

# SEA TURTLE FRIENDLY LIGHTING

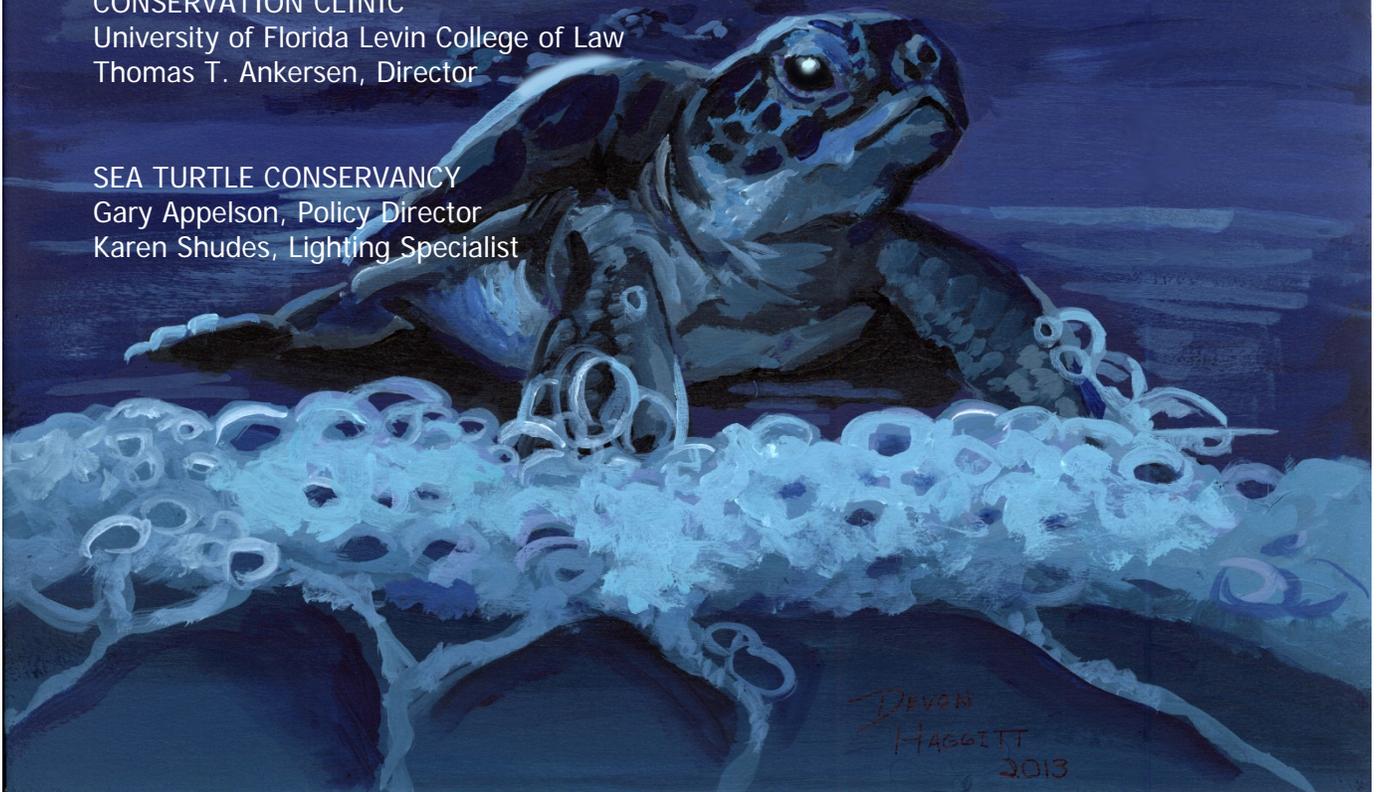
A MODEL ORDINANCE FOR LOCAL GOVERNMENTS  
&  
MODEL GUIDELINES FOR INCORPORATION INTO GOVERNING  
DOCUMENTS OF PLANNED COMMUNITIES:  
CONDOMINIUMS, COOPERATIVES AND HOMEOWNERS' ASSOCIATIONS

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Finally, special thanks goes to the students in the Fall 2012 Conservation Clinic, the “survey monkeys”, who undertook the laborious task of performing content analysis surveys for all 82 counties and municipalities with sea turtle lighting ordinances in the State of Florida.

## *Disclaimer*

This policy analysis and the legal models it offers is not a substitute for legal advice. Factual and jurisdictional circumstances vary among local government and entities. Local governments, associations and other coastal stakeholders should consult with an attorney to determine how to best incorporate these guidelines into their existing ordinances and governing documents, as well as for consistency with applicable federal, state and local laws. The contents of this analysis, including any errors or omissions are the sole responsibility of the authors and do not necessarily reflect the views of the institutions that supported the effort.



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# **I. The Sea Turtle Friendly Lighting Initiative**

## **A. Introduction**

Sea turtles are a beloved species in Florida, evidenced by the fact that there are dozens of sea turtle protection groups around the state, many coastal communities have passed ordinances to protect sea turtles, and the sea turtle license plate remains the second most popular vanity license tag in Florida, ranking only behind the University of Florida in number of tags sold or renewed.<sup>1</sup> During the late spring, summer and early fall Floridians share the beach with sea turtles, a co-habitation that can lead to a wide variety of conflicts. One such conflict, and the one that may be most easily remedied, results from the anthropogenic footprint of light on the beach at night. Each year egg-bearing female sea turtles abandon the urge to nest on lighted beaches, and thousands of sea turtle hatchlings suffer from misorientations<sup>2</sup> and disorientations<sup>3</sup> that exacerbate an already difficult journey by leading them away from the water - and often leads to death – and potential liability for both those who cast that light, as well as those charged with regulating it.

The Conservation Clinic at the University of Florida’s Levin College of Law undertook this “Sea Turtle Friendly Lighting (STFL) policy analysis on behalf of the Sea Turtle Conservancy to provide guidance to local governments, state regulators, sea turtle advocates and coastal residents on the most appropriate means to address artificial beachfront lighting concerns in Florida. This report results from an interdisciplinary collaboration of law and graduate students and their faculty, along with experts at the Florida-based Sea Turtle Conservancy, the world's oldest sea turtle research and conservation group.<sup>4</sup> The report includes both a new model sea turtle friendly lighting ordinance for local governments, as well as a model set of sea turtle friendly lighting provisions, which to be considered by homeowner and condominium associations for inclusion in governance documents. Sea Turtle advocates believe that the current law, including a 1993 model ordinance adopted as a rule by the Florida Department of Environmental Protection, does not adequately protect sea turtles. Moreover, advances in our understanding of sea turtle biology, coupled with advances in lighting technology, have rendered many parts of most existing ordinances and the model ordinance obsolete.

