light Pollution as a New Environmental Concern

Since the 1970s, there has been a growing concern about the amount of light emitted from various sources.⁴⁴ Astronomers and others have coined the phrase "light pollution" to describe the phenomenon of wasted light

that lights are either too bright or the light is not directed where it is needed).

38. See Reese, *supra* note 5, at 23 (estimating that "50 percent of the light emanating from street lamps misses its intended target"); see also Bower, *supra* note 6, at 96 (reporting that one-third of light is wasted due to shining upward or sideways rather than down where it is needed).

39. See Reese, *supra* note 5, at 24 (citing International Dark Sky Association's statistics of dollars wasted due to inefficient lighting); see also Mary Giunca, *Glaring: We're Being Blinded By Our Own Light*, WINSTON-SALEM JOURNAL, Oct. 22, 2000, at 1.

40. See Bower, *supra* note 6, at 96.

41. "The EPA is the primary enforcer of all federal environmental statutes." ENVIRONMENTAL LAW HANDBOOK 55 (Thomas F. P. Sullivan ed., 14th ed. 1997).

42. See Bower, *supra* note 6, at 96. One of the primary uses of electricity for residential, commercial, and industrial end-users was for lighting, and in order to generate this electricity, United States utilities consumed fossil fuels. See U.S. EMISSIONS INVENTORY – 1999: INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-1997, at 2-8 (EPA 236-R-99-003, April 1999). Electric utilities generally rely on carbon intensive coal for the majority of their primary energy output, and used 87% of all coal consumed in 1997. See *id.* at 2-10.

43. See Bower, *supra* note 6, at 96; see also CHARLES E. KUPCHELLA & MARGARET C. HYLAND, ENVIRONMENTAL SCIENCE: *Living Within the System of Nature*, 143-55 (2d ed. 1989). See generally U.S. EMISSIONS INVENTORY – 1999, *supra* note 42, at 2-1 to 2-39 (reporting on the pollution created by energy production in the United States).

44. See Bower, *supra* note 6, at 94. "By the accounts of local and state legislators, light pollution has gained prominence in recent years and has become affixed to the larger debate over sprawl." Graeme Zielinski, *Astronomers Try to Illuminate Region on Threats to Night Skies*, WASH. POST, Sept. 25, 2000, at B04.

being cast into the atmosphere,⁴⁵ which ultimately hinders astronomical observations. This relatively new and lesser known environmental concern has been described as “the artificial light that illuminates more than its intended target area,”⁴⁶ “sky glow caused by the scattering of artificial light in the atmosphere”⁴⁷ or, in more descriptive words, “sky glow, [or] the eerie radiance that emanates from settled areas.”⁴⁸ In fact, the United States generates so much wasted and upward shining light that the nation’s borders and major metropolitan areas appear visible on satellite images taken at night.⁴⁹

Light pollution is not limited to the United States.⁵⁰ Normally, 2,000 stars would be visible in northern Europe if it were not for light pollution;

45. See Bower, *supra* note 6, at 94. But see James Geary, *A Thousand Points of Blight*, TIME (International Ed.), Dec. 16, 1996, at 38 (stating that, at least in Europe, excessive light from urban and industrial centers is not yet considered an official pollutant).

46. Reese, *supra* note 5, at 22.

47. H.B. 3990, 181st Gen. Ct., Reg. Sess. (Mass. 1999).

48. Bower, *supra* note 6, at 94. Referring to the night skies over the Washington, D.C. area, a Northern Virginia Astronomy Club member describes it as a “dull blush that . . . suggest[s] the aftermath of a nuclear bomb.” Zielinski, *supra* note 44, at B01.

49. See Reese, *supra* note 5, at 23. Not only are Las Vegas’ lights easily detected from above, but so are those of other cities including Boston, New York, and Los Angeles. See *id.* When NASA mapped the permanent lights around the world using satellite technology, “[t]he United States interstate highways appear as a grid system connecting the brighter dots of the major city centres including the brightly lit New York.” Mark Daly, *Who Turned the Light On In Outer Mongolia?*, SCOT. DAILY REC., Oct. 25, 2000, at 18. See also Annette Reynolds, *Dark Crusade: Flower Mound Urged to Curb Light Pollution*, DALLAS MORNING NEWS, Aug. 10, 2000, at 1H (areas in north Texas visible from satellite photos); Reese, *supra* note 5, at 23 (quoting an observatory superintendent who noted: “When you’re up in an airplane, all that light you see on the ground from the city is wasted. It’s going up into the night sky. That’s why you can see it.”); Brown, *supra* note 7, at 58 (“any city with a population exceeding 10,000 can be identified on [a satellite] photograph”). To view various satellite images demonstrating the effect of misdirected light, visit the International Dark Sky Association’s website at <http://www.darksky.org/ida/sat.html>.

50. For a detailed analysis of British law as it relates to light pollution, see Penny Jewkes, *Light Pollution: A Review of the Law*, J. PLAN. & ENV’T. L., Jan. 1998, 10. “[A]part from the Netherlands, England’s conglomeration of brightly lit areas is more extensive than anywhere else in Europe.” *Id.* In 1996, Belgium was considered the most light-polluted country in Europe, with England and the Netherlands not far behind. See Geary, *supra* note 45, at 38; see also Ross Clark, *Let’s Keep the Country in the Dark*, DAILY TELEGRAPH, Oct. 14, 2000, available at 2000 WL 28449284 (providing additional information about light pollution in England); *Chinese Environment News: Weekly Highlights*, XINHUA ENGLISH NEWSWIRE, Feb. 11, 2001, available at 2001 WL 10871629 (noting that some Chinese doctors now believe light pollution may cause near-sightedness).

unfortunately, most individuals can only see ten percent of those stars.⁵¹ Scientists in northern Europe warn that within twenty-five years, no stars will be visible at all.⁵² Similar to satellite photographs taken of the United States, there are many other areas around the globe that appear as bright white dots, revealing that light pollution is a worldwide phenomenon.⁵³

In addition to astronomers, others around the United States have begun to recognize light pollution as an environmental concern.⁵⁴ Organizations within the United States and abroad, including the International Dark-Sky Association⁵⁵ and the Fatal Light Awareness Program,⁵⁶ have officially organized to study light pollution, educate others about its impact, and push for increased legislation that would reduce the “eerie radiance.”⁵⁷

B. Harmful Effects of Artificial Light and Light Pollution⁵⁸

51. See Geary, *supra* note 45, at 38.

52. See *id.*

53. See Daly, *supra* note 49, at 18-19. Lights in Japan, England, Scotland, France and Spain appear clearly on satellite photographs, while some areas such as Antarctica and interior South American forests do not reflect any light. See *id.*

54. See, e.g., Doug Irving, *Mayor Wants to Tone Down Glow*, PORTLAND OREGONIAN, Nov. 21, 2000, at D02 (mayor of rural community has recognized light pollution as a growing problem).

55. See generally *International Dark-Sky Association*, at <http://www.darksky.org/ida/index.html> (last visited Apr. 19, 2002). The mission of the International Dark-Sky Association (IDA), a membership-based nonprofit organization, is “[t]o preserve and protect the nighttime environment and our heritage of dark skies through quality outdoor lighting.” *Id.* On its website, the IDA maintains a large supply of information sheets to educate the public about light pollution, as well as a resource of links to other websites that can provide additional information. See *Information Sheets*, at <http://www.darksky.org/ida/infoshts.html>.

56. See generally *Fatal Light Awareness Program*, at <http://www.flap.org/home2.htm> (last visited Apr. 19, 2002) (stating the mission of the Fatal Light Awareness Program (FLAP) is “[w]orking to preserve the lives of migratory birds in urban areas”). Information and links on this website include a listing of birds at risk, as well as mortality reports and photos from recent collisions due to illuminated structures. See *id.*

57. See *Local & Regional IDA Sections*, at http://www.darksky.org/ida/ida_2/info140.html (last visited Apr. 19, 2002) (providing a list of dark sky protection and light pollution prevention advisory groups and councils). Formal and informal groups have organized to reduce light pollution in countries such as Australia, Canada, Japan and several European countries. See *id.* More than seventeen state and regional chapters of IDA exist in the United States. See *id.*

58. For purposes of this Note, the various negative impacts of light will focus only on how light harms humans, wildlife and the dark sky as a natural resource. However, when drafting new legislation to reduce light use, all factors should be considered by the legislature. Pollution and economic waste generated as a result of electricity used to keep lights on are also significant side effects of light pollution, but

Scientists are just now beginning to realize the impacts of light and light pollution in various contexts.⁵⁹ Over the past thirty years, astronomers were among the first to recognize that light pollution has impaired our visibility of the heavens.⁶⁰ Because many, if not most, astronomical observatories are relatively near areas emitting some light, almost all astronomers have been affected by light pollution.⁶¹ The nature of an astronomer's work – observing the night skies – requires a relatively light-free environment.⁶² Otherwise, stars and other astronomical phenomena cannot be seen by earth-bound devices, even with the most powerful instruments.⁶³

Under normal light-free conditions, there are approximately 2,500 stars that are visible in the night sky in the United States.⁶⁴ Unfortunately, only ten percent of Americans today can actually see the majority of these stars

these factors will only be considered incidentally in this Note. *See, e.g.*, Murphy, *supra* note 8, at 627. However, it is important to note that a significant amount of the gases that cause global warming and acid rain are released during the production of electricity for light. *See id.* Billions of tons of these gases—including carbon dioxide, sulfur dioxide, and nitrous oxides—are released each year. *See id.* Furthermore, the equivalent of over eight million tons of coal or thirty million barrels of oil are wasted each year during the production of light that is not directed properly for its intended use. *See Bower, supra* note 6, at 96; *see also supra* notes 42-43 and accompanying text.

59. *See* Murphy, *supra* note 8, at 627. “The adverse effect of light pollution on stargazing is clear, but environmental impacts are only now coming into focus.” *Id.*

60. *See* Bower, *supra* note 6, at 94. For example, in areas near Washington, D.C., “[t]here is no major astronomical research left in the Washington area, and the US Naval Observatory moved its heavy equipment and operations to Arizona more than 40 years ago.” Triplett, *supra* note 27, at 988.

61. *See* M. Mitchell Waldrop, *Taking Back the Night: Astronomical Research Being Affected by City Lights & Satellites*, SCIENCE, Sept. 9, 1988, at 1288 (noting that the sky near an observatory some 100 kilometers from Tucson, Arizona was 6.5% brighter than normal, and an observatory 80 kilometers from San Diego, California had a sky that was 100% brighter than normal); *see also* Arthur H. Rotstein, *Stargazers Call for Lights Out*, THE DETROIT NEWS, Sept. 1, 2000, at A1 (growth near Tucson, Arizona has increased the amount of light by up to 20% in the last 10 years).

62. *See* Rotstein, *supra* note 61, at A1 (noting that “[f]or astronomers . . . keeping the sky dark is a matter of their survival”).

63. *See* Johannes Andersen, *Astronomy and the Degrading Environment*, SCIENCE, Apr. 21, 2000, at 443; *see also* William C. Burton & Peter S. Gural, *Measuring the Night Sky*, SKY & TELESCOPE, June 1996, at 82.

64. *See* Bower, *supra* note 6, at 94. Another source indicates that “[u]nder ideal conditions, one might view a night sky with over 15,000 visible stars plus the Milky Way (which includes billions of stars).” *NPCA Survey Finds Light Pollution Threatens National Park System*, U.S. NEWswire, Mar. 24, 1999, available at 1999 WL 4635973.

from where they live.⁶⁵ In suburban areas, only ten percent of the stars in the Milky Way are visible, and even less can be seen from more urban areas.⁶⁶

Many consider the night sky and its contents a natural resource.⁶⁷ For the National Park Service (NPS)⁶⁸, this natural resource is a vital part of the activities sought by visitors to its parks.⁶⁹ To determine whether and how light pollution was impacting star gazing within the NPS parks, the National Parks and Conservation Association (NPCA)⁷⁰ conducted a survey of parks within the NPS and found that of those responding to the survey, ninety-four percent stated that “a dark night sky is important to that

65. See Bower, *supra* note 6, at 94.

66. See Reese, *supra* note 5, at 22-23 (attributing reduced visibility of stars in suburbs to factors such as overlit shopping center parking lots); see also Graeme Zielinski, *Astronomers Try to Illuminate Region on Threats to Night Skies*, WASH. POST, Sept. 25, 2000, at B1 (in an area forty miles from Washington, D.C., at least fifty degrees of constellations in the night skies are obscured by light pollution).

67. See Apperson, *supra* note 5, at 1A. Both amateur and professional astronomers are now realizing the importance of the dark sky to their night observations, and according to one amateur astronomer, “[t]he stars are as much a part of nature as the trees are.” Dana Tofig, *Roswell May Dim Lights to Brighten Stars*, THE ATLANTA JOURNAL, Oct. 15, 2000, at C1. Believing this natural resource to be important enough to protect with legislation, New Mexico has passed legislation to protect the dark skies. See John Buting, *The Starry Night: Santa Fe’s Summer Milky Way Among World’s Best*, THE SANTA FE NEW MEXICAN, July 28, 2000, at C2. Even rural Vermont is trying to protect its dark skies that have yet to be impacted by light pollution. See Clair Wood, *Light Pollution Has Unknown Consequences to Nature*, BANGOR DAILY NEWS, Aug. 3, 2000, available at 2000 WL 22131087. “[Local opponents] are vigorously opposed to a proposed new prison in Springfield[, Vermont] for fear that its lights will diminish stargazing from nearby Breezy Hill. Stellafane, a celebrated festival of the stars that attracts thousands, has been held at Breezy Hill since 1926.” *Id.*

68. The National Park Service is a bureau of the U.S. Department of the Interior, and its mission has been codified at 16 U.S.C. §§ 1-4 (1994). See also Richard J. Ansson, Jr., *Funding Our National Parks in the 21st Century: Will We be Able to Preserve and Protect Our Embattled National Parks?*, 11 FORDHAM ENVTL. L.J. 1, 5-7 (1999) (providing a brief description of the NPS mission and some of the problems it faces today, including noise pollution).

69. See NPCA Survey Finds Light Pollution Threatens National Park System, *supra* note 64. “Star gazing is a connection to humanity’s earliest curiosity about our place in the universe. It is practically impossible to see the stars from most cities, but now, clear night vistas in our national parks are an important resource that is literally fading from sight.” *Id.* (quoting NPCA President, Thomas Kiernan).

70. See *id.* The National Parks and Conservation Association, the United States’ only private nonprofit citizen organization, is the leading park advocacy group in the United States that is “dedicated solely to preserving, protecting and enhancing the U.S. National Park System.” *Id.*

park's purpose and visitor experience."⁷¹ More importantly, approximately seventy percent of those responding to the survey indicated that light pollution is a problem in four of the five United States regions within the NPS.⁷² In the Northeast, Southeast and Midwest regions of the United States, light pollution is an even greater problem due to the higher concentration of urban areas.⁷³

In addition to diminishing the dark sky as a natural resource for amateur and professional astronomers alike, light pollution harms other aspects of our natural world as well. Since many species of migrating birds depend on the constellations to guide them during their migrations,⁷⁴ "artificial light will cause them to fly off course, often with disastrous results."⁷⁵ The Fatal Light Awareness Program (FLAP), an organization based in Toronto, Canada estimates that "at least 100 million birds are killed annually by flying into manmade structures."⁷⁶ It is believed that the birds are using the manmade light sources as a guide rather than the constellations upon

71. *Id.*

72. *See NPCA Survey Finds Light Pollution Threatens National Park System*, *supra* note 64. "One-third . . . of these parks consider light pollution a moderately serious or very serious problem." *Id.*

73. *See id.* The NPS concentrates more of its efforts to curb light pollution in the Pacific and Rocky Mountain areas so that it can take a proactive approach in these areas where light pollution is not quite as prevalent. *See id.* As a result of the NPCA studies on light pollution, the NPS is currently collecting data that will measure the brightness of light that is interfering with stargazing at five national parks. *See* William A. Updike, *Agency Begins Light Pollution Monitoring: NPS Initiates a Program to Address the Loss of Dark Skies*, NAT'L PARKS CONSERVATION ASS'N MAG., Sept.-Oct. 2000, at 11. This and other data resulting from the survey may help park officials to work with local communities to develop legislation that will reduce light pollution. *See id.* *See also* Chad Moore, *Light Pollution to be Studied in Parks*, IDAHO STATESMAN, Oct. 20, 2000, at 10 (reporting that the NPS will take its studies nationwide, and will conduct research in at least eight parks in order to determine how best to deal with light pollution that is affecting the view of many stars).

74. *See* JOHN CLOUDSLEY-THOMPSON ET AL., NIGHTWATCH: THE NATURAL WORLD FROM DUSK TO DAWN, 134 (1983).

It seems unlikely that a young bird could recognize the star pattern of the whole sky, and indeed, research suggests that only one small part of the sky is being used. Experiments with North American indigo buntings have shown that young birds need to watch the starry sky and to find out which part apparently rotates the least.

Id. at 132.

75. Wood, *supra* note 67. In 1954, 50,000 birds were killed after following an Air Force beacon and ultimately flying into the ground; in 1981, 10,000 birds similarly died when they were guided by the floodlights of a smokestack in Canada. *See id.* *See also* Bower, *supra* note 6, at 94-95.

76. Bower, *supra* note 6, at 95. Of the 1,500 birds that have crashed into Chicago's McCormick Place Exposition Center, there were 141 different species identified. *See* Wood, *supra* note 67.

which they would ordinarily rely.⁷⁷

Migrating birds are not the only wildlife that rely on natural nighttime light sources for specific life functions⁷⁸ or that are otherwise negatively affected by artificial light.⁷⁹ Sea turtles rely on “visual brightness cues to find the sea.”⁸⁰ Along a large portion of Florida’s coast, a region of the continental United States where sea turtles occur in the greatest numbers,⁸¹ there is prolific artificial beachfront lighting.⁸² This artificial lighting and an accompanying “urban skyglow” from bright and concentrated inland light sources misleads nesting females from the ocean and often fatally misguides hatchlings trying to make their way back to the ocean once born.⁸³

Still other wildlife can be affected by artificial light sources.⁸⁴ Moths, one of the great nighttime pollinators in nature,⁸⁵ are also attracted to

77. See Bower, *supra* note 6, at 94.

Night-migrating birds may also be attracted to large, bright lights and in North America huge flocks of wood warblers are sometimes killed as they swarm about lighthouses or airport searchlights, apparently unable to escape from the beam. . . . Why they should be attracted to the lights is not known, unless they too navigate by means of light-compass orientation.

CLOUDSLEY-THOMPSON ET AL., *supra* note 74, at 135.

78. See generally CLOUDSLEY-THOMPSON ET AL., *supra* note 74. For example, some fish species are also believed to use astral or star navigation as a means to migrate. See *id.* at 24.

79. In one of the few cases where a court has used the phrase “light pollution,” the court in *City of Chula Vista* considers the least tern bird species, which might be impacted by “[n]oise and light pollution from development,” as it decides whether a development project was appropriately denied. *City of Chula Vista v. California Coastal Commission*, 183 Cal. Rptr. 909, 921-22 (Cal. Ct. App. 1982).

80. Katherine R. Butler, Comment, *Coastal Protection of Sea Turtles in Florida*, 13 J. LAND USE & ENVTL. L. 399, 413 (1998).

81. See *id.* at 400.

82. See *id.* at 412.

83. See *id.* at 412-13. When sea turtle hatchlings do not make it to the ocean due to their reliance on the artificial light, they can die from exhaustion, dehydration and predation. See *id.* See also Bower, *supra* note 6, at 96 (quoting a marine scientist who stated, “[the sea turtles’] reliance on light is so strong that they’ll continue heading to a light source, even if it’s an abandoned fire that burns them alive”).

84. See, e.g., Steve LaRue, *Biologists Survey How Well Local Reptiles and Amphibians Are*, THE SAN DIEGO UNION-TRIB., Dec. 27, 2000, at F1. The California glossy snake and the western long-nosed snake, both nocturnal species, have been found to be “missing from coastal areas where there is a lot of light pollution from cars and houses.” *Id.* Scientists believe that predators may have been better able to catch these prey, once very common in the region during the 1920s and 1930s, due to the abundance of light in the snakes’ natural habitats. See *id.*

85. See CLOUDSLEY-THOMPSON ET AL., *supra* note 74 at 140-41. “Moths are the main agents of nocturnal pollination in the temperate regions.” *Id.* at 140.

lights.⁸⁶ Wasted time at these light sources creates a loss in energy that would otherwise be used to attract a mate.⁸⁷ For other animals, disrupted foraging, reproduction, circadian rhythms, and hormone levels may all find their causes to be in excessive artificial light in their natural environment.⁸⁸ As the awareness of light pollution grows, the need for additional research and findings indicating the potentially adverse effects on wildlife will also increase.⁸⁹

86. *See id.* at 135. Some animals use “light-compass orientation” as a way to navigate at night. *Id.* By keeping a light source, such as the sun or moon, “in the same part of their field of vision, [animals] maintain a constant angle to it as they move.” *Id.*

It is this which causes moths to collide with street lamps and lighted windows at night, for they tend to apply light-compass navigation to any source of light [If the moth] orientates to a nearby source of light, it must correct its angle as it goes past the light and consequently begins to move in a circle around it, then in a steadily diminishing spiral until it finally strikes the light.

Id. *See also* Geary, *supra* note 45, at 38. Although the death’s-head hawk moth’s normal nocturnal migratory route stretches from Africa to Scandinavia, this species has been observed to fly off course over France and Belgium. *See id.* This diversion, believed to be caused by the moths’ attraction to brightly lit sports complexes and shopping centers, often results in death to those moths flying too close to the heat generated by the intense lights. *See id.* *See generally*, Kenneth D. Frank, *Impact of Outdoor Lighting on Moths*, 42 J. LEPIDOPTERISTS’ SOC’Y 63-93 (1988) *excerpt available at*, <http://www.darksky.org/ida/info109.html> (last visited Apr. 19, 2002).

87. *See* Bower, *supra* note 6, at 96. This attraction to light may be what is causing some species’ populations to decline in the United States. *See id.* Moths may lay their eggs in areas where they will not survive. *See* Wood, *supra* note 67. *See also* Kathleen Daminger, *Shedding Light on Moth Behavior*, LANCASTER NEW ERA, July 12, 2001, at 11 (noting that male moths waste precious time when attempting to find female mates due to their erroneous reliance on street lights rather than the moon or bright stars).

88. For example, firefly populations are facing reduction due to the interference of light pollution with their mating patterns. *See* Susan Okie, *A Spotlight on Fireflies*, ORLANDO SENTINEL, July 22, 2001, at G6. Photoperiodic behavior, abnormal responses to artificial light, can affect not only migrating patterns, but also reproduction and foraging behavior. *See* Wood, *supra* note 67. Hormonal levels of animals may be altered by exposure to light and “anything that alters the hormonal levels will bring enormous changes.” *Id.* *See also* Geary, *supra* note 45, at 38 (stating that research conducted by the French Astronomical Society has indicated that “exposure to powerful floodlights can interfere with the circadian rhythms of plants and disorient migratory birds and insects”). *See generally* CLOUDSLEY-THOMPSON ET AL., *supra* note 74, at 12-22 (discussing the role and mechanics of circadian rhythms in wildlife).

89. *See* Aili Petersen, *Night Lights*, AM. SCIENTIST, Jan. 1, 2001, at 24.

For all the buzz, little research has been done on other ecological effects of light pollution – for instance, its impact under water. One aquatic ecologist, however, is currently investigating the effects of light pollution in lakes [T]hese areas, along with coastal waters, are at higher risk than other habitats in developed areas because they are unshielded and openly exposed to light.

Scientists also believe that humans are adversely affected by excessive light as well.⁹⁰ Drivers may be temporarily blinded by glare given off by lights and thus prone to accidents.⁹¹ Studies also indicate that light present during sleeping hours may disrupt internal clocks and hormone levels.⁹² Sleeping patterns themselves may have changed over the course of the post-Edison era due to the increase of artificial light.⁹³ Because this is a relatively new area, the research available on human effects of light pollution is minimal, however it appears persuasive enough that some negative effects may result.⁹⁴

IV. AN OVERVIEW OF COMMON LAW CLAIMS INVOLVING LIGHT

Although scientists are just now discovering the harmful physiological and psychological impacts of light on humans and wildlife, other unwanted and disturbing aspects of light existed well before the modern problem of light pollution existed.⁹⁵ In fact, despite the much-awaited discovery of

Id. One research study conducted at five lakes in urban and rural areas indicated that the migration of *Daphnia*, a species of freshwater zooplankton, is significantly impacted by light pollution. *See id.* at 24-25.

90. *See* Wood, *supra* note 67. Two separate scientific journals have recently published articles that identify humans as being more sensitive to light than what was previously believed, and that human circadian rhythms can be disrupted by exposure to light. *See id.*

91. *See* Reese, *supra* note 5, at 23.

92. *See* Bower, *supra* note 6, at 95. Disruption of circadian rhythms can create changes in blood and urine chemistry, behavior and melatonin production. *See id.* Furthermore, some scientists believe that “chronic disruptions in melatonin production – such as those caused by sleeping in a room that’s bathed in a streetlight’s glow – might contribute to the development of ‘hormone-related’ cancers, including breast cancer.” *Id.* *See also* N.A. Kerenyi et al., *Why the Incidence of Cancer is Increasing: The Role of ‘Light Pollution,’* 33 MED. HYPOTHESES 75 (1990) (hypothesizing that the rapid growth rate of cancer incidences correlates to the increase in exposure to light, which reduces melatonin production, over the last 100 years).

93. *See* Wolkomir & Wolkomir, *supra* note 19, at 38. While most people would assume that prior to the invention of artificial light people slept continuously throughout the night, the contrary might be true. *See id.* A study done by a National Institute of Mental Health psychiatrist indicated that when “[d]eprived of artificial light, [research volunteers] reverted to the preindustrial pattern” of segmented sleep. *Id.* It is believed that “[w]ithout the stimulus of artificial light, people secrete more prolactin, a pituitary hormone that seems to promote a state of quiet restfulness,” and prior to the industrial age, “people slept differently because they had less artificial light recalibrating their hormone production.” *Id.*

94. *See* Bower, *supra* note 6, at 95.

95. *See, e.g.,* Akers v. Marsh, 19 App. D.C. 28 (1901) (involving one of the first litigated complaints about a non-electric source of light, torch lamps, shining onto plaintiff’s property).

electric illumination and its benefits, individuals were relatively quick to react with lawsuits to enjoin light cast by others upon their property,⁹⁶ long before anyone recognized “light pollution” as a distinct environmental problem.⁹⁷

Using common law claims in all types of pollution cases has been a tool for many landowners both past and present.⁹⁸ Perhaps the two most frequent common law claims brought in environmental litigation cases have been nuisance and trespass.⁹⁹ While there are differences between these

96. See *Shelburne, Inc. v. Crossan Corp.*, 95 N.J. Eq. 188 (1923) (involving an early instance of electric light shining on to an adjoining property). See also 58 AM. JUR. 2D *Nuisances* § 153 (1989) (listing several cases where light cast upon another’s property were brought into court under the theory of nuisance). See generally K.J. Roberts, Annotation, *Casting of Light on Another’s Premises as Constituting Actionable Wrong*, 5 A.L.R. 2d 705 (1949) (providing a comprehensive overview of early twentieth-century cases involving various sources of light that were complained about in court).

97. See *supra* notes 44-94 and accompanying text for a discussion on the problem of light pollution.

98. See Frona M. Powell, *Trespass, Nuisance and the Evolution of Common Law in Modern Pollution Cases*, 21 REAL ESTATE L.J. 182, 183 (1992). Despite all the current statutory environmental law, “the common law provides the only legal recourse to individual plaintiffs in the environmental pollution cases.” *Id.* at 183 n.2. “Common-law theories protecting interests in real property focus on two essential questions: First, the *nature* of the legal interest protected, and second, the kind of *invasion* of interest which gives an owner or possessor the right to a legal remedy.” *Id.* at 184 (emphasis added). See also Arnold W. Reitze, Jr., *A Century of Air Pollution Control Laws: What’s Worked; What’s Failed; What Might Work*, 21 ENVTL. L. 1549, 1554-57 (1991) (providing a brief overview of the common law claims of nuisance and trespass generally in air pollution cases); *Bradley v. American Smelting and Refining Co.*, 709 P.2d 782 (Wash. 1985) (cause of action in trespass due to copper smelter’s deposits of particulate arsenic and cadmium falling on another’s land); *Borland v. Sanders Lead Co.*, 369 So. 2d 523, 529 (Ala. 1979) (cause of action in trespass against lead smelter for emissions of lead particulates and sulfoxide deposits on another’s land); *Martin v. Reynolds Metals Co.*, 342 P.2d 790 (1959) (cause of action in trespass against aluminum manufacturer causing fluoride gases and particulates to fall on another’s property).

99. See Roger Meiners & Bruce Yandle, *Common Law and the Conceit of Modern Environmental Policy*, 7 GEO. MASON L. REV. 923, 926 (1999). “Before federal environmental statutes became dominant, the common law doctrines most frequently relied upon in environmental litigation were nuisance and trespass.” *Id.* “The legal theories of nuisance and trespass were developed long before the birth of [the United States]” and can be traced back to twelfth century England. G. Nelson Smith, III, *Nuisance and Trespass Claims in Environmental Litigation: Legislative Inaction and Common Law Confusion*, 36 SANTA CLARA L. REV. 39, 41 (1995). Since that time, however, the theories have evolved and been applied by the courts in a much different way. See PATTON, BOGGS & BLOW, ENVIRONMENTAL LAW HANDBOOK 25-26 (BNA 1994). See also Powell, *supra* note 98, at 183 (stating that in addition to trespass and

two causes of action,¹⁰⁰ the theories behind both are considered related,¹⁰¹ and, particularly in pollution cases, these common law theories stem from property and tort law.¹⁰² Despite the predominance of legislation as a mode of dealing with environmental protection, these common law doctrines continue to have a place in environmental protection.¹⁰³ Before the

nuisance, the common law claims of negligence and strict liability have also been used in environmental pollution cases); DANIEL P. SELMI & KENNETH A. MANASTER, *STATE ENVIRONMENTAL LAW 2-1* (Release #8, Nov. 1997) (noting that the public trust doctrine is an additional common law doctrine that is frequently used in environmental law). *But see* THOMAS M. HOBAN & RICHARD O. BROOKS, *GREEN JUSTICE: THE ENVIRONMENT AND THE COURTS 11* (2d ed. 1996) (stating that “today a purely common-law cause of action is rare”).

100. “Nuisance law traditionally protected the right of a landowner or occupier to the use and enjoyment of property, while trespass provided compensation for unpermitted physical intrusion upon property rights.” SELMI & MANASTER, *supra* note 99, at 2-2 to 2-3. Furthermore, “[a] claim of trespass contemplates actual physical entry or invasion, whereas nuisance liability arises merely by virtue of an activity which falls short of tangible, concrete invasion but interferes with the use and enjoyment of land.” Smith, *supra* note 99, at 54. Just because an individual may have a claim under nuisance, it does not follow that he or she will simultaneously have a claim under trespass. *See id.* at 55.

101. *See Meiners & Yandle, supra* note 99, at 935. “Trespass, when invoked in pollution cases, is a common law theory closely related to nuisance.” *Id.* “A primary distinction between the actions of trespass and nuisance is the difference in the legal right protected.” Powell, *supra* note 98, at 185. “[Trespass and nuisance] can be distinguished by comparing the interest invaded; an actionable invasion of a possessor’s interest in the exclusive possession of land is a trespass; an actionable invasion of a possessor’s interest in the use and enjoyment of his land is a nuisance.” *Martin v. Reynolds Metals Co.*, 342 P.2d 790, 792 (Or. 1959).

102. *See* BRUCE YANDLE, *COMMON SENSE AND COMMON LAW FOR THE ENVIRONMENT: CREATING WEALTH IN HUMMINGBIRD ECONOMIES 88* (1997).

The common law-theory that applies to pollution is a part of the law of property and torts, a body of law that protects life and property from harm caused by others. Based on rights, the common law emerges in rulings announced by judges on a case-by-case basis. The law is formed from specific controversies, claims for actual damage, and requests for injunctions against the threat of damage. The rules of tort law that relate to the environment are found in a component of common law that deals with nuisance and trespass. The latter property right violation is associated with uninvited physical invasion of property, while the former relates to harms, like odors . . . , that do not reflect a physical crossing of a property boundary.

Id.

103. *See* SELMI & MANASTER, *supra* note 99, at 2-2. “Statutes have not totally eclipsed the common law doctrines for several reasons,” including the incorporation of common law concepts into the statutory scheme, the use of common law analysis by courts in interpreting a statute, the inadequacy of statutes to deal with a particular environmental problem, insufficiency of statutory remedies, and the tendency of courts to be receptive to common law actions. *Id.* at 2-6 to 2-9. *See generally* THE COMMON LAW AND THE ENVIRONMENT: RETHINKING THE STATUTORY BASIS FOR

phrase “light pollution” was coined, plaintiffs complaining about intruding light reached the courts by bringing a claim against a neighboring individual or entity in one of two ways: light as nuisance or light as trespass.¹⁰⁴

As Part IV will reveal, neither of these claims were very successful for aggrieved plaintiffs seeking to dim a neighbor’s light. Given the modern problem of light pollution and its *many* sources of light, as well as the nature of the pollutant itself, there may need to be another more reliable and effective source of relief for both humans *and* wildlife.

A. Nuisance in Environmental Pollution and Light as Nuisance Cases

Landowners seeking damages for pollution to their property may bring a nuisance claim¹⁰⁵ since a property owner’s right to use and enjoy his property is protected by the law of nuisance.¹⁰⁶ While there are two types of nuisance claims, private and public,¹⁰⁷ both “relate to the unreasonable interference with the use and enjoyment of land.”¹⁰⁸ In a private nuisance case, the plaintiff must show that the defendant, typically a neighboring

MODERN ENVIRONMENTAL LAW (Roger E. Meiners & Andrew P. Morriss eds., 2000) (providing several articles on the use and benefits of the common law over statutory legislation in protecting the environment).

104. See *Amphitheaters, Inc. v. Portland Meadows*, 198 P.2d 847, 850 (Or. 1948) (light as trespass claim); *Shelburne, Inc. v. Crossan Corp.*, 95 N.J. Eq. 188, 191 (1923) (light as nuisance claim). See also *infra* notes 124-40, 182-84 and accompanying text for a discussion of *Amphitheaters, Inc.*

105. See Powell, *supra* note 98, at 183. See also *Amphitheaters, Inc.*, 198 P.2d. at 851 (plaintiff’s second assignment of error in his appeal was that the trial court erred in denying his claim of nuisance to go forward).

106. See Powell, *supra* note 98, at 188.

107. See Ronald J. Rychlak, *Common-Law Remedies for Environmental Wrongs: The Role of Private Nuisance*, 59 MISS. L.J. 657, 658-61 (1989). Private nuisance “is an unreasonable interference with the plaintiff’s enjoyment of his property,” while public nuisance is an “unreasonable interference with the right of, or a threat to, the general public.” *Id.* at 658, 660. In many jurisdictions, public nuisances are statutory. See *id.* at 658. “[P]rivate nuisance is an invasion of another’s interest in the private use and enjoyment of land.” PATTON, BOGGS & BLOW, *supra* note 99, at 26. “The invasion will be actionable only if (1) the conduct giving rise to the invasion is tortious and (2) an interest associated with the use and enjoyment of the plaintiff’s land has been invaded.” *Id.* (relying on the RESTATEMENT (SECOND) OF TORTS §§ 821, 822). “A public nuisance . . . is an interference with a right of the public at large, which is not limited to the use and enjoyment of land.” *Id.* “[T]he plaintiff must prove both tortious conduct and an actionable invasion resulting therefrom.” *Id.* at 27. See also Smith, *supra* note 99, at 50-53 (describing the difference between private and public nuisance).