Part I of this report provides background information on the problems associated with artificial beachfront lighting in Florida. This includes information on sea turtle biology with respect to artificial light, the legal protections for sea turtles as endangered and threatened species, and successes with new lighting technology. Part II details the process and results of a “content analysis” undertaken to analyze the relative strengths and weaknesses of existing sea turtle lighting ordinances around Florida. Part III and IV address the lack of needed guidance for local governments and coastal community associations, both of which have been sued for failure to

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<sup>1</sup> Monthly Revenue Collections Report, Florida Department of Highway Safety and Motor Vehicles (last visited June 11, 2013) available at <http://services.flhsmv.gov/specialtyplates/Revenue.aspx>

<sup>2</sup> Misorientation occurs when the animal crawls on straight paths toward light sources visible from the beach at night instead of the ocean. See Salmon, M., Tolbert, M., Painter, D., & Goff, M. (1995). Behavior of loggerhead sea turtles on an urban beach. II. Hatchling orientation. *Journal of Herpetology*, 29(4), 568–576.

<sup>3</sup> Disorientation occurs when the animal crawls in circuitous paths, as if unable to detect directional cues. See Salmon, M., Tolbert, M., Painter, D., & Goff, M. (1995). Behavior of loggerhead sea turtles on an urban beach. II. Hatchling orientation. *Journal of Herpetology*, 29(4), 568–576.

<sup>4</sup> About the Sea Turtle Conservancy, Sea Turtle Conservancy, Formerly the Caribbean Conservation Corporation (last visited June 11, 2013) available at <http://www.conserveturtles.org/about.php>

address artificial lighting. Part III is a revised model lighting ordinance, titled “Model Sea Turtle Friendly Lighting Ordinance” that incorporates advances in both lighting technology and sea turtle biology since the enactment of the model ordinance in 1993. Part IV is titled “Sea Turtle Friendly Lighting Model Guidelines for Planned Communities.” These guidelines could be added to community association bylaws to provide additional, privately enforced safeguards. They could also be required as a condition of development approval by state and local regulatory agencies. The Clinic used the best scientific data available as the basis of these highly technical lighting guidelines.

## **B. The Response of Sea Turtles to Artificial Lighting**

Artificial beach lighting at night can interfere with the normal behavior of adult and hatchling sea turtles. Light level is a strong cue for nest site selection, as adult turtles prefer darker beaches to those with more light. Consequently, beaches with high light levels often have lower nesting densities or no nests at all.<sup>5</sup> Also, nests found on artificially lighted beaches may be clustered in the few remaining darkened areas. These high nest concentrations can be detrimental to the population of sea turtles because concentrated nests increase the rate of hatchling mortality.<sup>6</sup> Adult sea turtles may have difficulties finding their way back to the ocean in the presence of artificial light, a phenomena known as “misorientation” or “disorientation.”<sup>7</sup> Artificial beach lighting may also cause misorientation and disorientation in sea turtle hatchlings by interfering with their ability to correctly interpret cues that should lead them to the ocean. These cues include the light color (wavelength)<sup>8</sup>, brightness<sup>9</sup>, horizon shape<sup>10</sup>, continuity<sup>11</sup>, silhouette<sup>12</sup> and slope.<sup>13</sup> Disruption of orientation negatively impacts hatchling survival by increasing the chances that hatchlings are taken by terrestrial predators, killed by exposure to lethal temperatures after sunrise, crushed by vehicles on the road, entrained in swimming pools, and exhausted and/or dehydrated to the point of death.<sup>14</sup> Behavioral studies have shown that hatchlings orient most strongly towards shorter wavelengths of light (white light), including the near-ultraviolet, which is measured at 360 nanometers.<sup>15</sup> Hatchlings are least sensitive to wavelengths greater than 580 nanometers, which are

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<sup>5</sup> Witherington, B. E. (1992). Behavioral responses of nesting sea turtles to artificial lighting. *Herpetologica*, 48(1), 31–39.

<sup>6</sup> Salmon, M. (2006). Protecting sea turtles from artificial night lighting at Florida’s oceanic beaches. In C. Rich & T. Longcore (Eds.), *Ecological Consequences of Artificial Night Lighting* (pp. 141–168). Washington, DC: Island Press.

<sup>7</sup> Salmon, M., Tolbert, M., Painter, D., & Goff, M. (1995). Behavior of loggerhead sea turtles on an urban beach. II. Hatchling orientation. *Journal of Herpetology*, 29(4), 568–576.

<sup>8</sup> Horch, K., Gocke, J., & Salmon, M. (2008). Visual spectral sensitivity of hatchling loggerhead (*Caretta caretta* L.) and leatherback (*Dermochelys coriacea* L.) sea turtles, as determined by single-flash electroretinography. *Marine and Freshwater*, 41(2), 79–91.

<sup>9</sup> Witherington, B., & Bjorndal, K. (1991). Influences of artificial lighting on the seaward orientation of hatchling loggerhead turtles *Caretta caretta*. *Biological Conservation*, 55(2), 139–149. doi:10.1016/0006-3207(91)90053-C

<sup>10</sup> Witherington, B. E., & Martin, R. E. (1996). *Understanding, assessing, and resolving light-pollution problems on sea turtle nesting beaches*. *Environmental Protection*.

<sup>11</sup> *Id.*

<sup>12</sup> Salmon, M., Wynneken, J., Fritz, E., & Lucas, M. (1992). Seafinding by hatchling sea turtles: role of brightness, silhouette and beach slope as orientation cues. *Behaviour*, 122(1), 56–77.

<sup>13</sup> *Id.*

<sup>14</sup> Witherington, B. E., & Martin, R. E. (1996). *Understanding, assessing, and resolving light-pollution problems on sea turtle nesting beaches*. *Environmental Protection*.

<sup>15</sup> Horch, K., Gocke, J., & Salmon, M. (2008). Visual spectral sensitivity of hatchling loggerhead (*Caretta caretta* L.) and leatherback (*Dermochelys coriacea* L.) sea turtles, as determined by single-flash electroretinography. *Marine and Freshwater*, 41(2), 79–91.

seen as reds and ambers in the light spectrum.<sup>16</sup> Thus, excessive artificial lighting, when not within an acceptable wavelength band, draws hatchlings toward the land rather than the sea, significantly impairing their chances of survival.