108. Smith, *supra* note 99, at 50.

individual or entity,¹⁰⁹ invaded the plaintiff's interest in his property either intentionally and unreasonably, negligently, recklessly or, in the case of abnormally hazardous activities, under the theory of strict liability.¹¹⁰ Furthermore, the invasion must be substantial,¹¹¹ but this has not been interpreted to mean that the invasion must have a physical or tangible impact.¹¹² Once the plaintiff has met his or her burden, "the burden shifts to the defendant to establish that its use was reasonable or the interference inconsequential," but the defendant's conduct will not be excused merely because it was "necessary, modern or efficient."¹¹³ The courts essentially use a balancing test to determine whether the defendant's activities are sufficient to constitute a nuisance to the plaintiff's enjoyment of his or her property.¹¹⁴ The most common forms of environmental nuisance have included noise pollution, dust, smoke, vibrations and odors,¹¹⁵ and remedies for the

109. "Often the environmental plaintiff is an individual or small group, and the defendant is a large corporate entity." Rychlak, *supra* note 107, at 661.

110. See Smith, *supra* note 99, at 50. "A private nuisance cause of action arises when the injury inflicted either diminishes the value of [plaintiff's] property, continually interferes with the power or control of that property, or causes a material disturbance or annoyance to the person in the use or occupation of that property." *Id.* "A private nuisance is a nontrespassory invasion of another's interest in the private use and enjoyment of land." RESTATEMENT (SECOND) TORTS § 821D (1979).

One is subject to liability for a private nuisance if, but only if, his conduct is a legal cause of an invasion of another's interest in the private use and enjoyment of land, and the invasion is either

- (a) intentional and unreasonable, or
- (b) unintentional and otherwise actionable under the rules controlling liability for negligent or reckless conduct, or for abnormally dangerous conditions or activities.

RESTATEMENT (SECOND) TORTS § 822 (1965). See also Rychlak, *supra* note 107, at 674 (stating that a defendant's mere knowledge that an interference with plaintiff's enjoyment of the land may be sufficient to establish intent).

111. See PATTON, BOGGS & BLOW, *supra* note 99, at 27. "An invasion will not be actionable in nuisance unless it is substantial, i.e., if it offends normal persons in that particular locality." *Id.* See also Rychlak, *supra* note 107, at 676-77. "[M]inor interferences of a short duration will not amount to a nuisance." *Id.* at 676.

112. See PATTON, BOGGS & BLOW, *supra* note 99, at 27. "Unlike trespass, nuisance does not require a physical invasion of the property but occurs if a condition is maintained on the defendant's land that interferes with the plaintiff's use and enjoyment of the plaintiff's property." Powell, *supra* note 98, at 188-89.

113. See Rychlak, *supra* note 107, at 678.

114. See Reitze, *supra* note 98, at 1555. See also Andrew Jackson Heimert, *Keeping Pigs Out of Parlors: Using Nuisance Law to Affect the Location of Pollution*, 27 ENVTL. L. 403, 410-12 (1997) (describing the shifting view of the courts over the years to at least recognize some sort of relief for plaintiffs even if the defendant's pollution-creating activity was considered more socially valuable).

115. See Rychlak, *supra* note 107, at 660-61 & nn. 17-21. Arguably, some of these types of pollution, and perhaps adding light to the list, would require a showing

plaintiff can include monetary and equitable injunctive relief.¹¹⁶

It was not until the early twentieth century that courts began hearing nuisance claims from individuals complaining of light being emitted from an adjacent property onto theirs.¹¹⁷ In *Shelburne, Inc. v. Crossan*,¹¹⁸ some of the plaintiff's hotel rooms were subjected to light shining in from the defendant's property upon which a large sign emitting the light was affixed.¹¹⁹ Because the lights were turned on from dusk until midnight, and on at least one occasion until after midnight, the illumination disturbed guests of the hotel and allegedly lowered the value of the rooms.¹²⁰ In its holding, the court reasoned "that the amount of light radiating from the sign does illuminate or 'light up' many of the rooms facing it, and in some instances, at least, to such an extent as to be objectionable to the guests."¹²¹

of intentional interference by the defendant because in some cases they do not physically damage the land. *See id.* at 674-75 (stating that "when there is physical damage to the plaintiff's land, water or improvements, even unintentional or accidental interferences are generally actionable"). *But see id.* at 676 (stating that the harm caused by defendant "is not limited to physical harm or injury" and the standard is whether a reasonable person would find the harm to be substantial).

116. *See Reitze, supra* note 98, at 1555-56.

Nuisance, along with the doctrine of trespass, allows not only the awarding of monetary damages, but also the use of equitable relief such as injunctions or abatement orders. Because equitable relief is available, the private nuisance doctrine is the common law remedy that can be used to directly abate pollution.

Id. at 1555. In *Essick v. Shillam*, residents of a community sought to enjoin the defendant from building a supermarket and adjoining parking lot because they feared that both would constitute a nuisance despite being in conformity with the zoning and building guidelines. *See Essick v. Shillam*, 32 A.2d 416, 417 (Pa. 1943). Despite the defendant's stated intent to "illuminate the premises brightly, inside and out, and the parking lot as well," the court held that there was not yet a nuisance. *Id.* at 419. However, if the resulting illumination did, in fact, become objectionable or produce a sleep-disturbing glare, the court stated "it can be adjusted to satisfy plaintiffs' objections, or, if necessary, enjoined at that time." *Id.* Today, such plaintiffs might possibly still oppose such building projects, but they would probably have more local regulations to ensure that specific lighting requirements are met by the developer. *See B.J.'s Wholesale Club, Inc. v. Hutchings*, No. CA 99-00732, 2000 Mass. Super. LEXIS 430 (Mass. Super. Ct. Sept. 27, 2000).

117. *See Shelburne, Inc. v. Crossan Corp.*, 95 N.J. Eq. 188 (1923). The plaintiff in the case was the owner of a hotel in Atlantic City, New Jersey. *See id.* The defendants were an adjacent property owner, and a company renting rooftop space on a building on the property for the purpose of erecting an advertising sign. *See id.* The sign consisted of 1,084 15-watt lights, six 100-watt lights and twenty-eight 75-watt lights. *See id.* at 189.

118. *See id.*

119. *See id.* at 189.

120. *See id.* at 189-90.

121. *Id.* at 190.

The court found that the defendant's light is better considered a nuisance,¹²² and provided relief for the plaintiff.¹²³

There are few cases aside from *Shelburne, Inc.* that have light emissions as the *exclusive* factor declared as a nuisance by the plaintiff.¹²⁴ The court in *Amphitheaters, Inc.* reasoned that although light emitted from a neighboring race track onto a drive-in theater's property might not constitute trespass as the plaintiff had claimed,¹²⁵ there may be a legitimate claim in nuisance.¹²⁶ In *Amphitheaters, Inc.*, the plaintiff was a drive-in theater operator whose theater abutted a parcel of land that included a one-mile outdoor racing track.¹²⁷ That the track would be lighted for night racing was featured extensively in local newspapers.¹²⁸ The floodlights were generally aimed at the track, but there was substantial evidence that the emitted light spilled onto the theater's premises and had "a serious effect

122. See *id.* at 191. "There can be little, if any, doubt that light radiating from lamps of the intensity, and, when placed in the position of those in the sign in question, may become a nuisance, if it (the light) materially interferes with the ordinary comfort, physically, of human existence." *Id.* (citation omitted).

123. See *id.* at 192. The defendant was ordered to limit the sign's hours of operation to the hours before midnight. See *id.*

124. See, e.g., *Amphitheaters, Inc. v. Portland Meadows*, 198 P.2d 847 (Or. 1948) (discussed *infra* at notes 126-40, 182-84); *Shepler v. Kansas Milling Co.*, 278 P. 757 (Kan. 1929) (reflected sunlight from defendant's grain storage tanks). See also Dean N. Alterman, Comment, *Reflected Sunlight Is a Nuisance*, 18 ENVTL. L. 321, 330-31 (1988) (noting a few cases, including *Shepler*, that have dealt with reflected sunlight as a nuisance). For cases that have light as at least one factor in a nuisance claim, see 58 AM. JUR. 2D *Nuisances* § 153 (1989) (listing several cases where light cast upon another's property was brought into court under a nuisance claim); K.J. Roberts, Annotation, *Casting of Light on Another's Premises as Constituting Actionable Wrong*, 5 A.L.R.2d 705 (1949) (providing a comprehensive overview of early twentieth-century cases involving various sources of light that were complained about in court).

125. See *Amphitheaters, Inc.*, 198 P.2d at 850.

126. See *infra* notes 182-84 and accompanying text. See also John-Mark Stensvaag, *State Regulation of Nuclear Generating Plants Under the Clean Air Act Amendments of 1977*, 55 S. CAL. L. REV. 511, 536 n.131 (1982) (stating that *Amphitheaters, Inc.* "address[es] a nuisance which might today be called 'light pollution'").

127. See *Amphitheaters, Inc.*, 198 P.2d at 848. *Amphitheaters, Inc.*'s lease on the property allowed the construction of a drive-in outdoor movie theater, but also provided that the theater's activities could not interfere with the race track which was located on the same property. See *id.* Some of the theater promoters knew that the neighboring race track would be illuminated to some extent, but regardless, the construction of the theater was completed fifteen days before the completion of the race track. See *id.*

128. See *id.* The racetrack was equipped with "approximately 350 1500-watt lights" mounted and clustered on 80-foot poles around the track. See *id.* at 850.

on the quality of pictures shown on the screen.”¹²⁹ As a result, the theater operator brought a claim of trespass against the race track operator.¹³⁰

The court, while acknowledging that the line between trespass and nuisance claims was blurry, held that the theater operator’s claim was governed by the law of nuisance and not trespass.¹³¹ In analyzing this case of first impression, the court found that nuisance cases tended to fall in one of four categories,¹³² and that the plaintiff’s claim may possibly be analogous to only the first category.¹³³ However, the court found itself in a difficult position when it was time to analyze why light should be considered parallel to the cases involving smoke, odors and flies; “no one can contend that light is inherently harmful to persons in the ordinary enjoyment of property.”¹³⁴ Instead, the court decided to use a balancing test of weighing the plaintiff’s complaint against the defendant’s activities¹³⁵ and looked to

129. *Id.* at 850. Not only did the light reduce the quality of movie pictures, but the theater suffered a financial loss due to this invasion of light. *See id.* There was evidence that the light cast upon the theater’s property was equivalent to that of a full moon. *See id.*

130. *See infra* notes 182-84 and accompanying text. On his appeal from the circuit court ruling, the plaintiff contended that the defendant’s light was, in fact a trespass, and “error [should be] assigned by reason of the failure of the court to submit to the jury the question of trespass.” *Amphitheaters, Inc. v. Portland Meadows*, 198 P. 2d 847, 850 (Or. 1948).

131. *See Amphitheaters, Inc.*, 198 P. 2d at 850. “The mere suggestion that the casting of light upon the premises of a plaintiff would render a defendant liable without proof of any actual damage, carries its own refutation. Actions for damages on account of smoke, noxious odors and the like have been universally classified as falling within the law of nuisance.” *Id.*

132. *See Amphitheaters, Inc.*, 198 P.2d at 851. The court delineated the four classes of nuisance as follows:

- (1) Cases involving harm to human comfort, safety or health by reason of the maintenance by a defendant upon his land of noxious or dangerous instrumentalities causing damage to the plaintiff in respect to legally protected interests of the plaintiff in his land.
- (2) Cases involving illegal or immoral practices, most of them being public as distinct from private nuisances [i.e. gambling, abortions, lotteries].
- (3) Cases involving obstructions to streets, public ways, common rights, access to property and the like.
- (4) Cases involving damage to the land itself, as by flooding.

Id. The court also listed several Oregon cases that fell into the first class. *See id.*

133. *See id.* The court likened previous cases involving noxious odors, ashes, smoke, dynamite and stream pollution to the type of case being brought by the theater operator. *See id.*

134. *Id.* at 851-52. In previous cases, the factor that was held to be a nuisance was held to be both inherently harmful and an unreasonable and substantial interference with the plaintiff’s ordinary use and enjoyment of his property. *See id.* In fact, in another part of the opinion the court states that the “case [at bar] differs fundamentally from other cases, all typical cases of nuisance, in that light is not a noxious, but is, in general, a *highly beneficial element*.” *Id.* at 858 (emphasis added).

135. *See id.* at 852. The interference with the use and enjoyment of land must

other jurisdictions to determine whether the race track's lights did indeed constitute a nuisance.¹³⁶

After much analysis of other courts' decisions on similar issues, the Oregon Supreme Court ultimately held that the defendant's race track lights cast upon the plaintiffs did not constitute a nuisance.¹³⁷ The court reasoned that a drive-in theater is of a sensitive nature, not one of the ordinary person,¹³⁸ and in analogous cases finding light as nuisance, light was but one of many other factors comprising the nuisance.¹³⁹ In its dicta, the court indicated its willingness to classify light as nuisance in other more appropriate cases.¹⁴⁰

Hildebrand v. Watts is another, more recent case that also indicates a court's unwillingness to classify light as nuisance in certain instances.¹⁴¹ In this case, the plaintiffs and defendants were neighbors in a residential area of Connecticut.¹⁴² The plaintiffs objected to the defendants' placement of a security and recreational light on the roof of their house because when it was in use at night, it illuminated the plaintiff's driveway and parts of the house.¹⁴³ The court, not convinced by the plaintiff's arguments,

be substantial and unreasonable, and "whether a particular annoyance or inconvenience is sufficient to constitute a nuisance depends on its effect upon an ordinarily reasonable man, that is, a normal person of ordinary habits and sensibilities." *Id.* "In determining whether the conduct of the defendant was unreasonable under the facts of this case, the court found that neither party could claim any greater social utility in its conduct than the other." Powell, *supra* note 98, at 191.

136. See Powell, *supra* note 98, at 189-91. "The Oregon Supreme Court noted that no Oregon decision had ever held that the casting of light in any quantity or form upon the land of another gave rise to a cause of action under any legal theory." *Id.* at 190. The court, not finding any relevant caselaw in its own jurisdiction, looked to other decisions to see whether light had ever constituted a nuisance. See *Amphitheaters, Inc.*, 198 P.2d at 854-58.

137. See *Amphitheaters, Inc. v. Portland Meadows*, 198 P.2d 847, 858.

138. See *id.* at 857.

139. See *id.* The court did note that in *Shelburne, Inc.*, light was the only factor in the nuisance, but differentiated that case from the one at bar because unlike the theater operator, a hotel dweller trying to sleep at night "was with the normal and ordinary sensibilities of dwellers in the hotel, and with the ordinary use of property." *Id.*

140. See *id.* at 858.

We do not say that the shedding of light upon another's property may never under any conditions become a nuisance, but we do say that extreme caution must be employed in applying such legal theory. The conditions of modern city life impose upon the city dweller and his property many burdens more severe than that of light reflected upon him or it.

Id.

141. See *Hildebrand v. Watts*, No. 13988, 1997 Del. Ch. LEXIS 32, at *20-21 (Del. Ch. Feb. 18, 1997).

142. See *id.* at *2.

143. See *id.* at *4. The defendants "testified that there is crime in their

found that they had not met their burden of proving by a preponderance of the evidence that the light was a sufficiently impermissible interference so as to be enjoined.¹⁴⁴ The court reiterated that a “balancing of equities is involved in determining whether an interference with one’s use of property is such an impermissible interference that it should be enjoined as a nuisance.”¹⁴⁵ In this case the court held,

absent stronger evidence than has been presented here – for example, that sleep is interfered with – the plaintiffs have not made out a case, by a preponderance of the evidence, that the intrusion of light onto their property unreasonably outweighs the legitimate interests of the [defendants] in lighting their own property for purposes of safety and for the recreation of their children.¹⁴⁶

neighborhood and that they placed the light on their house in an effort to protect themselves against vandalism and theft.” *Id.* The plaintiffs contended that the light shined into their kitchen, bathroom and screened-in porch during the period from dusk until around 9:30 p.m. or later and interfered with their enjoyment of these areas. *See id.* at *12-13. They also alleged that the light was frequently turned on and off by defendant in order to harass them. *See id.* at *13.

144. *See id.* at *14-21. The court, upon review of the videotaped evidence, was not persuaded that the light was unreasonable or too obtrusive in the kitchen and bathroom. *See id.* at *15. Furthermore, the court did not find that there was any injury to the plaintiffs from the light being cast upon the driveway and front lawn since “they do not use these places for relaxation.” *Id.* at *16. In terms of the back porch, the court stated that the plaintiffs were also not entitled to relief because no claim as to the specific light fixture that was causing such light was before the court (only the roof light was before the court), and because there was not sufficient evidence to determine whether the defendants were really turning the light on and off purposely. *See id.* at *16-18.

145. *Id.* at *19. In referring to a previous case that cited the *Shelburne, Inc.* decision, the court noted that “generally courts have been hesitant to enjoin the use of outside lights.” *Id.* at *19.

146. *Id.* at *20-21. *But see* *Rhudy v. Fairfield Univ.*, No. CV-990368012S, 2000 WL 1269296, at *1, *5 (Conn. Super. Ct. Aug. 18, 2000) (court found that the activities being conducted on University Field were sufficient to constitute a nuisance that warranted injunctive relief). In *Rhudy*, the plaintiffs, four families living adjacent to and abutting University Field at Fairfield University, claimed noise and light from the field were creating a nuisance. *See id.* at *2-5. The lighting along University Field consisted of “eight light towers, four on each side of the field, with clusters of floodlights . . . [with each floodlight consisting of] a 1500-watt metal halide lamp” which, according to one expert, is the biggest lamp source of this kind available in commerce. *Id.* at *4. It created a light on some plaintiffs’ property up to 30 times brighter than a full moon and reached various rooms, including bedrooms. *See id.* The court issued an injunction that lights be turned off by 7:00 p.m. during the week, by 5:00 p.m. on weekends and light fixtures could not directly shine towards plaintiffs’ property. *See id.* at *6.