### C. The Legal and Regulatory Background

Light pollution has been defined as the “degradation of the photic habitat by artificial light.”<sup>17</sup> Light pollution is a particularly salient issue in Florida, which hosts 90% of the sea turtle nesting in the United States and must balance protection with increasing resident and tourist populations. In 2012, the number of foreign and domestic visitors Florida attracted rose 4.6% to reach 91.4 million.<sup>18</sup> One estimate suggests that by 2050 there will be nearly 15 million residents in Florida’s coastal counties.<sup>19</sup> With this increase in population comes an increase in the use of artificial light that can escalate already problematic light pollution.<sup>20</sup> Florida’s high percentage of already developed coastal properties, coupled with increasing development pressure for the foreseeable future, means that sea turtle populations are increasingly vulnerable to the adverse impacts of artificial lighting.

Recognizing artificial lighting as a threat to sea turtle populations, The Florida Legislature tasked the Department of Environmental Protection (DEP) with adopting by rule “guidelines for local government regulations that control beachfront lighting to protect hatching sea turtles.”<sup>21</sup> In response, DEP enacted rule 62B-55 F.A.C., entitled Model Lighting Ordinance for Marine Turtle Protection in 1993, but did not require local governments to adopt the model (although many local governments have incorporated all or parts of it).

Within the last year, DEP has begun to promulgate an updated set of best management practices for the lighting of beachfront buildings, parking lots and dune crossovers to better protect nesting sea turtles and hatchlings from artificial light pollution. The latest 2013 draft DEP guidelines provided a basis for many of the technical standards used in this report’s content analysis as well as the model STFL Ordinance and Guidelines. Once adopted, the DEP guidelines will be implemented as a condition of the Department’s Coastal Construction Control Line (“CCCL”) permitting program for development seaward of the CCCL.<sup>22</sup> However, the proposed DEP guidelines only apply to new construction. Additionally, not all development that could potentially contribute to illumination on the beach at night is covered under the CCCL permitting process. In a state where successful nesting is essential to the survival of sea turtle populations, current state and local laws may not go far enough to protect these species from the legal and biological

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<sup>16</sup> Witherington, B. E., & Martin, R. E. (1996). Understanding, assessing, and resolving light-pollution problems on sea turtle nesting beaches. Environmental Protection.

<sup>17</sup> Verheijen, F. (1985). Photopollution- artificial light optical spatial control systems fail to cope with incidents, causations, remedies. *EXPERIMENTAL BIOLOGY*, 44(1), 1–18.

<sup>18</sup> Research- Official Media Newsroom, VISITFLORIDA.com, (last accessed June 11, 2013) available at <http://www.visitflorida.com/en-us/media/research.html>

<sup>19</sup> Civers, T., Farr, J., Hall, C., Huntington, J., Mikita, K., & Heidi Recksick. (2000). *Florida assessment of coastal trends (FACT): Florida Coastal Management Program*. (D. Bagley, M. Harrison, & C. McCay, Eds.) Secretary. Florida Department of Community Affairs.

<sup>20</sup> Brock, K. A., Reece, J. S., & Ehrhart, L. M. (2009). The Effects of Artificial Beach Nourishment on Marine Turtles: Differences between Loggerhead and Green Turtles. *Restoration Ecology*, 17(2), 297–307. doi:10.1111/j.1526-100X.2007.00337.x

<sup>21</sup> Fla. Stat. § 161.163 (2012)

<sup>22</sup> Fla. Stat. § 161.041(1) (2012)

consequences of light pollution.

Both federal and state laws protect all five sea turtles species found in Florida. Section 9 of the 1973 Endangered Species Act (“ESA”) strictly prohibits a “take” of these species by any person.<sup>23</sup> In the ESA, the term “take” includes the harassment and harm of protected wildlife.<sup>24</sup> To “harm” means an act that actually kills or injures wildlife, such as significant habitat modification that actually kills or injures wildlife by *significantly impairing essential behavior patterns, including breeding, feeding, or sheltering.*<sup>25</sup> The 1995 Florida Marine Turtle Protection Act (“MTPA”) contains further provisions for the protection of sea turtles. The MTPA makes it a third degree felony<sup>26</sup> to “knowingly take, disturb, mutilate, destroy, cause to be destroyed,... or harass any marine turtles or the eggs or nest of any marine turtles described in this subsection.”<sup>27</sup> The definition of “take” within the MTPA ‘means an act that actually kills or injures marine turtles, and includes significant habitat modification or degradation that kills or injures marine turtles by significantly impairing their essential behavioral patterns, such as breeding, feeding, or sheltering.’<sup>28</sup> Thus, “significant habitat modification that actually kills or injures wildlife” could be punishable by third degree felony.

Scientific evidence shows that artificial lighting on beaches disrupts sea turtle behavior, which is prohibited under the federal ESA and complementary state law. A federal appellate court has already found that artificial lighting on a Florida beach may result in a violation of the ESA’s take provision.<sup>29</sup> In one Florida case, the federal government sued a condominium association after its lighting near a sea turtle nesting area caused high loggerhead turtle hatchling deaths.<sup>30</sup> The case eventually settled, with the association agreeing to pay a \$15,000 fine and correct the lighting situation. Accordingly, it is in the best interests of local governments and coastal property owners to be proactive and incorporate the best lighting practices and technologies into their own ordinances or governing documents. Those practices and technologies are incorporated into the STFL Ordinance and Guidelines provided in this document.

82 local governments in Florida have adopted beach lighting ordinances, most of them based on the 1993 DEP Model Lighting Ordinance. Yet, there are still high numbers of disorientation events throughout the state. For example, according to the Florida Fish and Wildlife Conservation Commission (FWC), in 2008 (the last year FWC published disorientation reports) Palm Beach County reported over 9,000 disoriented turtles, Franklin County in the Panhandle reported 1,506 and in Southwest Florida, Sarasota County reported 3,279.<sup>31</sup> The Sea Turtle Oversight Protection, Inc., the organization permitted by FWC to monitor nesting and disorientations in just Broward

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<sup>23</sup> 16 U.S.C. § 1538(1)(B) (2012)

<sup>24</sup> 50 C.F.R. §17.3 (2012)

<sup>25</sup> 50 C.F.R. § 17.3 (2013) (emphasis added); The Interior Department regulations that implement the ESA and define ‘harm’ as described above was upheld by the US Supreme Court in *Babbitt, Secretary of the Interior, et. Al. v. Sweet Home Chapter of Communities for a Great Oregon, et. al.* 515 U.S. 687 (1995).

<sup>26</sup> Fla. Stat. § 379.2431(1)(e)(5) (2012)

<sup>27</sup> Fla. Stat. § 379.2431(1)(d)(2) (2012)

<sup>28</sup> Fla. Stat. § 379.2431(1)(c)(2) (2012)

<sup>29</sup> *Loggerhead Turtle v. County Council of Volusia County, Florida*, 148 F.3d 1231 (11th Cir. 1998)

<sup>30</sup> Notice of Violation, *U.S. v. The Breakers Condominiums*, Civil Penalty Proceeding, No. INV 0091 AO, U.S. Department of the Interior, April 18, 1994.

<sup>31</sup> FWC Unpublished Data (available on request)

County, reported over 20,656 disorientations in 2012.<sup>32</sup> Data such as this suggests that artificial beachfront lighting remains one of the major threats to Florida's sea turtles, and that current state and local law has not been adequate to address this threat.

#### **D. Technological Developments**

Regulating artificial lighting can incorporate two approaches. Sea Turtle Friendly Lighting technologies can be mandated or human behavior can be addressed. Instead of relying on recent technological developments, many of the ordinances reviewed in the content analysis (70%) primarily seek to regulate behavior. Some of these ordinances require that residents close their curtains, move interior housing lights away from windows, and even to turn off exterior lights during turtle nesting season.<sup>33</sup> However, proper design guidelines and new lighting technologies can eliminate much of the need for this kind of behavioral regulation.

In 2010-2012 The Sea Turtle Conservancy received several grants from the National Fish and Wildlife Foundation to correct lighting problems on large beachfront properties.<sup>34</sup> During this project the STC successfully retrofitted over 65 properties, darkening approximately 45,000 linear feet of beach,<sup>35</sup> while greatly reducing the need for residents to change their habits during the nesting season. The general principles of *Keep it Low, Keep it Long, and Keep it Shielded* are embodied in the retrofits and can be seen in the before and after photos below. As shown in the figures below, preliminary data suggests that for the nesting season following the retrofits (2011), disorientations from artificial lighting during nesting season dropped to 0 and continued to be 0 during the 2012 season. In addition to the ecological benefits, some retrofitted property owners wrote into the Sea Turtle Conservancy proclaiming significant savings on their outdoor electricity bills as a direct result of the retrofit, which included very energy efficient LED lights. After receiving retrofits, the property owner at La Playa Condominiums in Satellite Beach wrote to the Sea Turtle Conservancy to inform them that the outside electricity bill on his property decreased from \$1,100.00 a month to \$350.00 a month, a nearly 70% cost savings.

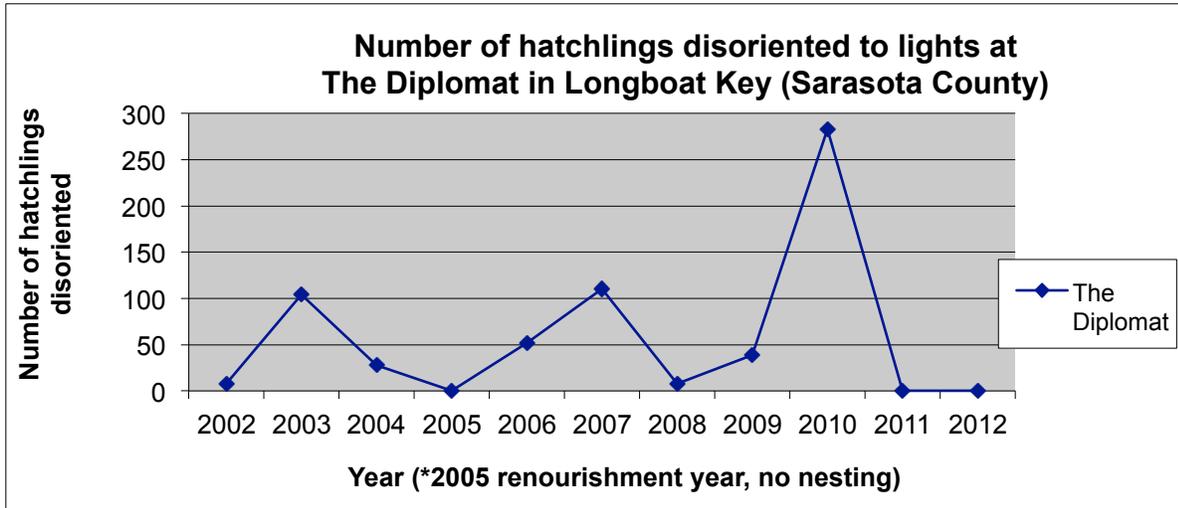
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<sup>32</sup> What does STOP do?, Sea Turtle Oversight Protection, (last visited June 17, 2013) available at <http://seaturtleop.org/broward/>

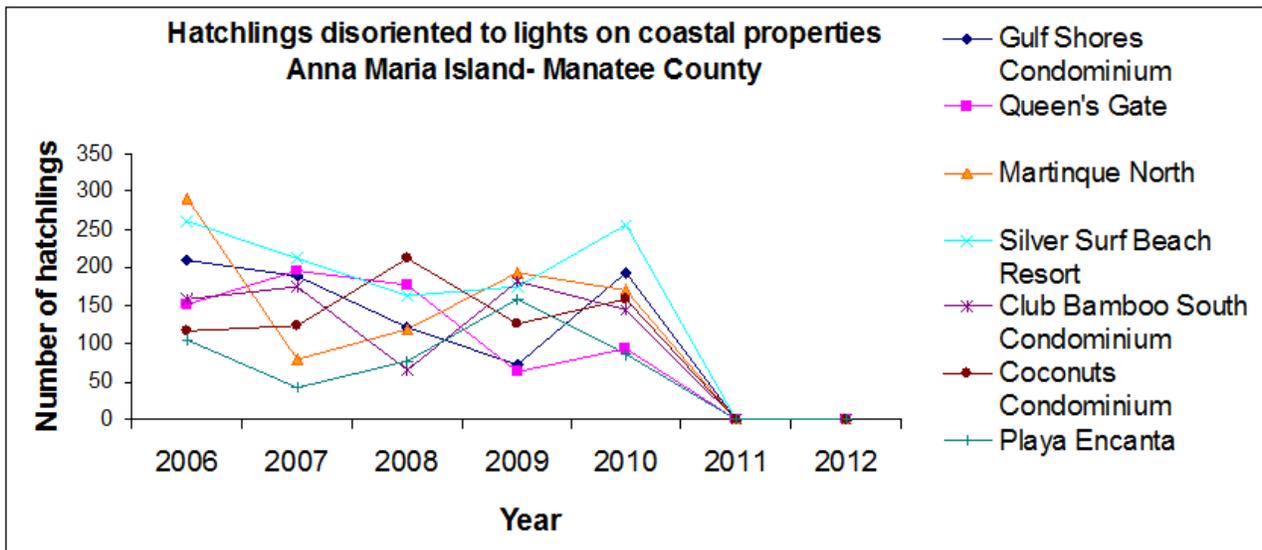
<sup>33</sup> Mexico City Beach, Bay County, Florida, Municipal Ord. No. 399 IV (3); Volusia County, Florida, Municipal Ord. No. 90-22, § 1204, Vero Beach, Indian River County, Florida, Municipal Ord. No. §46-109c(1).