While *Shelburne, Inc., Amphitheaters, Inc.*, and *Hildebrand* dealt with light being cast upon a plaintiff's property by one other defendant, the problem of light pollution is created by *many* sources of light, some of which are not located on adjacent property.¹⁴⁷ To date, there have been no cases brought under the theory of private nuisance to combat light pollution, but predictably, such plaintiffs would not prevail. First, the nature of the interest protected by nuisance is "the private use and enjoyment of land."¹⁴⁸ It is hard to imagine that, given the unsuccessful claims of the drive-in theater operator combating a significant source of adjacent light, or the neighbor complaining of a security light shining in an area not traditionally considered an area used for relaxation, a particular individual or group would be successful in combating multiple defendants who are creating a more diffuse "sky glow." Further, it is likely that the glow of light pollution that would be complained about would be produced by multiple and distant defendants, thus creating more legal difficulties in bringing a lawsuit.¹⁴⁹ Courts have indicated that "[t]he hypersensitive user will not recover for the actual harm he suffers, but only (if at all) for the harm that a normal person would suffer from the same invasion."¹⁵⁰ For example, astronomers, who require the darkest of skies, may find themselves in the same position as drive-in theater owners.¹⁵¹ Finally, since light pollution can be found without other nuisances such as noise, it is uncertain whether light alone will be sufficient for a plaintiff to prevail in the majority of cases.¹⁵²

In contrast to the private nuisance claims, "a public nuisance is an unreasonable interference with a right common to the general public."¹⁵³

147. See *supra* Part III.A.

148. Falcone, III & Utain, *infra* note 162, at 68.

149. Even if there were one significant building creating light pollution, it is unlikely that courts would find this to be a nuisance since adjacent property owners fighting one building have had difficulty prevailing in lawsuits. See Dean N. Alterman, Comment, *Reflected Sunlight Is A Nuisance*, 18 ENVTL. L. 321, 323 (1988). "Buildings in urban areas often invade the property rights of adjacent landowners (i.e., by causing noise or emitting artificial light). However, courts usually consider these invasions to be reasonable because buildings are socially useful." *Id.*

150. *Id.* at 325 (citing the example of *Amphitheaters, Inc.*).

151. But see *infra* notes 189-90, 196 and accompanying text (indicating that in at least some areas statutes are being drafted to protect the night sky for astronomical observatories).

152. The lack of cases where light was the sole nuisance factor does not help a plaintiff in determining whether his claim will prevail. See, e.g., *supra* note 124 and accompanying text. Most of the cases that have involved light as a nuisance have also had other factors such as noise, odors, or smoke. See also sources cited *supra* note 96 (indicating that light is usually one of many factors in a nuisance suit).

153. Smith, *supra* note 99, at 52. A private nuisance, therefore, is not necessarily created from a public nuisance and, in order for an individual to have standing to

Public nuisance claims are often used to help abate environmental pollution that may harm public health or the general quality of life for the community.¹⁵⁴ To prevail, “a plaintiff must show that the defendant's conduct constitutes substantial and unreasonable interference with the public or with public property.”¹⁵⁵ Usually plaintiffs in public nuisance claims are seeking injunctive relief to prevent defendant's continued nuisance activity.¹⁵⁶ Bright lights, in combination with other activity, have constituted a public nuisance in some jurisdictions.¹⁵⁷

recover under a private nuisance claim, he or she must also have an injury distinct from that of the public. *See id.* *See also* RESTATEMENT (SECOND) OF TORTS § 821B (1977) (defining of public nuisance).

- (1) A public nuisance is an unreasonable interference with a right common to the general public.
- (2) Circumstances that may sustain a holding that an interference with a public right is unreasonable include the following:
 - (a) Whether the conduct involves a significant interference with the public health, the public safety, the public peace, the public comfort or the public convenience, or
 - (b) whether the conduct is proscribed by a statute, ordinance or administrative regulation, or
 - (c) whether the conduct is of a continuing nature or has produced a permanent or long-lasting effect, and, as the actor knows or has reason to know, has a significant effect upon the public right.

Id.

154. *See* John L. Giesser, Comment, *The National Park Service and External Development: Addressing Park Boundary-Area Threats Through Public Nuisance*, 20 B.C. ENVTL. AFF. L. REV. 761, 761 & n.4, 775 (1993) (arguing that the public nuisance doctrine could possibly help the National Park Service in preventing development activities, which would cause increased traffic, smog, noise, and artificial light, near park boundaries).

155. *Id.* at 776.

Thus, in order to find a public nuisance, a court must conclude that the defendant's conduct substantially damages public property, or significantly disturbs, offends, or endangers the health of members of the public with ordinary physical stature and “sensibilities.” Furthermore, the court must find that the defendant's conduct decreases the environmental quality of the affected property to a level lower than that which the public reasonably expects.

Id. at 776-77.

156. *See id.* at 777. The plaintiff must show that the requested injunction would be the only adequate remedy, and granting of the injunction is of greater benefit than the impact of the injunction on the defendant. *See id.* Most courts that do issue injunctions usually require only a modification in the defendant's behavior, and not a complete cessation of activity. *See id.* at 783.

157. *See id.* at 791 & n.298 (citing *Brough v. Ute Stampede Ass'n*, 142 P.2d 670 (Utah 1943) and *Hansen v. Indep. School Dist. No. 1*, 98 P.2d 959 (Idaho 1939)). In *Hansen*, the court considered both how an injunction would impact the defendant's night baseball games, as well as the fact that the field was in a residential area. *See Hansen*, 98 P.2d at 962. The court required an injunction to prevent any lights from

Whether a public nuisance claim would be more successful than a private nuisance claim in a light pollution case is uncertain. For example, given the relatively recent and few research findings that light pollution may be harmful to the public health, it may be unlikely that light pollution is yet to be accepted as harming public health.¹⁵⁸ In addition, usually only attorneys general or district attorneys have standing to advance public nuisance claims.¹⁵⁹ In either type of nuisance claim, however, the inconsistency and insufficiency of court holdings across jurisdictions does not seem adequate to deal with the modern problem of light pollution.¹⁶⁰

B. Trespass in Environmental Pollution and Light as Trespass Cases

Trespass can generally be described as “an [intentional]¹⁶¹ intrusion or invasion of tangible property, either real or personal, which interferes with the possessor’s interest in the right of *exclusive possession* of the property.”¹⁶² Nuisance and trespass, because they are so closely related, often

further shining onto the plaintiffs’ premises. *See id.* The court noted that while night baseball games are not nuisances *per se*, they “become such under circumstances such as here where they are conducted in such a manner as to greatly interfere with legitimate and necessary use and enjoyment of the property of others.” *Id.* The dissent argued that whether the baseball games constituted a nuisance in this particular case was a question of fact that should have been determined at trial. *See id.* at 963.

158. *See supra* notes 90-94 and accompanying text for a discussion of the developing data surrounding public health impacts of light pollution.

159. *See Meiners & Yandle, supra* note 99, at 927.

160. *See, e.g.,* PATTON, BOGGS & BLOW, *supra* note 99, at 28 (listing some drawbacks to common law nuisance; such as, the courts’ unwillingness to allow “trifling inconveniences” to advance as claims, claims barred by statutes of limitations where the defendant’s activity is not continuing, the inability of plaintiffs to prevail in court’s balancing test, and the defendant’s compliance with laws and permits); David Schoenbrod, *Protecting the Environment in the Spirit of the Common Law*, in *THE COMMON LAW AND THE ENVIRONMENT* 4-6 (Roger E. Meiners & Andrew P. Morriss, eds., 2000). While this article, and in fact the entire book, suggests that the common law plays an important role in environmental law, there are some notable drawbacks to the common law: liability in modern day pollution cases is more difficult to define, unsatisfactory remedies and unenforcement. “Science has progressed so that we think about pollution as a matter of degree as well as of kind.” *Id.* at 5. “Even if the court can adjudicate liability, it will have trouble providing satisfactory remedies for many kinds of modern pollution problems” since typically only harms that are proven will be given remedies. *Id.*

161. The requisite intent can be shown by a plaintiff in one of two ways: proving that “the defendant acted for the purpose of causing the invasion,” or “the defendant [knew] that there [was] a substantial certainty that its actions [would] result in the invasion.” PATTON, BOGGS & BLOW, *supra* note 99, at 29-30. However, there may also be liability shown in cases where the defendant has acted negligently or recklessly. *See id.* at 29.

162. Powell, *supra* note 98, at 185.

result in confusion for plaintiffs as to which cause of action is best advanced in a particular case.¹⁶³

In pollution as trespass cases, one of the main issues that courts have struggled with has been to what degree the invasion must be tangible or physical.¹⁶⁴ There are three cases that have served as a model for courts requiring this analysis and may be helpful in analyzing light as a pollutant: *Martin v. Reynolds Metals Co.*,¹⁶⁵ *Borland v. Sanders Lead Co.*,¹⁶⁶ and *Bradley v. American Smelting and Refining Co.*¹⁶⁷ Briefly, these cases

One is subject to liability to another for trespass, irrespective of whether he thereby causes harm to any legally protected interest of the other, if he intentionally

- (a) enters the land in the possession of the other, or causes a thing or a third person to do so, or
- (b) remains on the land, or
- (c) fails to remove from the land a thing which he is under a duty to remove.

Id. at 185 n.10 (quoting RESTATEMENT (SECOND) OF TORTS § 158 (1965)). The harm suffered by the plaintiff in a trespass claim must be substantial. *See* PATTON, BOGGS & BLOW, *supra* note 99, at 30. “The degree of substantiality will depend, as in nuisance, on the facts of the case and the outlook of the court that is examining those facts.” *Id.* In addition, “courts have held that the definition of [“thing”] requires something larger and more substantial than smoke, dust, gas, or fumes.” Meiners & Yandle, *supra* note 97, at 936. *See also* Joseph F. Falcone, III & Daniel Utain, Comment, *You Can Teach an Old Dog New Tricks: The Application of Common Law in Present-Day Environmental Disputes*, 11 VILL. ENVTL. L.J. 59, 71-72 (2000) (providing a historical overview of how harmful an intrusion had to be in order for a plaintiff to prevail in trespass cases).

163. *See* Smith, *supra* note 99, at 57-67 (providing a general discussion of some considerations for plaintiffs seeking to recover under either theory: statute of limitations, whether the defendant’s actions are of a continuing or permanent nature, burden of proof, discovery rule, and damages that can be recovered).

164. Several tests have been developed by courts to determine whether an invasion should be classified as a trespass or instead as a nuisance. *See infra* notes 169-71 and accompanying text. *See also* Falcone & Utain, *supra* note 162, at 71-72. “That the traditional rule of trespass required some kind of physical invasion was undisputed; the real debate was grounded in how *tangible* or *visible* the invasion need be.” *Id.* Advances in science, and subsequently a better understanding of potential environmental hazards rendered the “dimensional” test unworkable. *See id.* at 72. Today, most courts utilize a “balancing” test in pollution trespass cases. *See id.* at 73.

165. 342 P.2d 790, 791 (Or. 1959) (landowners brought action against defendant aluminum reduction plant, alleging that defendant caused airborne fluoride gases and particulates to settle upon landowners’ property and thus constituted a trespass).

166. 369 So. 2d 523, 526 (Ala. 1979) (landowners brought action against defendant that recovered lead from used automobile batteries, alleging that lead particulates and sulfoxide deposits were falling on landowners’ property and thus constituted a trespass).

167. 709 P.2d 782 (Wash. 1985) (landowners brought claims against defendant copper smelter, alleging that “microscopic, airborne particles of heavy metals” were

represent the courts' development of an appropriate analysis for cases involving something less than the physical touching that is typically seen in trespass cases.¹⁶⁸ Initially, some courts used a "dimensional" test,¹⁶⁹ but ultimately more workable tests were created in order to deal with modern pollution problems.¹⁷⁰ Today, most courts use a "balancing test" similar to

falling on landowners' property and thus constituted either a trespass or nuisance).

168. See Falcone, III & Utain, *supra* note 162, at 70-71. "[T]he tort of trespass requires an 'intrusion,' some physical, tangible invasion of the plaintiff's land. This intrusion can occur 'on, beneath or above the surface' of the land." *Id.*

169. See *id.* at 72 & nn.58-59. The intrusion under the "dimensional" test was classified based on its visibility such that any invasions not detectable by the unaided eye were nuisances and visible invasions were trespasses. See *id.* This dimensional test was rejected by the *Martin* court. See *Martin*, 342 P.2d at 794.

If, then, we must look to the character of the instrumentality which is used in making an intrusion upon another's land we prefer to emphasize the object's energy or force rather than its size. Viewed in this way we may define trespass as any intrusion which invades the possessor's protected interest in exclusive possession, whether that intrusion is by visible or invisible pieces of matter or by energy which can be measured only by the mathematical language of the physicist.

Id. In *Martin*, the court ultimately held that intrusion of fluoride particles qualified as a trespass, and distinguished the case from *Amphitheaters, Inc.* where it had earlier indicated that light could not be considered a trespass when it noted the difference between "a cannon ball and a ray of light." See *id.* The court explained that its statement in *Amphitheaters, Inc.* was not "a pronouncement that a trespass can never be caused by the intrusion of light rays or other intangible forces," and rather it meant that "the conduct of the defendant in a particular case may not be actionable if it does not violate a legally protected interest of the plaintiff." *Id.* For further analysis of the *Amphitheaters, Inc.* decision in *Martin*, see *id.* at 794-97. See also Powell, *supra* note 98, at 197-201 (providing a further analysis of the *Martin* decision).

170. See Falcone & Utain, *supra* note 162, at 71-74 & nn.58-62. "[W]ith the evolution of science, and consequently a deeper understanding of potential environmental hazards, the continued application of the 'dimensional' test by courts became infeasible." *Id.* at 72. "In *Borland v. Sanders Lead Co.*, the Alabama Supreme Court expressly acknowledged the problem of limiting the scope of liability under the *Martin* test." Powell, *supra* note 98, at 201. In *Borland*, the court found there was a trespass by the defendant's lead reduction activities which caused harm to the plaintiff's farm. See *Borland v. Sanders Lead Co.*, 369 So. 2d 523, 529 (Ala. 1979). The court stated that:

[w]hether an invasion of a property interest is a trespass or a nuisance does not depend upon whether the intruding agent is 'tangible' or 'intangible.' Instead, an analysis must be made to determine the interest interfered with. If the intrusion interferes with the right to exclusive possession of property, the law of trespass applies. If the intrusion is to the interest in use and enjoyment of property, the law of nuisance applies.

Under the modern theory of trespass, the law presently allows an action to be maintained in trespass for invasions that, at one time, were considered indirect and, hence, only a nuisance. In order to recover in trespass for this type of invasion . . . a plaintiff must show 1) an invasion affecting an interest in the exclusive possession of his property; 2) an inten-

that of nuisance cases.¹⁷¹

The most recent case that may provide some insight as to how these types of pollution cases will be handled is found in *Bradley*.¹⁷² In *Bradley*, the court accepted the elements of trespass that were set forth by the *Borland* court.¹⁷³ However, as this decision relates to light as trespass, the court appeared to indicate that light should appropriately be considered a nuisance.¹⁷⁴ It appears that this court and others will require an actual and substantial damage to be present in trespass claims – perhaps something that a ray of light cannot achieve.¹⁷⁵ These cases may guide plaintiffs who advance light as trespass claims in jurisdictions where there have been few cases where light is the sole factor claimed in the trespass.

Again, defined as “an intrusion or invasion of tangible property, either real or personal, which interferes with the possessor’s interest in the right of *exclusive possession* of the property[,]”¹⁷⁶ claims in trespass have been used by plaintiffs disturbed by a neighbor’s source of electric illumination.¹⁷⁷ In trespass cases, not only must a plaintiff show the defendant was acting intentionally, negligently or recklessly,¹⁷⁸ he “must also show that

tional doing of the act which results in the invasion; 3) reasonable foreseeability that the act done could result in an invasion of plaintiff’s possessory interest; and 4) substantial damages to the *res*.

Id. at 529. It is perhaps this last requirement that may halt light as trespass cases, and more likely light pollution as trespass cases, in their tracks: how much does light really damage the *res*? See Powell, *supra* note 98, at 202 (positing “[a]t what point does the injury become so ‘substantial’ that a cause of action arises?”).

171. See *Falcone & Utain*, *supra* note 162, at 73. The weight of the defendant’s activity is measured against the character and substantiality of the harm. See *id.*

172. *Bradley v. American Smelting and Refining Co.*, 709 P.2d 782 (1985).

173. See *id.* at 790.

174. See *id.* at 791. “When airborne particles are transitory or quickly dissipate, they do not interfere with a property owner’s possessory rights and, therefore, are properly denominated as nuisances.” *Id.* (citing several cases, including *Amphitheaters, Inc. v. Portland Meadows*).

175. See *id.*

176. Powell, *supra* note 98, at 185. “One is subject to liability to another for trespass, irrespective of whether he thereby causes harm to any legally protected interest of the other, if he intentionally (a) enters land in the possession of the other, or causes a thing or a third person to do so, or (b) remains on the land, or (c) fails to remove from the land a thing which he is under a duty to remove.” RESTATEMENT (SECOND) OF TORTS § 158 (1965). An actor’s intent does not necessarily have to be hostile or possess a harmful motive, but “is an intent to bring about a result which will invade the interests of another in a way that the law will not sanction.” *Bradley*, 709 P.2d at 786 (citing W. PROSSER, TORTS, § 8, at 31-32 (4th ed. 1971)). “Intent may be established if the defendant knows that there is a substantial certainty that its actions will result in the invasion.” PATTON, BOGGS & BLOW, *supra* note 99, at 29-30.