<sup>34</sup> NFWF's Gulf Response Grants, National Fish and Wildlife Foundation, (last accessed June 11, 2013) available at <http://www.nfwf.org/Pages/gulf/projectlist.aspx#.UbilD-t3dcw>

<sup>35</sup> Sea Turtle Threats: Artificial Lighting, Sea Turtle Conservancy, Formerly the Caribbean Conservation Corporation (last visited July 1, 2013) available at <http://conserveturtles.org/sea-turtle-information.php?page=lighting>



**Figure 1** describes the number of sea turtle hatchlings that were disoriented after emergence at The Diplomat in Longboat Key. (\*\*2002 and 2008 each recorded 8 disorientations and low nesting)



**Figure 2** demonstrates that the seven properties in the figure combined were disorienting between 900 and 1,300 hatchlings a year. Disoriented hatchlings dropped 100% to 0 the two consecutive nesting seasons following the retrofits.

Before STFL Retrofits



After STFL Retrofits



**The Oceanwalk Resort,  
Daytona Beach, FL**

Before STFL Retrofits



After STFL Retrofits

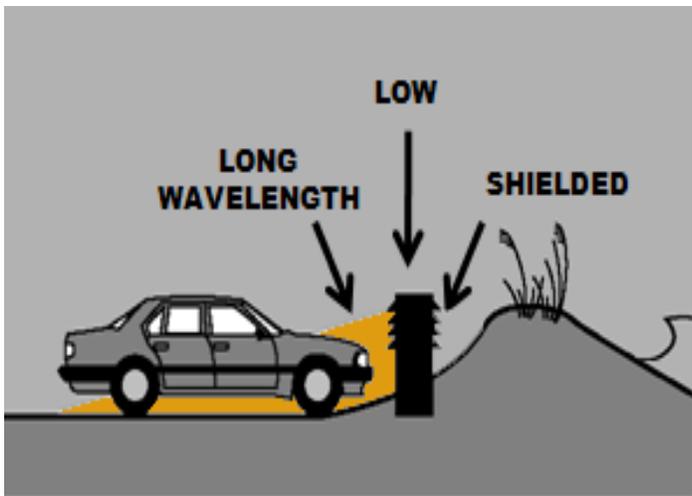


**O'Shucks and Trader Rickey's Restaurant  
Cocoa Beach, FL**

## II. A Comparative Analysis of Existing Sea Turtle Lighting Ordinances

### A. The Development of Best Management Practices and Guiding Principles

To better understand how continued disorientations of sea turtles may be related to the current local lighting ordinances around the state, the Clinic employed a “content analysis” methodology and developed a survey instrument to analyze the 82 available county and municipality sea turtle lighting ordinances.<sup>36</sup> The categories used in the content analysis survey were developed from DEP Rule 62B-55 F.A.C.(the old model ordinance), DEP Proposed Marine Turtle Lighting Guidelines, and on the ground lighting retrofit experience from experts at the Sea Turtle Conservancy. The guiding principles for the best management practices are ***Keep it Low, Keep it Long, and Keep it Shielded***. These principles form the basis of all Sea Turtle Friendly Lighting, and in the event that light does illuminate the beach they ensure that it minimizes disruption to nesting turtles and hatching behavior.



***Keep it Low*** – Mount the fixture as low as possible to minimize light trespass, and use the lowest amount of light (lumens) needed for the task.

***Keep it Long***- Use long wavelength light sources (Amber and Red) in the appropriate lighting wavelength, 580 nm and above.

***Keep it Shielded*** – Fully shield the light so bulbs and/or glowing lenses are not visible from the beach.

Figure 1 shows a bollard fixture at a beach dune that illustrates the three STFL general principles.

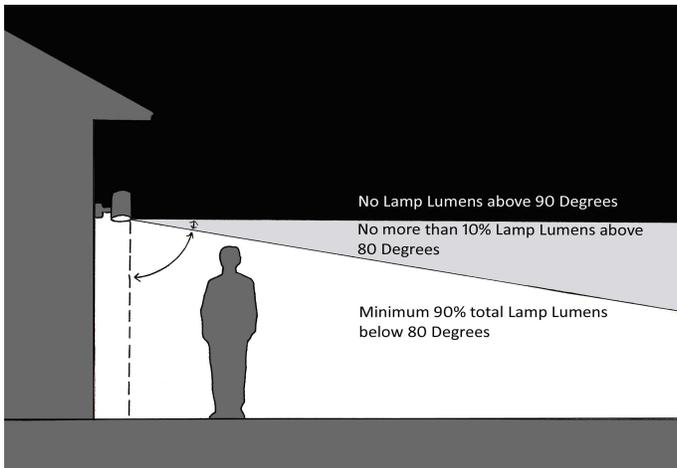


Figure 2 shows an appropriate “full-cut-off” fixture on the exterior of a home. A part of the ***Keep it Shielded*** requirement is that no lamp lumens go above a 90-degree angle with no more than 10% of the lamp lumens exceeding 80-degrees angle.

<sup>36</sup> Content analysis is a social science technique used to analyze text, including legal information, in a systematic, objective, and quantitative manner to make replicable and valid inferences from data. See Krippendorff, K. (2004). *Content analysis: an introduction to its methodology* (2nd ed.). Thousand Oaks, CA.; See also Riffe, D., & Lacy, A. F. (1998). *Analyzing media messages: using quantitative content analysis in research*. Mahway, NJ: Laurence Erlbaum Associates.

## B. Measuring Ordinance Strength with the Content Analysis

A team made up of graduate students from the Department of Wildlife Ecology and Conservation, the School of Forest Resources and Conservation, and second and third year law students at the University of Florida Levin College of Law were trained to evaluate, score and code the 82 available ordinances. These “coders” participated in a Lighting Workshop where they learned relevant sea turtle biology and lighting technology. All coders then completed a training survey based on a pre-selected local government ordinance. Coders were retrained on questions where less than 80% of the coders answered the question correctly. Coders were then assigned ordinances to score individually. To account for the variability in interpretation, two coders separately reviewed each ordinance.

Questions were divided into two sections, termed components: 17 statements addressed whether the ordinance would create lighting conditions favorable to sea turtle nesting behavior, (Table 1) and 9 questions addressed whether the ordinance had adequate implementation provisions (e.g. compliance, enforcement, education, etc.) (Table 2). The 17 questions regarding favorable sea turtle lighting conditions, based on sea turtle biology, were collapsed into the Sea Turtle Friendly Lighting Principles Component (STFLC) (Chronbach’s  $\alpha = 0.84$ )<sup>37</sup>. In this section each statement in the survey was compared to statements in the ordinance and scored on a scale of 0 to 3. Where 0= concept not mentioned, 1= concept addressed but vague, 2= concept addressed but less stringent (wording provides loopholes), 3= addressed with the same strength. The 9 questions relating to compliance and enforcement were collapsed into the Implementation Component (IC) (Chronbach’s  $\alpha = 0.76$ ). For these questions ordinances scored one point if they addressed a question in the document.

Scores for the STFLC and IC were calculated using four steps.<sup>38</sup> First, the sum of the items within each component was taken. Second, the item sum was divided by the total possible score (STFLC= 17 items x 3 points= 51; IC= 9 items x 1point each= 9 points). Third, the fractional score was multiplied by 50, placing each component on a 0-to-50 scale. A fifty-point scale was used to for ease of discussion. Fourth, as each ordinance was scored twice, the mean taken of the two scores to arrive at a single component score for each ordinance.

While some items within a scale might play more of a role in ordinance strength, an item’s relative weight is difficult to determine.<sup>39</sup> For example, does a public education clause confer more ordinance strength than compliance inspections or does requiring lights to be long wavelength have more weight than requiring lights to be shielded? Placing each component on the same scale assigns equal weight to each component maintaining consistency in the statistical results. It also eliminates the question of which component should be given more weight. Finally the total policy score was calculated by adding the scores for each component for a possible maximum score of 100. As will be discussed in Section C, the results of the content analysis demonstrated a need for improvements in sea turtle friendly lighting requirements and guidelines for Florida’s coastal counties.

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<sup>37</sup> Chronbach’s  $\alpha$  is a measure of scale reliability and internal consistency. See Acock, A. C. (2010). *A gentle introduction to stata* (3rd ed.). College Station, Tex.

<sup>38</sup> Brody, S. D. (2003). Are We Learning to Make Better Plans?: A Longitudinal Analysis of Plan Quality Associated with Natural Hazards. *Journal of Planning Education and Research*, 23(2).

<sup>39</sup> Wald, D. M., & Hostetler, M. E. (2010). Conservation Value of Residential Open Space: Designation and Management Language of Florida’s Land Development Regulations. *Sustainability*, 2(6).

### C. The Results of the Content Analysis

The Sea Turtle Friendly Lighting Component (STFLC) scores ranged from 4 to 39 on the 50 point scale; the Implementation Component (IC) ranged from 0 to 47. The Total Policy (TP) score ranged from 4 to 81 out of 100 total points. The County and Municipality Ordinance Policy Score Table (Appendix A) lists all 82 county and municipality sea turtle ordinances in descending order. Sarasota County had the highest TP with a score of 81 points followed closely by the City of Venice, in Sarasota County with a TP score of 78 points. The municipalities scoring the lowest were Juno Beach, Palm Beach County with 4 TP points and Dunedin, Pinellas County with a TP score of 11. Gulf Stream in Palm Beach County, an ordinance with voluntary compliance, was also among the low scores with a TP score of 7. We might expect a lower TP score since the ordinance did not get points for enforcement items; however, with a total of only 7 TP points the Gulf Stream ordinance doesn't address most of the biologically relevant principles either. It is important to mention that the TP score is based merely on the legal language of the current ordinances and some counties may be stronger "on the ground" than their policy score may reflect.

The current ordinances enacted by local county and municipality governments are most often divided into sections with regulations that specifically regulate new development (96% of ordinances) and sections that regulate existing development (93% of ordinances). The remaining ordinances chose not to differentiate. In many ordinances the requirements for old development and new development were similar, though requirements for existing development were less restrictive. With respect to incorporating the sea turtle friendly lighting technologies very few ordinances mandated low lumens<sup>40</sup> (8% of existing development and 5% of new development (Figure 3)). However, 89% of ordinances required lights in existing development to be shielded, 92% of ordinances required that lights in new development to be shielded (Figure 3). The general requirement that lights must not be "visible from the beach" was found in 44% of ordinances as a requirement for existing development and 90% included this stipulation for new development (Figure 3). No ordinance requires lights to be exclusively long wavelength though 5% of ordinances reference long wavelength light for existing development and 6% for new development (Figure 3). Bay County for example requires lights for existing and new development to be a Turtle Lamp<sup>41</sup> or be disconnected during nesting season.<sup>42</sup> However, the definition of Turtle Lamp includes incandescent bug lamps, which emit a full spectrum of light.

Most ordinances (74%) have penalties for non-compliance;<sup>43</sup> however, only 15% of ordinances mandate compliance inspections before the nesting season nesting season begins while

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<sup>40</sup> **Lumen:** Unit of luminous flux; the flux emitted within a unit solid angle by a point source with a uniform luminous intensity of one candela. One footcandle is one lumen per square foot. One lux is one lumen per square meter. See *Glossary of Basic Terms, Lighting*, International Dark-Sky Association, (last visited June 17, 2013) available at <http://www.darksky.org/education/glossary>

<sup>41</sup> **Turtle lamp** means low pressure sodium vapor lamps, incandescent bug lamps, 11 watt compact fluorescent bug lamps, "turtle safe lighting" ("TSL") sleeved fluorescent lamps, amber and red light emitting diodes (LED), true red neon lamps, other lamps certified by Florida Fish and Wildlife Conservation Commission as "Wildlife Lighting" (available at <http://myfwc.com/WILDLIFEHABITATS/seaturtle~index.htm>), lights approved by the Florida Department of Environmental Protection, and other artificial light sources emitting predominately long-wavelength light (570 or greater nanometers which are in the yellow, orange or red light spectrum).

<sup>42</sup> Bay County, Florida, Municipal Code Ord. No. 09-16, §1, §5-113.a 1(i-ii) & §5-113.b 2 (2012)

<sup>43</sup> Many local governments codify ordinances in land development codes and may aggregate penalties for a wide variety of regulatory violations in a separate and distinct chapter. Every effort was made to discern this through Internet searches during the survey.