177. See *Amphitheaters, Inc.*, 198 P.2d at 850.

178. See Powell, *supra* note 98, at n.22. “[I]nterests in land are protected under

the harm suffered is substantial.”¹⁷⁹ Although most courts initially required the intruding object to be visible to the unaided eye in order for it to be considered a trespass rather than a nuisance,¹⁸⁰ many jurisdictions may have begun to abandon this rule in modern air pollution cases.¹⁸¹

Perhaps the leading and only model case for light as trespass, albeit an unsuccessful one for the plaintiff, is *Amphitheaters, Inc. v. Portland Meadows*.¹⁸² The court was not convinced that the cases relied upon by the plaintiff in his trespass claim were analogous to the case at bar,¹⁸³ and held that nuisance was the more appropriate claim for the plaintiff since the race track’s operations were not substantial enough to constitute a trespass.¹⁸⁴ Given the relatively unsuccessful holding for the

three theories: The defendant intentionally invaded a legally protected interest; the defendant negligently or recklessly brought about an invasion of the plaintiff’s interest; or the defendant accidentally caused an invasion in the course of engaging in an activity for which strict liability is imposed.” *Id.*

179. PATTON, BOGGS & BLOW, *supra* note 99, at 30. “The degree of substantiality will depend, as in nuisance, on the facts of the case and the outlook of the court that is examining those facts.” *Id.* In many cases, a court will consider direct invasions with less scrutiny as they would indirect invasions in trespass claims. *See id.* “The distinction between injuries which were direct and substantial and those which were considered indirect and less substantial eventually evolved into a fictitious ‘dimensional’ test: ‘[I]f the intruding agent could be seen by the naked eye, the intrusion was considered a trespass.’” Powell, *supra* note 98, at 186. Otherwise, invisible objects were considered a nuisance as they were indirect and less substantial. *See id.* *See also Borland*, 369 So.2d at 527 (stating that “[t]he modern action for trespass to land stemmed inexorably from the common law action for trespass which lay when the injury was both direct and substantial”).

180. *See* Powell, *supra* note 98, at 186.

181. *See id.* “The traditional rule limiting trespass to invasion of things that can be seen with the naked eye is an arbitrary one that has been discarded in some modern airborne pollution cases.” *Id.* *But see* Michael C. Anibogu, *The Future of Electromagnetic Field Litigation*, 15 PACE ENVTL. L. REV. 527, 593 n.443 (1998) (noting the rule of a 1982 California Supreme Court decision that “actionable trespass may not be predicated upon non-damaging noise, odor or light”). *See also* *Wilson v. Interlake Steel Co.*, 32 Cal.3d 229, 233 (1982) (“All intangible intrusions, such as noise, odor, or light alone, are dealt with as nuisance cases, not trespass.”).

182. 198 P.2d 851 (Or. 1948). For facts of this case see *supra* notes 124-29 and accompanying text.

183. *See Amphitheaters, Inc.*, 198 P.2d at 850-51. The plaintiff relied upon one case which involved a trespass claim where the United States was “continuously firing artillery over the petitioners’ land[,]” to which the Oregon Supreme Court replied, “[w]e need not argue the distinction between a cannon ball and a ray of light.” *Id.* at 851. Furthermore, the plaintiff’s reliance on *Shelburne, Inc. v. Crossan Corp.*, 95 N.J. Eq. 188 (1923), and another case involving light cast upon an individual’s property resulted in the court pointing out that those cases were decided under the theory of nuisance, not trespass. *See id.* at 851.

184. *See id.* at 850-51.

plaintiff in *Amphitheaters, Inc.*, as well as in the traditional pollution cases mentioned above, it is unlikely that light pollution, let alone light crossing one property owner's boundary to another, will ever constitute a trespass. As such, statutes and regulations providing for such types of claims may be required in order to address the growing problem of light pollution.

V. MODERN DEVELOPMENTS IN LIGHT POLLUTION LEGISLATION

Given the increased levels of light use around the country, and the relatively minimal and unpredictable success of common law claims for plaintiffs seeking to curb their neighbors' light use,¹⁸⁵ additional sources of law governing light use are needed if we are to curb light pollution as a larger problem.¹⁸⁶ To date, there is no federal, and relatively little state, legislation in place to reduce light pollution and its impacts,¹⁸⁷ and the majority of legislation for reducing this relatively new type of pollution largely exists at the county and municipal levels.¹⁸⁸

There are a few pioneer states that have enacted statewide or partially statewide light pollution or light reduction statutes.¹⁸⁹ The goal, scope and

185. See *supra* notes 95-184 and accompanying text.

186. See, e.g., *infra* notes 189-239, 242-51 and accompanying text for examples of state and local regulations that are geared towards further reducing light pollution that is different from the typical property owner versus property owner dispute over misdirected light.

187. See Brown, *supra* note 7, at 62. The United States Environmental Protection Agency's Green Lights Program is designed to promote voluntary energy conservation, but largely as it relates to *indoor* lighting and not *outdoor* lighting. See *id.* There is nothing currently in the federal Clean Air Act or other federal legislation to regulate light pollution. See 42 U.S.C. §§ 7401-7671 (Clean Air Act provisions). But see John-Mark Stensvaag, *State Regulation of Nuclear Generating Plants Under the Clean Air Act Amendments of 1977*, 55 S. CAL. L. REV. 511, 535 n.131 (1982) (suggesting that if "air pollution agent" under the Clean Air Act is interpreted broadly, then the Clean Air Act could conceivably cover nonionizing electromagnetic radiation which includes, among other things, *visible light*).

188. See Brown, *supra* note 7, at 49. "[L]egislation, regulations, or government policies to control the adverse effects of lighting are being implemented at the federal, state, and especially the local levels." *Id.*

189. Arizona, Connecticut, Maine, Michigan, New Mexico and Texas have state statutes that in some way regulate the use of light within all or a portion of the state. See ARIZ. REV. STAT. ANN. §§ 49-1101-06 (2001) (specifying what types of light fixtures can be used in outdoor lighting, such as fully or partially shielded fixtures, automatic shutoff devices and prohibition of mercury vapor fixtures); CONN. GEN. STAT. ANN. §§ 13a-110-110a (2001) (providing the types of roadway light fixtures that may be paid for with state funds); CONN. ACTS. 01-134 (Reg.) (repealing and amending § 13a-110a to include municipal roads and municipal funds in addition to

purpose of these statutes varies widely. In Arizona, the legislature found that “the continued existence of astronomical observatories in Arizona is in the best interests of the state,” thus requiring a tighter control on nearby outdoor lighting.¹⁹⁰ Connecticut, through its statute, tries to “maximize energy conservation and to minimize light pollution, glare and light trespass” from roadway lighting.¹⁹¹ Similarly, a Maine statute was drafted to minimize “glare and light trespass” from publicly funded lights along roadways.¹⁹² A Michigan statute governs a limited region near Lake Hudson¹⁹³ where specific sections of Lenawee County in Michigan have been designated as a “dark sky preserve.”¹⁹⁴ Some of the activities the legisla-

state highways and state funds as within the statute’s reach); ME. REV. STAT. ANN. tit. 23, § 708 (West 2001); ME. REV. STAT. ANN. tit. 5, § 1769 (West 1999) (requiring that state funds may only be used to install or replace a permanent outdoor luminaire if it is a full cutoff luminaire falling within the minimum illuminance recommended by the Illuminating Engineering Society of America or the federal Department of Transportation); MICH. COMP. LAWS §§ 324.75101-.75106 (2001) (stating factors that determine when and what kind of lighting can be installed within the dark sky preserve area); N.M. STAT. ANN. § 74-12-1 to -10 (Michie 2000) (mandating that after January 1, 2000 all outdoor lighting fixtures that are installed must be shielded or else extinguished automatically between 11:00 p.m. and sunrise); TEX. HEALTH & SAFETY CODE ANN. §§ 425.001-.002 (Vernon 2002) (mandating what kinds of lights can be “installed, replaced, maintained or operated using state funds” and that consideration be given to several factors, including light pollution, beforehand); TEX. LOC. GOV’T CODE ANN. § 240.032 (Vernon 2002) (granting permission to the commissioners court of a county within fifty-seven miles of a major astronomical observatory, acting upon the request of the director of the McDonald Observatory, to adopt orders to regulate the use of outdoor lighting so as to reduce interference with astronomical research). *See also* IND. CODE § 36-7-4-1403 (2000) (specifying that light pollution in Indiana may be included in specifications for development requirements); MONT. CODE ANN. § 23-1-126 (2001) (indicating that Montana’s “good neighbor policy of public land use . . . seeks a goal of no impact upon adjoining private and public lands by preventing impact upon those adjoining lands from . . . light pollution”); VA. CODE ANN. § 15.2-920 (Michie 1997) (granting any Virginia locality the power by ordinance to “regulate outdoor lighting within an area one-half mile around planetariums, astronomical observatories and meteorological laboratories”); VA. CODE ANN. § 18.2-121.2 (Michie 1996) (creating a Class 3 misdemeanor in Virginia for those who willfully cast a spotlight upon private property used for agriculture or livestock).

190. ARIZ. SESS. LAWS CH. 236 §1 (West 1999). “[T]he legislature requests the cooperation of public and private utilities, billboard owners, counties, municipalities and others owning or operating outdoor lights to reduce light pollution which interferes with the successful operation of such observatories.” *Id.*

191. CONN. GEN. STAT. § 13a-110a (West Supp. 2001). The title of this section, which falls under the Highway and Bridges title, is “Highway lighting designed to maximize energy conservation and minimize light pollution.” *Id.*

192. *See* ME. REV. STAT. ANN. tit. 23, § 708 (West Supp. 2001).

193. *See* MICH. COMP. LAWS ANN. §§ 324.75102-.75105 (West 1999).

194. *See id.* §§ 324.75101-.75102. “‘Dark sky preserve’ means the area desig-

ture intended to protect in those areas includes those that require darkness, such as “enjoyment of the night sky, nighttime photography, and wildlife photography.”¹⁹⁵ One Texas statute clearly is aimed at protecting the livelihood of the state’s astronomers¹⁹⁶ and gives a wide range of options for county commissioners,¹⁹⁷ while the other statute appears to consider certain factors similar to Maine and Connecticut when allowing the use of state funds for lighting.¹⁹⁸

Perhaps the most comprehensive state statute belongs to New Mexico.¹⁹⁹ Titled the “Night Sky Protection Act,”²⁰⁰ the purpose of this statute “is to regulate outdoor night lighting fixtures to preserve and enhance the state’s dark sky while promoting safety, conserving energy and preserving the environment for astronomy.”²⁰¹ By enacting this statute, New Mexico became the only other southwestern state to join Arizona in actively trying

nated in section .75102.” *Id.* § 324.75101. Section 324.75102 states that “[t]he state owned land at lake Hudson, legally described as: All state owned land located in [various sections]—Lenawee County, Michigan[,] is designated a dark sky preserve.” *Id.* § 324.75012.

195. *Id.* § 324.75103.

196. *See* TEX. LOC. GOV’T CODE ANN. § 240.032(a), (b) (Vernon Supp. 2002). “[T]he commissioners court of a county, any part of which is located within 57 miles of a major astronomical observatory . . . may adopt orders regulating the installation and use of outdoor lighting The orders must be designed to protect against the use of outdoor lighting in a way that interferes with scientific astronomical research.” *Id.* § 240.032(a), (c). “[A] facility that is established to conduct scientific observations of astronomical phenomena and is equipped with one or more telescopes that (A) have objective diameters that total 69 inches or more; and (B) are permanently mounted in enclosed buildings” is considered a “major astronomical observatory.” *Id.* § 240.031(1).

197. *See* TEX. LOC. GOV’T CODE ANN. § 240.002(c) (Vernon Supp. 2002). The commissioners may

- (1) require that a permit be obtained from the county before the installation and use of certain types of outdoor lighting in a regulated area;
- (2) establish a fee for the issuance of the permit;
- (3) prohibit the use of a type of outdoor lighting that is incompatible with the effective use of the observatory;
- (4) establish requirements for the shielding of outdoor lighting; and
- (5) regulate the times during which certain types of outdoor lighting may be used.

§ 240.032(c).

198. *See* TEX. HEALTH & SAFETY CODE ANN. § 425.002. Consideration must be given to “energy conservation, reducing glare, minimizing light pollution, and preserving the natural night environment” when appropriating state funds for lighting. *Id.* at § 425.002(a)(4).

199. *See* N.M. STAT. ANN. §§ 74-12-1 - 10 (Michie 2000).

200. *See id.* § 74-12-1.

201. *Id.* § 74-12-2.

to preserve the night sky for its astronomers.²⁰² While Texas also has legislation designed to protect astronomical observations, the Texas statute is more limited than the New Mexico statute in that commissioners can only enact orders if the area is within fifty-seven miles of a major astronomical observatory.²⁰³ Despite being enacted to protect the astronomers in each state, the positive result of these statutes – reduced nighttime light – potentially benefits wildlife and people as well.

Of the six state statutes regulating light pollution within at least a portion of the state's boundaries, only Texas actually defines light pollution.²⁰⁴ Instead, most of these statutes define and regulate types of acceptable or unacceptable light fixtures installed or repaired with state funds, or other factors that contribute to light pollution.²⁰⁵ The comprehensive and statewide New Mexico statute defines “outdoor lighting fixture” as “an outdoor artificial illuminating device, whether permanent or portable, used for illumination or advertisement, including searchlights, spotlights and floodlights, whether for architectural lighting, parking lot lighting, landscape lighting, billboards or street lighting.”²⁰⁶ Beginning January 1, 2000, the New Mexico Night Sky Protection Act took effect and required virtually all newly installed outdoor lighting fixtures to be shielded,²⁰⁷ and no

202. See *supra* note 190 and accompanying text.

203. See TEX. LOC. GOV'T CODE ANN. § 240.032(a). See also VA. CODE ANN. § 15.2-920, *supra* note 189 (allowing localities to regulate outdoor lighting only in areas within one-half mile around such observatories).

204. See TEX. HEALTH & SAFETY CODE ANN. § 425.001(2). “Light pollution” means the night sky glow caused by the scattering of artificial light in the atmosphere.” *Id.*

205. See, e.g., ARIZ. REV. STAT. ANN. § 49-1101 (providing definitions only for types of lighting fixtures); CONN. GEN. STAT. ANN. § 13a-110a(6) (providing only a definition of “light trespass” to mean “light emitted by a luminaire that shines beyond the boundaries of the property on which the luminaire is located”); ME. REV. STAT. ANN. tit. 23, § 708(1) (defining only “Commissioner” and “roadway lighting”); ME. REV. STAT. ANN. tit. 5, § 1769 (defining “light trespass” identical to Connecticut’s definition); MICH. COMP. LAWS ANN. § 324.75101 (defining only “dark sky preserve” and “fully shielded”); N.M. STAT. ANN. § 74-12-3 (defining only “outdoor lighting fixture” and “shielded”).

206. N.M. STAT. ANN. § 74-12-3(A) (Michie 2000). Arizona defines “outdoor lighting fixture” in almost identical terms. See ARIZ. REV. STAT. ANN. § 49-1101(2) (West 1999) (adding lighting for recreational areas to the list). See also TEX. HEALTH & SAFETY CODE ANN. § 425.001(3) (excluding from its list -- but otherwise similar to Arizona and New Mexico -- “lighting equipment that is required by law to be installed on motor vehicles or lighting required for the safe operation of aircraft”).

207. N.M. STAT. ANN. § 74-12-4 (Michie 2000). The Act does not require that incandescent fixtures of 150 watts or less and all other sources of light up to 75 watts be shielded. See *id.*

mercury vapor outdoor lighting fixtures can be sold or installed.²⁰⁸ Furthermore, “an outdoor lighting fixture not meeting these provisions shall be allowed, if the fixture is extinguished by an automatic shutoff device between the hours of 11:00 p.m. and sunrise.”²⁰⁹ The broad scope of the New Mexico statute becomes quite apparent when compared to other statutes – the regulations are not restricted to state funded activities or lighting fixtures.²¹⁰

Arizona’s statute also applies equally to most public and private lighting and is quite similar to the New Mexico statute. One difference between the Arizona and New Mexico statutes is that Arizona exempts streetlight fixtures from being shielded if a shielding device is not available from the light manufacturer.²¹¹ Additionally, the Arizona statute, while allowing automatic shutoff devices for nonconforming light fixtures, does not mention the requirements for outdoor recreational facilities.²¹² In this way, the Arizona statute appears to be slightly more lenient in regulating light use outdoors.

In contrast, Maine merely regulates state-funded permanent outdoor “luminaires,” defined as “the complete lighting system, including the lamp and the fixture,”²¹³ on highways, or “roadway lighting.”²¹⁴ Similarly, Con-

208. See *id.* § 74-12-6.

209. *Id.* § 74-12-5(A).

210. See *id.* § 74-12-5(B). “No outdoor recreational facility, whether public or private, shall be illuminated after 11:00 p.m. except for a national or international tournament or to conclude any recreational or sporting event or other activity conducted, which is in progress prior to 11:00 p.m. at a ballpark, outdoor amphitheater, arena or similar facility.” *Id.*

211. See ARIZ. REV. STAT. ANN. § 49-1102. There are also restrictions on the use and installation of mercury vapor lights. See *id.* § 49-1104.

212. See *id.* § 49-1103. Despite the statute, the issue of light pollution continues to be a pressing issue of concern for residents near areas where commercial developments are taking place. See Jennifer Sterba, *Some Love Development Idea, Other Residents Cite Concerns*, ARIZ. DAILY STAR, Jan. 31, 2001, at B3 (quoting one resident’s concerns about light pollution that would come with a proposed 320,000 square foot shopping center near Tucson).

213. See ME. REV. STAT. ANN. tit. 5, § 1769(1)(J) (West 1999). Section 1769, which falls under Maine’s Energy Conservation in Buildings Act, also provides the same definition for Maine Revised Statutes Annotated, title 23, section 708 which regulates highway lighting under the state highway law.