9% have compliance inspections during the nesting season (Figure 4). This leaves the discovery and reporting of non-compliant properties up to concerned citizens, often sea turtle monitoring groups, or proactive code enforcement officers. It is also important to make sure people are knowledgeable about lighting and sea turtle behavior and local regulations. 20% of the ordinances have provisions for educating the general public. For example St. John’s County states “Each year this Ordinance is in effect, the County shall conduct a community education effort to support the goal of protecting Marine Turtles against Artificial Light hazards.”<sup>44</sup> 15% have provisions for educating the affected public (Figure 4). In Charlotte County, for example, “The community development department shall develop a process whereby any individual submitting a site plan or building plan for construction within the nesting zone is made aware of all instructions, requirements, and guidelines contained herein.”<sup>45</sup>

**TABLE 1- Sea Turtle Friendly Lighting Principles Component (17 items)**

Exterior artificial light for existing development must be low lumens.
Exterior artificial light for existing development must be full cut off (ex. No light emitted above 90 degree angle).
Exterior artificial light for existing development must be downward directed.
Exterior artificial light for existing development must not be visible from the beach.
Exterior artificial light for existing development must be long wavelength (ie. 580 nm or greater).
Exterior artificial light for existing development must be shielded.
Exterior artificial light for new development must be low lumens.
Exterior artificial light for new development must be full cut off (ex. No light emitted above 90 degree angle).
Exterior artificial light for new development must be downward directed.
Exterior artificial light for new development must not be visible from the beach.
Exterior artificial light for existing development must be long wavelength (ie. 580 nm or greater).
Exterior artificial light for new development must be shielded.
Artificial light shall not be visible (eg. directly/indirectly/cumulatively) from the beach.
Areas seaward of the frontal dune are not to be directly illuminated.
Areas seaward of the frontal dune are not to be indirectly illuminated.
Areas seaward of the frontal dune are not to be cumulatively illuminated.
The building of campfires or bonfires shall be prohibited during the nesting season.

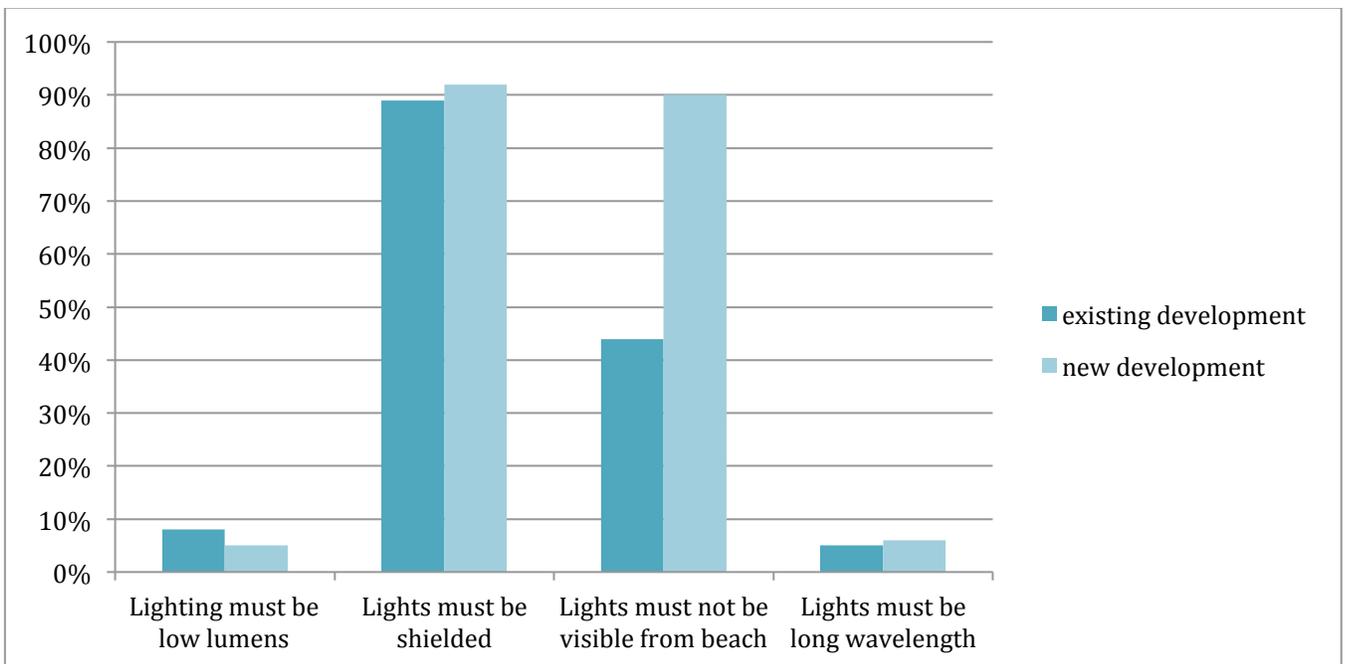
<sup>44</sup> St. Johns County, Florida, Municipal Code Ord. No. 99-33, § 10.1 (2012)

<sup>45</sup> Charlotte County, Florida, Municipal Code Ord. No. 98-041, § 7, 6-23-98, § 3-5-304.1 (2012)

**TABLE 2- Implementation Component (9 items)**

Is a provision made for a compliance inspection during the nesting season?
Does the ordinance provide for a pre-enforcement warning?
Does the ordinance provide for a notice of violation?
The ordinance establishes civil penalties for non-compliance
The ordinance establishes criminal penalties for non-compliance.
Are the enforcement penalties incorporated into the ordinance by reference?
Shall each day of any such violation constitute a separate and distinct offense?
Does the ordinance provide for the education of the general public?
Does the ordinance provide for the education of the affected public (ex. Those submitting an application for construction)?

**Sea Turtle Friendly Lighting Component: Incorporation of Favorable Lighting Conditions**



**Figure 3** shows the Sea Turtle Friendly Lighting Component, lists the four major requirements that a strong sea turtle lighting ordinance should have and the percentage of existing ordinances that comply with those sea turtle favorable requirements.