214. See ME. REV. STAT. ANN. tit. 23, § 708(1)(B). “‘Roadway lighting’ means lighting that is specifically intended to illuminate roadways for automobiles but does not mean lighting intended to illuminate roadways only for pedestrian purposes.” *Id.* State funds may not be used to install or replace any permanent outdoor luminaire unless it is a “full cutoff luminaire when the rated output of the luminaire is greater than 1,800 lumens; . . . does not exceed the minimum illuminance recommended by the federal Department of Transportation for that purpose;” safety in the area cannot be achieved through other passive means, and consideration has been given to mini-

necticut also regulates which state-funded “luminaires” can be used on roadways.²¹⁵ Two feasible limitations to these two states’ statutes are that they only pertain to state funded lighting, and the lighting is limited to roadway lighting.²¹⁶ Furthermore, Michigan’s statute is even more restricted in that it regulates very localized lighting activity near Lake Hudson.²¹⁷ Although these statutes may be a step in the right direction, the proliferation of light use leading to light pollution has not been limited to state highway lighting or to small regions of a state.²¹⁸

In addition to defining what types of fixtures are to be regulated, the statutes in the six states – Arizona, Connecticut, Maine, Michigan, New Mexico and Texas – all generally provide a minimum indication of how much light should be emitted and where, unless an exemption exists.²¹⁹ For example, in its dark sky preserve areas, Michigan requires that “lighting shall be directed downward,”²²⁰ and when possible and/or appropriate, “fully shielded fixtures” or “motion sensor fixtures” should be used.²²¹ In Connecticut, in addition to being required to “maximize energy conservation and minimize light pollution, glare and light trespass,”²²² no state funds will be used to install or replace permanent outdoor lights unless the light emitted from the luminaire is adequate for its intended purpose,²²³ and is a “full cutoff” luminaire on secondary roads or primary roads where safety will not be compromised.²²⁴ Connecticut also requires that state-funded light fixtures be allowed only in areas where “the purpose of the lighting installation or replacement cannot be achieved by reducing the speed limit in the area to be lighted or by installing reflectorized roadway

mizing glare and light trespass. *Id.* § 708(2).

215. See CONN. GEN. STAT. ANN. § 13a-110a(a)(8), (b) (Supp. 2001).

216. See *id.* § 13a-110(a), (b). See also ME. REV. STAT. ANN. tit. 23, § 708(1)(B), *supra* note 214 and accompanying text.

217. See MICH. COMP. LAWS ANN. § 324.75102 (West 1999).

218. See, e.g., *supra* notes 27-33, 44-57 and accompanying text.

219. See *infra* notes 220-29 and accompanying text.

220. MICH. COMP. LAWS ANN. § 324.75104(a) (West 1999). The county commission is responsible for ensuring that only lighting for safety, security or the reasonable use and enjoyment of the property is used within the preserve, and that it does not reasonably interfere with activities requiring darkness. See *id.* § 324.75103.

221. See *id.* § 324.75104(b), (c). “Fully shielded” fixtures must be “shielded or constructed so that no light rays are emitted by the installed fixture at angles above 15 degrees below the horizontal plane and also constructed so that the filament or light source is not visible to the naked eye when viewed from a point higher than 15 degrees below the horizontal plane.” *Id.* at § 324.75101(b).

222. CONN. GEN. STAT. ANN. § 13a-110a(b)(1) (Supp. 2001).

223. See *id.* § 13a-110a(b)(2).

224. See *id.* § 13a-110a(b)(3)-(4). “Full cutoff luminaire” is defined as a “luminaire that allows no direct light emissions above a horizontal plane through the luminaire’s lowest light-emitting part.” *Id.* § 13a-110a(a)(2).

markers, lines, warnings, informational signs or other means of passive or reflective lighting.”²²⁵ Similarly in Maine, no state funds will be used to replace or install any outdoor luminaire unless it is a “full cutoff luminaire,” and the “maximum illuminance does not exceed the minimum illuminance recommended for that purpose.”²²⁶

In Arizona, all outdoor lighting fixtures are required to be fully or partially shielded if over a certain wattage.²²⁷ If outdoor lights do not meet this requirement or fall under other exemptions, they may use automatic shutoff devices to keep lights off from midnight through sunrise.²²⁸ The New Mexico statute, while similar to the Arizona statute, provides further explanation for permissible use of lighting for private and public outdoor recreational facilities.²²⁹

In some states, certain exemptions from the statute may apply thus limiting the extent of how much light is being reduced or regulated.²³⁰ For instance, in the Texas statute regulating light use within fifty-seven miles of observatories, there is an exemption for “outdoor lighting in existence or under construction on September 1, 1975.”²³¹ In its other light pollution statute, Texas exempts temporary emergency lighting, temporary lighting necessary for nighttime work, special events requiring additional lighting, lighting used solely to enhance the “aesthetic beauty of an object” or any compelling safety interest not addressable by other means.²³² Despite New Mexico’s extensive legislation in this area, there are many exemptions from the statute, including “fixtures on advertisement signs on interstates and federal primary highways,”²³³ “fixtures existing and legally installed prior to the effective date of the [statute],”²³⁴ lighting required for “worker

225. *Id.* § 13a-110a(b)(7)

226. *See* ME. REV. STAT. ANN. tit. 23, § 708(2) (West 1999); ME. REV. STAT. ANN. tit. 5, § 1769(2) (West 2002). Consideration should also be made to minimize glare and light trespass. *See id.*

227. *See* ARIZ. REV. STAT. ANN. § 49-1102 (West 1999). Streetlights are exempt if the manufacturer does not provide a shielding device. *See id.* In addition, airport navigational lighting is also exempt from this statute. *See id.* § 49-1105.

228. *See* ARIZ. REV. STAT. ANN. § 49-1103 (West 2001).

229. *See* N.M. STAT. ANN. § 74-12-5(B) (Michie 2000). “No outdoor recreational facility, whether public or private, shall be illuminated after 11:00 p.m. except for a national or international tournament or to conclude any recreational or sporting event which is in progress prior to 11:00 p.m. at a ballpark, outdoor amphitheater, arena or similar facility.” *Id.*

230. *See infra* notes 231-36 and accompanying text.

231. TEX. LOC. GOV’T CODE ANN. § 240.034 (Vernon 2002).

232. *See* TEX. HEALTH & SAFETY CODE ANN. § 425.002(c)(2)-(5) (Vernon 2002).

233. N.M. STAT. ANN. § 74-12-7(1) (Michie 2000).

234. *Id.* at § 74-12-7(2). “[H]owever, when existing lighting fixtures become unrepairable, their replacements are subject to all the provisions of the Night Sky

safety at farms, ranches, dairies, feedlots or industrial, mining or oil and gas facilities,”²³⁵ and lights required for navigation at airports and aircraft safety.²³⁶ Ironically, these types of exemptions are also some of the larger and more harmful sources of light pollution.²³⁷

Only two states provide for any kind of penalty for violations in their statutes—New Mexico and Texas.²³⁸ In New Mexico, “[a]ny person, firm or corporation violating the provisions of the Night Sky Protection Act shall be punished as follows: A. for a first offense, the offender may be issued a warning; and B. for a second offense or offense that continues for thirty days from the date of the warning, [the offender will be charged \$25.00] minus the replacement cost for each offending fixture.”²³⁹ In Texas, a violator may be sued by the county or district attorney for an injunction, and is found to have committed a misdemeanor.²⁴⁰

Over the past few years, several state bills have been introduced to state legislatures to enact statutes that will reduce light pollution or prompt studies of light pollution.²⁴¹ Perhaps the increasing introduction of these bills

Protection Act.” *Id.*

235. *Id.* at § 74-12-7(4).

236. *See id.* at § 74-12-7(3). *See also* ARIZ. REV. STAT. ANN. § 49-1105 (West 1999) (stating that “[n]othing in this article shall apply to navigational lighting systems at airports”).

237. *See, e.g., supra* note 28 and accompanying text.

238. *See* N.M. STAT. ANN. § 74-12-10 (Michie 2000); TEX. LOC. GOV’T CODE ANN. § 240.035 (Vernon 2002).

239. N.M. STAT. ANN. at § 74-12-10 (Michie 2000).

240. *See* TEX. LOC. GOV’T CODE ANN. § 240.035 (Vernon 2002). “(a) A county or district attorney may sue in the district court to enjoin a violation of this chapter. (b) A person who violates an order adopted under this chapter commits an offense. An offense under this section is a Class C misdemeanor. (c) Both civil and criminal enforcement may be used against the same conduct.” *Id.*

241. Alabama, Colorado, Connecticut, Iowa, Maryland, Massachusetts, Minnesota, New Hampshire, New York, Oregon, Pennsylvania, Rhode Island, Vermont and Wyoming have recently seen the introduction of bills and resolutions related to statewide study or reduction of light pollution. *See generally* H.R.J. Res. 316, Reg. Sess. (Ala. 2000) (failed to be carried over from 2000 regular session); H.B. 1160, 63d Gen. Assem., 1st Reg. Sess. (Colo. 2001) (pending); H.B. 5636, Gen. Assem., 2002 Reg. Sess. (Conn. 2002) (failed Joint favorable deadline); H.B. 265, 78th Gen. Assem., 1st Sess. (Iowa 1999) (failed to be carried over from 78th Second Session); H.B. 2141, 78th Gen. Assem., 2d Sess. (Iowa 1999) (failed to be carried over from 78th Second Session); S.S.B. 3035, 78th Gen. Assem., 2d Sess. (Iowa 1999) (senate study bill listing the findings of light pollution and its effects); H.S.B. 574, 78th Gen. Assem., 2d Sess. (Iowa 1999) (house study bill listing the findings of light pollution and its effects); H.J.R. 14, Gen. Assem., 415th Sess. (Md. 2001) (enacted: creates a task force to study the causes and consequences of light pollution); H.B. 3990, 181st Gen. Court., Reg. Sess. (Mass. 1999) (failed to move from House Committee on Science and Technology); H.B. 3528, 182d Gen. Court, Reg. Sess. (Mass. 2001) (pending: to

is due in large part to organizations such as the International Dark Sky Association and its local chapters that provide information for citizens seeking to introduce legislation at the state or local level.²⁴² While it is encouraging that some states are becoming increasingly aware that the night sky is a viable natural resource²⁴³ and are providing for the study of light pollution,²⁴⁴ many states repeatedly fail to pass statewide light pollution laws.²⁴⁵ Whether or not these bills pass now or in the future may depend on increased awareness and research findings regarding the effects of light pollution, and the determination that this kind of pollution should be regulated.

Municipal and county legislation is currently the most abundant source

Senate Committee on Ways and Means); H.R. 3368, 81st Leg., Reg. Sess. (Minn. 1999) (failed to be carried over from 81st Regular Session); H.B. 2276, 82d Leg., Reg. Sess. (Minn. 2001) (pending); S.B. 2204, 82d Leg., Reg. Sess. (Minn. 2001) (pending); H.R. 727, Gen. Court, 156th Sess. (N.H. 1999) (enacted: established a committee to study the effects of and possible solutions to light pollution); H.B. 222, Gen. Court, 157th Sess. (N.H. 2001) (pending); S.B. 6799, 223rd Leg. Sess. (N.Y. 1999) (attempted to amend the environmental conservation law); A.B. 6357, 223rd Leg. Sess. (N.Y. 1999) (attempted to amend the environmental conservation law); A.B. 5352, 224th Leg. Sess. (N.Y. 2001) (passed by Senate, but subsequently vetoed by Governor); H.B. 3973, 71st Leg. Assem. (Or. 2001) (pending); H.R. 175, 185th Gen. Assem., Reg. Sess. (Pa. 2001) (pending: attempting to establish a light pollution study committee); H.B. 300, 185th Gen. Assem., Reg. Sess. (Pa. 2001) (pending: includes penalty provision for individuals committing light trespass); S.B. 2399, 2001-2002 Leg. Sess. (R.I. 2002) (pending); H.R. 698, Adjourned Sess. of 1999-2000 Biennium (Vt. 1999) (failed to be carried over); S.B. 41, 55th Leg., 2000 Budget Sess. (Wyo. 2000) (failed to be carried over); S.B. 73, 56th Leg. (Wyo. 2001) (failed to be carried over); and H.B. 308, 56th Leg. (Wyo. 2001) (failed to be carried over). *See also* Lynn Bartels, *Lawmaker Has Bright Idea: Dim the Lights*, DENVER ROCKY MOUNTAIN NEWS, Jan. 16, 2001, at 10A (reporting that Colorado Representative Andrew Romanoff is proposing statewide legislation to reduce light pollution).

242. *See A Guide to Outdoor Lighting Regulations*, at <http://www.skykeepers.org/ordguide.htm> (last visited Apr. 19, 2002) (providing a long list of links to general reference on how to draft ordinances and other regulations for introduction to legislature, as well as a fairly comprehensive listing of currently enacted and proposed state and local regulations in the United States).

243. *See, e.g.*, H.S.B. 574, 78th Gen. Assem., 2d Sess. (Iowa 1999). In this House Study Bill, the General Assembly found that

[t]he night sky is an important part of the natural heritage of the citizens of [Iowa] and steps should be taken to minimize the amount of terrestrial light that shines up into the night sky. Uplight from terrestrial light sources is wasteful and has made it increasingly difficult for the citizens of the state to enjoy the night sky because celestial objects are obscured.

Id. "Celestial objects" includes "stars, constellations, the milky way, meteors, comets, the northern lights, star clusters, nebulae, galaxies, the moon, and the planets." *Id.*

244. *See, e.g.*, H.J.R. 14, Gen. Assem., 415th Sess. (Md. 2001); H.R. 727, Gen. Court, 156th Sess. (N.H. 1999).

245. *See supra* note 241 and accompanying text.

of light regulation.²⁴⁶ Traditionally, these bylaws have mandated that emitted light does not extend visibly beyond the property line or create significant glare, and they represent the codification of light as trespass or nuisance.²⁴⁷ More recently however, as awareness and appreciation of the harmful effects of light pollution has grown, municipalities have been enacting regulations specifically to reduce light pollution.²⁴⁸ Regions within

246. “Most towns have zoning bylaws with some provisions related to lighting, intended to avoid nuisance conditions such as bright light from commercial properties spilling onto residential properties.” Brown, *supra* note 7, at 59. For purposes of this Note, however, only a small and general sampling of the myriad of lighting regulations will be highlighted.

247. See *id.* at 60. See, e.g., NEWPORT, R.I., CODIFIED ORDINANCES ch. 17.96, § 17.96.020(H), available at <http://ordlink.com/codes/newport/maintoc.htm> (last visited Apr. 19, 2002) (“All external illumination shall be directed or shielded in such a manner that the illuminated areas are confined essentially to the property on which the illumination originates”).

248. See Brown, *supra* note 7, at 61. For example, Bisbee, Arizona has entitled one of its ordinances the “Light Pollution Code.” BISBEE COUNTY, ARIZ., ORDINANCE 0-98-10, art. 7.10 (1998), available at <http://c3po.cochise.cc.a3.us/astro/pollution05.htm> (last visited Apr. 19, 2002). The purpose of this ordinance is to:

- A. Minimize light pollution and light trespass for the enjoyment and use of property and the night environment by the citizens of the City of Bisbee, and
- B. Encourage the use of types, kinds, construction, installation and uses of outdoor light fixtures, lighting practices and systems which will reduce light pollution and light trespass, and
- C. Benefit astronomical research and observations, and
- D. Conserve energy while increasing nighttime visibility, utility, security and productivity.

Id. at art. 7.10.1. In the city of Ketchum, Idaho, there exists an ordinance known as the “Dark Sky Ordinance.” See KETCHUM, ID., ORDINANCE 743 (June 21, 1999), available at <http://darksky.org/~pai/vaIDA/ords/ketadrlo.html> (last visited Apr. 19, 2002). Recognizing that Ketchum’s dark nighttime sky is a natural resource to be enjoyed by both residents and tourists to this resort area, the purpose of the ordinance is worded more extensively than the Bisbee ordinance:

1.2 Purposes - The general purpose of this Ordinance is to protect and promote the public health, safety and welfare, the quality of life, and the ability to view the night sky, by establishing regulations and a process of review for exterior lighting. This Ordinance establishes standards for exterior lighting in order to accomplish the following:

- a. To protect against direct glare and excessive lighting;
- b. To provide safe roadways for motorists, cyclists and pedestrians;
- c. To protect and reclaim the ability to view the night sky, and thereby help preserve the quality of life and the tourist experience;
- d. To prevent light trespass in all areas of the City;
- e. To promote efficient and cost effective lighting;
- f. To ensure that sufficient lighting can be provided where needed to promote safety and security;
- g. To allow for flexibility in the style of lighting fixtures;
- h. To provide lighting guidelines;

the United States where astronomical observatories are more common have been some of the first communities to enact light pollution prevention legislation.²⁴⁹ However, areas that do not have local astronomical research stations have also taken into account the night sky when enacting ordinances.²⁵⁰ Some communities specify design requirements for certain lighting activities,²⁵¹ the maximum output of light from a fixture,²⁵² or sug-

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- i. To provide assistance to property owners and occupants in bringing nonconforming lighting into conformance with this Ordinance; and,
 - j. To work with other jurisdictions within Blaine County to meet the purposes of this Ordinance.

Id. at § 1.2.

249. See Brown, *supra* note 7, at 60. “A small number of municipalities developed more focused outdoor lighting regulations as early as the 1970s, primarily to reduce adverse effects on astronomical research.” *Id.* In Arizona, one of the states that also has a statewide light pollution prevention statute, there are two major observatories in the Tucson area. See *id.* Because of its local regulations, “Tucson is reputed to be the only city in the United States with a population exceeding 500,000 where the Milky Way is visible from the city center” *Id.* Similar legislation was later passed in Boxborough and Harvard Massachusetts, two towns close to the Oak Ridge Observatory, the largest telescope east of the Mississippi River. See *id.*

250. See *id.* at 60-61. For some localities, the incentive to reduce light use may be purely economic and not environmental. See Keri Buscaglia, *Light Pollution is a Glowing Concern*, CHIC. TRIB., Jan. 31, 2001, at 4 (noting that some dark sky advocates often point out that with a few simple modifications to current lighting, a savings of \$200,000 a year could be attained in a city of 600,000 residents); *Let There Be Less Light*, CAPITAL TIMES, Oct. 15, 1999, at 10A (turning off 1,200 street lights in Madison, Wisconsin would have saved \$50,000 annually). While many of these towns also see the economic incentive in reducing the number of lights or increasing the energy efficiency in the bulbs that are used, the aesthetic benefits of reducing light pollution may also be a driving factor. See Brown, *supra* note 7, at 61-62.

251. See Brown, *supra* note 7, at 62. Atlanta, Georgia requires billboards to be lit from the top of the sign facing down rather than lights on the bottom of the sign facing up. See *id.* In Limerick, Pennsylvania, the town ordinance requires, among other things, that “[d]irectional fixtures such as flood lights, spot lights and sign lights shall be installed or aimed so that they do not shine directly into the window of a neighboring residence, directly into a roadway, or skyward.” LIMERICK TOWNSHIP, PA, ORDINANCE ch. 180 § (C)(3)(b) (Nov. 6, 1996). Limerick also has a provision for illuminated signs as well: “Externally illuminated signs shall be lighted by fixtures mounted at the top of the sign and aimed down rather than by fixtures mounted at the bottom of the sign and aimed up.” *Id.* at § 3(f). In Moab, Utah the requirement is more of a performance standard rather than a specific design standard. See MOAB, UTAH, CITY CODE § 15.44.070 (2001). “Lighted signs shall have stationary and constant lighting A lighted sign on a property that abuts a residential zone shall be subdued and shall not be allowed to penetrate beyond the property in such a manner as to annoy or interfere with the adjacent residential properties.” *Id.* at § 15.44.070 (A)-(B). If a person complains about any light that reaches a residential property, the city council can either dismiss the complaint as unreasonable or require the offending party to use shielded lights. See *id.* at 15.44.070 (B). In Bisbee, Arizona, outdoor lights of

gest or require certain periods during which exterior lights should be turned off.²⁵³ Other communities have enacted ordinances with the local habitat and wildlife in mind.²⁵⁴ Penalties for violations can also be found in some ordinances.²⁵⁵

greater than 150 watts are required to be either fully or partially shielded, with an exemption created for streetlights if such lights are not available from the manufacturer, and a general exemption for outdoor sporting events (which are required to use shielded fixtures) that have started prior to 11:00 p.m. *See* BISBEE COUNTY, ARIZ., ORDINANCE 0-98-10, art. 7.10, §§ 7.10.3, 7.10.7 (May 5, 1998).

252. *See, e.g.*, KETCHUM, ID., ORDINANCE 743 §§ 3.2, 3.6 (June 21, 1999) (providing certain exemptions from using shielded fixtures where the wattage or lumen output is below a specified amount); LIMERICK TOWNSHIP, PA., ORDINANCE 180 § 3(C)(1)(a) (Nov. 6, 1996) (providing a chart for the intensities of light allowed in certain areas such as parking lots and roadways). Pima County, Arizona is one of the first communities to establish a lumens per acre restriction on lighting in a metropolitan area, it is only the third law in the country to limit lumens per acre. *See* Rotstein, *supra* note 61, at A2 (noting also that Flagstaff and Cottonwood, Arizona are the other two communities with such stringent requirements for lighting output).

253. *See, e.g.*, KETCHUM, ID., ORDINANCE 743 § 3.5 (June 21, 1999) (encouraging community members to turn off “[a]ll non-essential exterior commercial and residential lighting . . . after business hours and/or when not in use. Lights on a timer are encouraged. Sensor activated lights are encouraged to replace existing lighting that is desired for security purposes”); BOULDER, COLO., BOULDER REV. CODE, tit. 10, ch. 11, § 10-11-3(c)(5)(D)(1981) (requiring indirectly or internally lit signs in a residential area to be turned off between 11:00 p.m. and 7:00 a.m., unless required for safety); BOULDER, COLO., BOULDER REV. CODE, tit. 10, ch. 11, § 10-11-3(c)(5)(E) (1981) (requiring any illuminated sign visible from and located within 300 feet of residentially zoned property to be turned off between 11:00 p.m., or one-half hour after the use of which is completed, and 7:00 a.m.).

254. *See, e.g.*, MAUI, HAW., COUNTY CODE, ch. 19.7, § 19.70.100(O) (2001) (providing in its zoning statute for the Lanai Project District of Maui, Hawaii that “lighting shall be established in a manner so as to not adversely impact the surrounding areas including the shoreline and ocean”); FLA. ADMIN. CODE ANN. r. 62B-55.001 (2000) (requiring the Florida Department of Environmental Protection to “designate coastal areas utilized, or likely to be utilized, by sea turtles for nesting, and to establish guidelines for local government regulations that control beachfront lighting”). For a recent case involving the Florida ordinance, see *Loggerhead Turtle v. County Council of Volusia County*, 148 F.3d 1231 (11th Cir. 1998), *cert. denied*, 526 U.S. 1081 (1999). *See also* Katherine R. Butler, Comment, *Coastal Protection of Sea Turtles in Florida*, 13 J. LAND USE & ENVTL. L. 399, 423-26 & nn.236-54 (providing a detailed overview of the state of Florida’s and its several coastal counties’ attempts to protect sea turtles through lighting ordinances); Cece Von Kolnitz, *Oak Island/Providing an Improved Habitat*, MORNING STAR, Sept. 28, 2000 (describing a Wilmington, North Carolina project to create a sea turtle nesting area and the recent approval of a “lighting ordinance meant to reduce light pollution for the turtles”).

255. *See, e.g.*, BISBEE COUNTY, ARIZ., ORDINANCE 0-98-10, art. 7.10, § 7.10.9 (1998) (imposing a minimum fine of \$100 to a maximum of \$1,000 for each day there is a violation of the ordinance).

Notwithstanding the benefits of the state and local regulations that have been passed, there are also many impediments that have been encountered.²⁵⁶ One of the problems with many regulations is that they are often too vague, difficult to enforce or remain completely unenforced by law enforcement officials.²⁵⁷ In other cases, they do not appear to be stringently²⁵⁸ or sufficiently²⁵⁹ worded to prevent light pollution. Fears of crime and reduced safety also seem to inhibit cities and towns from enacting more rigorous regulations.²⁶⁰ Certain enacted or proposed regulations,

256. See *infra* notes 257-62 and accompanying text.

257. See Brown, *supra* note 7, at 59. Many light fixtures, even those that are shielded, often emit some amount of light that may cross a property line, and often there is not an adequate definition of what constitutes glare so it is difficult to prohibit such activity. See *id.* “Because of the imprecision and unintended stringency of such bylaws, they are rarely enforced.” *Id.* Furthermore, residents have expressed fears that individual freedoms may be compromised by the “light police.” See *id.* at 61. In Deschutes County, Oregon, one of the region’s first dark sky preservation ordinances was enacted six years ago, imposing maximum allowable lighting intensities. See Doug Irving, *Mayor Wants to Tone Down Glow*, PORTLAND OREGONIAN, Nov. 21, 2000, at D02. Despite its presence on the books, the county had only recently begun enforcing this ordinance in September of 2000, and has yet to issue the \$250 fine for violations. See *id.* But see Peter H. Lehner, *Act Locally: Municipal Enforcement of Environmental Law*, 12 STAN. ENVTL. L.J. 50, 55-66 (1993) (arguing that municipalities are perhaps in the best position to enforce environmental law against polluters because they “have great incentive to act, knowledge about which of the numerous local violators present the greatest threat, flexibility to pursue those violators under a variety of laws, [standing and credibility,] and the ability to respond quickly”).

258. See, e.g., ANN ARBOR, MICH., CITY CODE, ch. 61, § 5:510 (1998). This zoning ordinance provides that signs may be illuminated by artificial lights, provided they are white, but does not require any specific output or placement of the lights. See *id.* In residential areas of Quincy, Massachusetts, “no outdoor decorative or floodlighting shall be permitted except lighting primarily designed to illuminate walks, driveways, parking areas, doorways, outdoor living areas or outdoor recreational facilities, . . . except temporary holiday lighting, and except decorative floodlighting of institutions, public or historic buildings.” QUINCY, MASS., CITY CODE tit. 17, § 17.36.010 (1999).

259. See, e.g., LAS VEGAS, NEV., CITY CODE § 18.12.260 (2001). In a city generally known for its thousands of outdoor electric lights, Las Vegas’ street lighting ordinance only vaguely requires that “[s]treet lighting for public streets shall be designed, installed or upgraded in accordance with City standards.” *Id.*

260. See, e.g., Terri Williams, *Astronomer Fights for ‘Good Sky,’* DALLAS MORNING NEWS, Dec. 22, 2000, at 1M (quoting Mesquite, Texas Mayor Mike Anderson as saying that, when asked to consider changing the types of bulbs in the retail and business areas of the city, it was not feasible because “[i]t’s important we provide enough lights for our citizens for their public safety”); *Let There Be Less Light*, CAPITAL TIMES, Oct. 15, 1999, at 10A (safety concerns of residents were seen to outweigh the economic savings that would have resulted from proposed legislation to turn off over 1,000 lights in residential neighborhoods and along busy roads). But see

denounced as illegal, unfair or inapplicable in some cases, have been the center of controversy in lawsuits or town meetings.²⁶¹ Finally, convincing

supra note 26 and accompanying text (showing, for example, that a U.S. Department of Justice study indicates that crime does not increase at night when there is less light than during the day).

261. For recent litigation involving the Tucson, Arizona Outdoor Lighting Code (OLC), which designates how billboards must be illuminated, see *Whiteco Outdoor Advertising v. City of Tucson*, 972 P.2d 647, 648 (Ariz. Ct. App. 1998) (involving the ability of a charter city in using its police powers to ban light fixtures mounted on the bottom of billboards and whether the nonconforming use statute in an outdoor lighting code precludes it from doing so) and *Eller Media Co. v. City of Tucson*, 7 P.3d 136, 139 (Ariz. Ct. App. 2000) (subsequent case related to *Whiteco Outdoor Advertising* [business name changed to Eller] that heard constitutional issues of the OLC). The controversy in *Whiteco Outdoor Advertising* involved the changing of the original OLC enacted in 1985 (which required billboards to be illuminated from the top, but exempted those that were already in existence and designed with lights elsewhere) to a more recent version of the OLC enacted in 1994 which required *all* lighting to be mounted on top of billboards without exception. See *Whiteco Outdoor Advertising*, 972 P.2d at 648. *Whiteco* was notified by the City of Tucson that its lights were in violation of the 1994 OLC, and subsequently *Whiteco* argued that the City's ability to regulate such lighting was granted under the state's zoning statutes which had a nonconforming use provision (a provision that stated no new ordinance could affect property that was already in existence). See *id.* at 649. The court ultimately decided that the City did in fact have police powers to regulate billboard lighting, and is not restricted by the state zoning laws in regulating illumination of signs. See *id.* at 650. Subsequently in *Eller Media Co.*, the court considered *Eller Media Company's* claims that the injunction granted by the lower court to stop illuminating signs from the bottom violates substantive due process and equal protection rights. See *Eller Media Co.*, 7 P.3d at 139. Because the OLC requirement does not affect free speech or any other fundamental right (there was no claim by *Eller* that its billboard messages were inhibited by top rather than bottom mounted lights), and *Eller Media Company* is not a member of suspect class, the court held the appropriate test is the rational basis test. See *id.* at 139-40. Under this test, the court held that the OLC's stated purpose of reducing light shining upwards to better astronomical observations is rationally related to the requirement of top-mounted lights. See *id.* at 140. Furthermore, the court also disputed that *Eller Media Company* was denied equal protection under the law simply because other light sources, such as parking lots, are permitted to use other lights. See *id.* at 140-41. "This suggestion would preclude the City from regulating all but the brightest bulb in the night sky . . . it presumes that all light sources should and must emit the same amount of light." *Id.* at 141. See also Howard Fischer, *Cities the Boss on Lighting Can Regulate Businesses*, ARIZ. BUS. GAZETTE, Jan. 18, 2001, at 1 (reporting on the most recent activity in the *Whiteco Outdoor Advertising* and *Eller Media* cases). "Arizona cities have broad rights to regulate outdoor lighting by businesses, even for purely aesthetic reasons . . . the Arizona Supreme Court upheld a 16-year old Tucson ordinance that requires billboards to be lighted from the top." *Id.* See also Daniel M. Monte, *Summerfield Decides to Turn Down Lights, Keep Small-Town Feel*, GREENSBORO NEWS & RECORD, Sept. 6, 2000, at B7 (some residents believed that the proposed ordinance, which was ultimately passed, would be costly for

the general public that light pollution is even an environmental problem, and more importantly, that it can be solved, is yet another hurdle in advancing legislation.²⁶²

VI. THE NOISE POLLUTION MODEL: A RECOMMENDATION FOR FEDERAL ASSISTANCE IN REDUCING LIGHT POLLUTION

Given that the common law,²⁶³ state legislation, and local regulation²⁶⁴ of light do not appear to be adequately dealing with the growing modern problem of light pollution, there may be a need for some additional federal legislative guidance as to how we deal with this relatively new environmental concern. To date, there is no federal regulation of light pollution as it is not explicitly mentioned in the federal Clean Air Act.²⁶⁵ Until there is at least some uniformity of laws among the states, there may be difficult hurdles for organizations and individuals attempting to curb light pollution without some federal legislation.²⁶⁶

some to be in compliance, difficult to enforce or create an unfair burden for certain activities that require nighttime lighting such as ball fields); Irving, *supra* note 5, at D2 (reporting that Sandy, Oregon Mayor Linda Malone expects to hear opposition to her proposed lighting law from car dealerships, another commercial entity that tends to use bright outdoor lights); Isabel Sanchez, *Sportsplex Loses Light Decision*, ALBUQUERQUE J., Sept. 23, 2000, at E1 (reporting that district judge held that a Bernalillo County law requiring light poles to be no more than 16 feet and must not produce light trespass 10 feet beyond a property line is constitutional despite plaintiff sports complex's claim that the law does not have a "rational basis"); Rotstein, *supra* note 5, at 12 (noting that an attorney for a commercial entity argued that the industry standard for outdoor lighting in shopping centers is 900,000 lumens which is three times the amount of the recently enacted lighting code requirements).

262. See Zielinski, *supra* note 66, at B1. Despite the growing prominence of light pollution as an environmental concern and something of great importance to astronomers and non-astronomers alike, light pollution appears to remain low on the list of priorities for anti-sprawl and environmental activists. See *id.* Gaithersburg, Virginia Councilmember-at-Large, Ann Somerset, who was elected to a platform that had members who were opposed to light pollution legislation, said, "I think [light pollution] has been below the radar, because I don't think the average person is aware anything can be done. I think you just assume that if you want to see the beauty of the night sky, you have to go to the mountains." *Id.* However, there may be a growing appreciation for light pollution as akin to other more widely accepted forms of pollution such as air and water pollution. See Chris Reynolds, *Bright Lights in Need of Dimmer Switch*, ATLANTA JOURNAL & CONSTITUTION, Nov. 9, 2000, at 9 (quoting a local astronomy club member)

263. See *supra* notes 95-184 and accompanying text.

264. See *supra* notes 185-260 and accompanying text.

265. But see *supra* note 187 and accompanying text.

266. For example, standing, as required by Article III of the United States Constitution, may be an issue for individuals, advocacy organizations or astronomical

An analogue to light pollution can be found in noise pollution.²⁶⁷

There are several parallels to be drawn between light pollution and noise [pollution], which occupied a similarly uncertain territory prior to 1960. ... Light has the potential to cause distress and is an equally insidious pollutant.

research labs wishing to stop the problem of too much light being emitted from too many sources. See, e.g., Lehner, *supra* note 257, at 62 & n.42 (referring to what the Supreme Court held in 1992 in *Lujan v. Defenders of Wildlife*, this article noted that “[l]ack of standing is a growing problem for non-profit environmental groups and local environmentalists”). See also *Lujan v. Defenders of Wildlife*, 504 U.S. 555 (1992). In *Lujan*, the plaintiffs were members of an environmental advocacy group that were attempting to stop activities abroad that might have been in violation of the Endangered Species Act. See *id.* at 562-63. Under the *Lujan* dicta stating that “of course, the desire to use or observe an animal species, even for purely esthetic purposes, is undeniably a cognizable interest for purpose of standing,” it is uncertain whether individuals who are members of astronomy groups, or nonprofit organizations that study and promote particular nocturnal species, would be considered as possessing Article III standing to argue that light pollution activities must be stopped *without some sort of federal legislation*. See *id.* See also *Friends of the Earth, Inc. v. Laidlaw Env'tl. Serv.*, 528 U.S. 167, 174-75, 183-85 (2000) (a suit similar to *Lujan* which held that an environmental group had standing to sue under the citizen suit provision of the Clean Water Act and also reaffirmed that recreational and aesthetic reasons are sufficient for standing). See generally Peter Van Tuyn, *Thirtieth Anniversary Edition Essays: “Who Do You Think You Are?”: Tales from the Trenches of the Environmental Standing Battle*, 30 ENVTL. L. 41 (2000) (offering a pre-*Friends of the Earth* look at standing in environmental suits as well as a short interpretation of the *Friends of the Earth* decision); David R. Hodas, *Standing and Climate Change: Can Anyone Complain About the Weather?*, 15 J. LAND USE & ENVTL. L. 451, 454-55 (2000) (offering an interesting discussion of standing and the required degree of injury from pollutants responsible for global warming).

Must the plaintiff be directly harmed by the pollutant itself, as is the case in the classic nuisance and pollution cases? Or, may the plaintiff complain about the impact of climate change that will be widespread and suffered by all persons where the threatened impact is only a statistical artifact rather than a particular event or effect that is harmful to the plaintiff? Thus, the climate change standing problem goes to the central question of what is injury, how particularized it must be, and is standing to be essentially a constitutionalization of the special injury rule in public nuisance?

Id. On the other hand perhaps there is some indication that federal legislation is not necessary to give the required standing for light pollution cases. See, e.g., *Texas Dep't Transp. v. City of Sunset Valley*, 8 S.W.3d 727, 728 (Tx. 1999) (reaffirming a lower court decision that the municipality of Sunset Valley had standing to sue for the physical taking of its streets, had standing derived from injuries that may result from the increased travel on the expanded highway as well as resultant noise and light pollution, and that the Texas Department of Transportation was not immune from such a lawsuit). This Note does not consider the issues of standing that may arise under federal or other legislation, but recognizes that it may, in fact, be another hurdle in preventing light pollution.

267. See Jewkes, *supra* note 5, at 10.

Noise and light are both intangible and ephemeral. ... It is the perception of the relative degree, frequency and effect of the problem which causes noise pollution to be more regulated than light pollution rather than any technological differences.²⁶⁸

Under this assumption, we may find potential solutions and ideas on how best to deal with light pollution, and perhaps avoid some of the mistakes that have already been made, by looking to the federal regulation of noise.

Described as unwanted sound,²⁶⁹ noise is considered an environmental pollutant²⁷⁰ with several harmful effects—similar, in many aspects, to light pollution.²⁷¹ The generally recognized sources of unwanted sound include airplanes and airports,²⁷² automobiles,²⁷³ sonic booms,²⁷⁴ and a myriad of

268. *Id.* (making this analogy as part of an analysis of light pollution in England).

269. See FRANK P. GRAD, TREATISE ON ENVIRONMENTAL LAW, VOLUME 4, 5-2 (2000). See also Donald F. Anthrop, *The Noise Crisis*, 20 U. TORONTO L.J. 1 (1970), reprinted in NOISE POLLUTION AND THE LAW 5 (James L. Hildebrand ed., 1970) (explaining how sound is measured and produced).

270. See GRAD, *supra* note 269, at 5-2. “[Noise] is nonetheless unique among ‘pollutants’ in that it leaves no residual accumulations. It dissipates very rapidly, and even very loud noises are rather limited in the geographic area they affect. Nonetheless, noise has become a substantial problem, especially in urban areas where three-fourths of the nation’s people live. In spite of its rather limited geographic reach, noise has become a national problem in terms of the control strategies that must be applied.” *Id.*

271. See CLIFFORD R. BRAGDON, *Preface* to NOISE POLLUTION: THE UNQUIET CRISIS xvii (1970). “A threat to physical and psychological well-being, the sounds of our technology follow us through our working, leisure, and sleeping hours.” *Id.* Some of the negative effects of noise include hearing loss, annoyance, psychological problems, physiological stress, and interference with sleep. See *id.* at 63-80. See also generally KUPCHELLA & HYLAND, *supra* note 43, at 499-505 (highlighting the various harmful effects of noise, including impacts on wildlife); Jason A. Lief, Note, *Insuring Domestic Tranquility Through Quieter Products: A Proposed Product-Nuisance Tort*, 16 CARDOZO L. REV. 595, 598-600 (1994) (noting that hearing loss to older individuals may be related to noise encountered during younger ages and the psychological stress resulting from noise may be linked to some cancers). Many of the same or similar health impacts stemming from light pollution are discussed *supra* at notes 90-94 and accompanying text.

272. See generally Kristen L. Falzone, Comment, *Airport Noise Pollution: Is There a Solution in Sight?*, 26 B.C. ENVTL. AFF. L. REV. 769, 769 (1999). “Since the introduction of commercial jets in 1958, the noise problem generated from airport operation has become increasingly widespread, affecting millions of Americans.” *Id.* See also Herbert Tenzer, *Jet Aircraft Noise: Problems and Their Solutions*, 13 N.Y.L.F. 465 (1967), reprinted in NOISE POLLUTION AND THE LAW 114 (James L. Hildebrand ed., 1970) (noting that, despite the advantages of the commercial jet industry, noise pollution is a primary disadvantage, particularly for those living in prox-

general everyday products.²⁷⁵ Noise pollution began to receive significant legal and media attention during the 1970s.²⁷⁶ In terms of environmental priority, like light pollution, noise pollution is not foremost in most people's minds.²⁷⁷ While the various sources of modern noise control laws include local, state and federal legislation as well as the common law,²⁷⁸

imity to airports).

273. See generally Steven N. Brautigam, Note, *Rethinking the Regulation of Car Horn and Car Alarm Noise: An Incentive-Based Proposal to Help Restore Civility to Cities*, 19 COLUM. J. ENVTL. L. 391, 393-95 (1994). Since its debut in the late nineteenth century, the automobile has contributed to noise pollution through engines, horns and most recently, electronic burglar alarms. See *id.* Analogous disturbances can be said to have occurred since the development of the light bulb which was also developed around the same time. See *supra* notes 17-43 and accompanying text.

274. See Anthony J. Ortner, *Sonic Boom: Containment or Confrontation*, 34 J. AIR L. & COM. 208 (1968), reprinted in NOISE POLLUTION AND THE LAW 240-42 (James L. Hildebrand ed., 1970) (describing the phenomenon of sonic booms, which produce a loud sound when aircraft reach the speed of sound).

275. See generally James L. Hildebrand, *Preface* to NOISE POLLUTION AND THE LAW 8-20 (James L. Hildebrand ed. 1970); KUPCHELLA & HYLAND, *supra* note 43, at 506 (noting that several products used in the home can produce a significant amount of noise, as well as city noise generated by traffic). Similar to noise pollution, light pollution also has several notorious sources of unwanted light. See *supra* notes 24, 28-33 and accompanying text.

276. See Hildebrand, *supra* note 272, *Preface* at v. "Noise pollution and its legal implications is becoming a relevant, current, and important topic for discussion in our technologically expanding society. This is the first book concerning *noise pollution and the law* to be published in the United States." *Id.* (referring to the book which was published in 1970). Light pollution was also becoming a noticeable problem around the 1970s, and today there is significant media coverage of this phenomenon. See *supra* notes 5-6 and accompanying text.

277. See Brautigam, *supra* note 273, at 401-02. "With the exception of airport noise, environmental groups have generally ignored noise pollution. This relative neglect of the noise issue may be due to the fact that other, more visible sources of pollution such as air and water pollution have been viewed as more threatening to human and ecological health." *Id.* at 401. In comparison, light too is not very high on environmentalists' priority list either. After the early 1980s when President Ronald Reagan cut funding for the Office of Noise Abatement and Control, noise pollution began to receive less federal attention. See Brad Cooper, *Cities Respond to Clamor for Peace and Quiet with Ordinances*, KANSAS CITY STAR, Apr. 15, 2001, at B1 (noting that noise "is getting heightened attention across the country," particularly since the mid-1990s).

278. See Albert J. Rosenthal, *Noise Control and the Law*, in HANDBOOK OF NOISE CONTROL, 37-3 to 37-5 (Cyril M. Harris, ed., 2d ed., 1979) (outlining the development of various types of noise pollution laws through the mid-1970s); see generally GRAD, *supra* note 269, at 5-35 to 5-101 (describing in detail the federal regulation of noise since the enactment of the first federal noise pollution statutes in the 1970s). See also *supra* notes 95-255 and accompanying text as these kinds of pollution control have been utilized to control light pollution.

this was not always the case.

Common law was initially the only source of relief for individuals who wanted to stop nearby noise.²⁷⁹ Nuisance claims comprised the earliest methods of dealing with noise.²⁸⁰ Products liability claims have also been used in many instances.²⁸¹ In relation to airport noise pollution in particular, inverse condemnation has been another means by which plaintiffs have sought judicial action.²⁸² Eventually, however, these types of claims became inadequate in addressing the growing public need of dealing with sources of noise other than a disruptive neighbor.²⁸³

Similar to current light pollution activities, state and local governments began enacting or strengthening local ordinances to deal with noise.²⁸⁴ However, these forms of controlling noise have not been without problems. Some hurdles include enforcement, which remains largely intermittent or impossible;²⁸⁵ vaguely drafted ordinances, which often renders them

279. See Rosenthal, *supra* note 278, at 37-3. "The earliest forms of noise control law were the creation of the judiciary, well before sufficient public interest was generated in the subject to impel legislatures to enact statutes." *Id.*

280. See Lief, *supra* note 271, at 609-10. However, "[t]he need to protect industrial development has justified new limits on nuisance law just as the industrial age is spawning the most powerful instruments of nuisance." *Id.* at 611. "Even when nuisance law provides a remedy against a particular user of a noisy product, it creates no incentive for manufacturers to make a quieter product." *Id.* at 612. See also Brautigam, *supra* note 273, at 417-20 (providing a background of nuisance cases as they relate to car horns and alarms).

281. See, e.g., Brautigam, *supra* note 273, at 420-21; Lief, *supra* note 271, at 612-14. This Note will not address products liability claims since they do not appear to have relevance to light pollution.

282. See Falzone, *supra* note 272, at 777-79. This type of action is "based on the Fifth Amendment of the U.S. Constitution, which requires compensation for the 'taking' of private property." *Id.* at 777. This Note will not address inverse condemnation claims since most sources indicate that it is not government actors who are generating light pollution, which arguably would constitute a taking.

283. See Rosenthal, *supra* note 278, at 37-3. "In urban areas particularly, other sources and other victims [of noise] emerged. Common-law remedies proved inadequate." *Id.*

284. See *id.* at 37-3 to 37-4. This is similar to what has been happening with light pollution. See *supra* notes 185-258 and accompanying text. See also GRAD, *supra* note 269, at 5-101. "Meaningful governmental regulation aimed at securing a quieter environment is a relatively new development." *Id.* The legal basis for regulating noise originates from the police powers doctrine. This allows state and local governments to act through legislation to protect their constituents' health. See *id.* "If any support for the exercise of the police power were at all necessary, that support is now more readily available" than when state and local governments first addressed noise pollution issues. *Id.* at 5-102.

285. See Rosenthal, *supra* note 278, at 37-3. Often ordinances are too vague to enforce, do not provide adequate deterrence to violators since many penalties are mis-

subjectively enforced;²⁸⁶ and lack of funding to combat noise pollution.²⁸⁷ Additionally, there has been some indication from the United States Supreme Court that it may consider anti-noise ordinances to be unconstitutional.²⁸⁸

On the federal level, there has been some involvement in alleviating noise pollution.²⁸⁹ The Noise Control Act of 1972²⁹⁰ was enacted to “promote an environment for all Americans free from noise that jeopardizes their health or welfare.”²⁹¹ Unlike other environmental statutes, the Noise Control Act did not provide specific abatement goals for the Environmental Protection Agency (EPA), the agency charged with overseeing this Act.²⁹² In 1978, additional federal grant support was provided for with the addition of the Quiet Communities Act.²⁹³ While the EPA Office of Noise Abatement and Control (ONAC) was eliminated in 1981 due to the permanent termination of funding for the Office,²⁹⁴ this provision of the Act

demeanor penalties, and the authority to control noise has not been granted to a specialized agency. *See* GRAD, *supra* note 269, at 5-104 to 5-105. While street and traffic noise are usually left to police, and health laws that deal with air and water pollution are delegated to some official body, there is rarely a noise-specific agency that can handle noise pollution issues at the state or local level. *See id.* at 5-105. For example, in 1999, the Lexington, Massachusetts, police department had to respond to more than 300 noise-related calls, comprising roughly 2.3 percent of its total calls that year. *See* Alice Hinkle, *Towns Propose Noise Regulations in Quest for Quiet*, BOSTON GLOBE (Northwest Weekly Edition), Mar. 25, 2001, at 1.

286. *See* Falzone, *supra* note 272, at 780. “[M]ost noise ordinances prohibit ‘unreasonable’ or ‘unusual’ noise. Due to their subjective nature, ordinances utilizing this language are difficult to enforce.” *Id.* With the advent of technology which now can more adequately measure sound, some ordinances were drafted to have maximum decibel outputs. *See id.* However, at least with aircraft, although some sounds may be loud and disruptive, they do not last long enough to violate the ordinances. *See id.*

287. *See* Lief, *supra* note 271, at 616. “[D]espite recent renewed interest in noise, the withdrawal of funding for federal anti-noise efforts may have reduced the incentive to regulate noise at the local level.” *Id.*

288. *See id.* at 619-21. (noting that in minority opinions, Justice Frankfurter did not find “aural aggression” to be protected by the Constitution).

289. *See* Brautigam, *supra* note 273, at 425-26. “The federal role in noise control has generally been modest, and non-existent [in certain areas of noise control]” *Id.* at 425. The Federal Aviation Agency is charged with regulating airport noise. *See id.* at 425-26.

290. 42 U.S.C. §§ 4901-4918 (1994).

291. 42 U.S.C. § 4901(b).

292. *See* Brautigam, *supra* note 273, at 426. Due to the lack of specific guidance, there was no legal reason for states and local governments to address noise pollution and as a result, efforts to curb noise pollution were absent. *See id.*

293. *See* 42 U.S.C. § 4913 (1994). *See also* Brautigam, *supra* note 273, at 426.

294. *See* Brautigam, *supra* note 273, at 426. With the elimination of ONAC, the federal role in noise pollution also ended, however during its active involvement,

would provide for a good model to begin understanding and reacting to the problem of light pollution on a national scale.

Perhaps the greatest feature of the Quiet Communities Act was the provision for funding public education about noise pollution,²⁹⁵ research to discover the effects of noise pollution²⁹⁶ and technical assistance to state and local governments.²⁹⁷ By replacing “noise” with “light” in most, if not all, provisions of the Quiet Communities Act, one can imagine a “Dark Communities Act.” For instance, given the relatively little research about the harmful effects of light pollution on humans, a provision for funding additional research as to what kinds of harm may occur with the increasing problem of light pollution may be necessary.²⁹⁸ Furthermore, a “Dark Communities Act,” if drafted in the same way, would also allow for the study of harmful effects on wildlife.²⁹⁹ As we have seen, some scientists and bird advocacy groups have already begun to see the harmful effects of

the federal government had been limited to research and grants. *See id.* Upon closing of ONAC, it is estimated that more than 1,000 community noise abatement programs had to shut down due to the cessation of funding. *See Falzone, supra* note 272, at 785-86. Despite the elimination of ONAC, the Noise Control Act remains in effect. *See Lief, supra* note 271, at 621-22. “This has created a situation where the federal government is essentially incapable of regulating noise, while the states are preempted from setting their own standards for those products already regulated by the EPA.” *Id.* at 622. Within the last ten years, there have been some attempts to re-open ONAC, but not everyone has supported the idea for various reasons. *See id.* In March 2001, a bill was introduced in the 107th Congress aiming to reestablish ONAC and provide for studies and an annual appropriation of \$21 million for ONAC activities. *See Quiet Communities Act of 2001, H.R. 1116, 107th Cong. (2001).*

295. *See* 42 U.S.C. § 4913(a) (1994).

[T]he Administrator [of the Environmental Protection Agency] shall ...
 (a) develop and disseminate information and educational materials to all segments of the public on the public health and other effects of noise and the most effective means for noise control, through the use of materials for school curricula, volunteer organizations, radio and television programs, publication, and other means ...

Id.

296. *See* 42 U.S.C. § 4913(b) (1994). Funding through this provision could be used to

conduct or finance research directly or with any public or private organization or any person on the effects, measurement, and control of noise, including but not limited to –

(1) investigation of the psychological and physiological effects of noise on humans and the effects of noise on domestic animals, wildlife, and property ...

Id.

297. *See* 42 U.S.C. § 4913(d) (1994). Under this provision, funding could be used to help “develop and implement a national noise environmental assessment program to identify trends in ... ambient levels, and compliance data.” *Id.*

298. *See supra* notes 90-94 and accompanying text.

299. *See supra* notes 74-89 and accompanying text.

light on migratory birds and other animals, but they have relatively little control on stopping those light sources.³⁰⁰ Arguably, unless one of these animals qualifies for protection under an endangered species statute, there may be no incentive to find out to what degree light pollution is affecting wildlife or what kinds of standards should be set for illumination.

Furthermore, as we have seen in Part V, states and local governments have intermittently and non-uniformly regulated light pollution.³⁰¹ By providing grants and other federal actions to these state and local governments, there could be a more coordinated effort to reduce light pollution.³⁰² Since many areas of the nation are urban and have always dealt with excessive light or are suburban and have accepted urban sprawl as a way of life, states, cities and towns may continue to enact (or not) legislation that will not deal with the problem adequately so as to solve it nationally.³⁰³ By enacting a "Dark Communities Act," or some degree of federal legislation to deal with this type of pollution in the same way that other federal legislation deals with keeping our air and water clean, we may be able to understand the problem of light pollution before it becomes too great.³⁰⁴

VII. CONCLUSION

This Note has revealed that light pollution is a growing problem with

300. See *supra* notes 74-89 and accompanying text for a discussion on the known harmful effects of light pollution on animals.

301. See *supra* notes 185-258 and accompanying text.

302. See 42 U.S.C. § 4913(c) (1994). Administration of a nationwide Quiet Communities Program was to include, but not be limited to

- (1) grants to States, local governments, and authorized regional planning agencies for the purpose of –
 - (A) identifying and determining the nature and extent of the noise problem within the subject jurisdiction;
 - (B) planning, developing, and establishing a noise control capacity in such jurisdiction, including purchasing initial equipment;
 - (C) developing abatement plans for areas around major transportation facilities (including airports, highways, and rail yards) and other major stationary sources of noise, and, where appropriate, for the facility or source itself; and
 - (D) evaluating techniques for controlling noise (including institutional arrangements) and demonstrating the best available techniques in such jurisdiction;

Id.

303. See *supra* note 258 and accompanying text.

304. See GRAD, *supra* note 269, at 5-91. "The Quiet Communities Program appears to be a first step in the direction of a state implementation plan similar to other pollution control legislation." *Id.* Conceivably, the same thing could be said if a similar Act were drafted to deal with light pollution.

growing public awareness.³⁰⁵ At first glance, it is viewed as more of a problem for astronomers and backyard stargazers than the general public; but as we have seen, light pollution does, in fact, injure many facets of our natural world and general quality of life.³⁰⁶ The common law does not appear to have the answers for organizations, communities, or those individuals seeking a darker sky.³⁰⁷ Furthermore, only a handful of states have enacted effective legislation, and local regulations vary widely or do not exist at all.³⁰⁸ Now is the time for the federal government to become “enlightened” about the potential scope of this growing national problem by funding initial research and providing public education about light pollution.

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305. See *supra* Part III and accompanying notes.

306. See *id.*

307. See *supra* Part IV and accompanying notes.

308. See *supra* Part V and accompanying notes.