## Implementation Component: Relevant Enforcement and Education Conditions

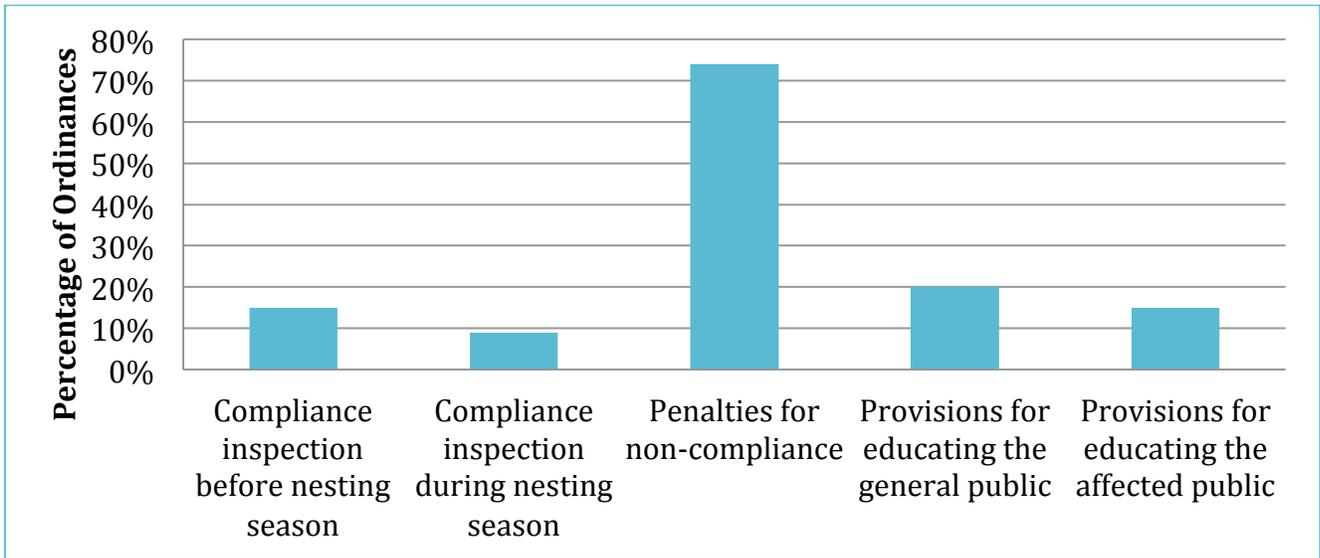


Figure 4 shows the percentage of current ordinances that have Enforcement and Education components in the existing sea turtle ordinances.

## Turtle Emergencies v. Ordinance Strength

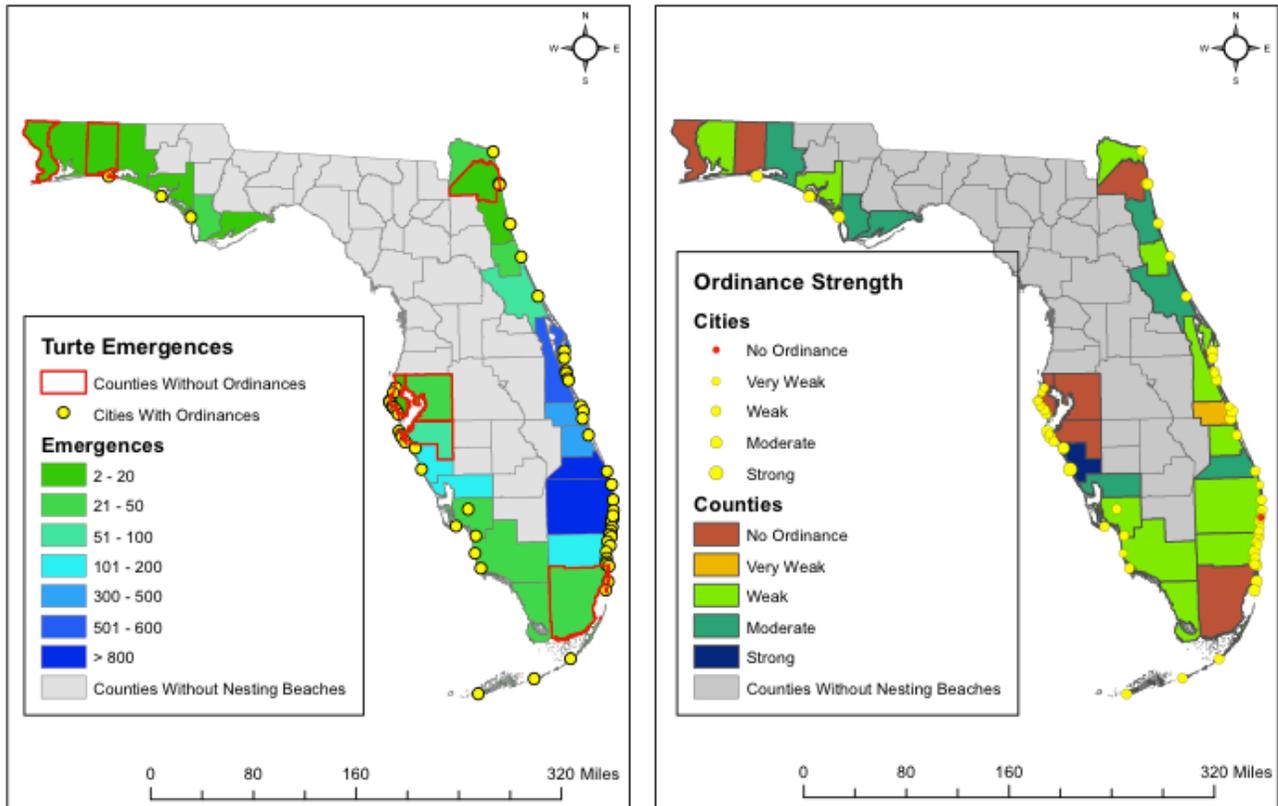


Figure 5 demonstrates through a side-by-side visual comparison the number of sea turtle emergencies in each of the coastal counties and municipalities (left) with the strength of the sea turtle ordinance in those counties and municipalities (right).

### **III. The Revised Model Ordinance: Sea Turtle Friendly Lighting Ordinance**

The Content Analysis described in Part II suggests that DEP’s 1993 model ordinance (62B-55 F.A.C.), lacks sufficient technical standards for the implementation of its’ objectives, as do the counties and municipalities who relied on this model in adopting sea turtle lighting ordinances. Based upon the results above, and advances in both our understanding of sea turtle response to artificial lighting and lighting technologies since the last model, the Clinic developed a new model Sea Turtle Friendly Lighting Ordinance (STFL Ordinance) based on best currently available technology and practices. The STFL Ordinance is divided into a number of sections that apply the general principles of Sea Turtle Friendly Lighting of *Keep it Low, Keep it Long, Keep it Shielded* to all sources of artificial light affecting the beaches. The STFL Ordinance includes sections that address enforcement and education measures to ensure that the protections provided are actively being applied in the community. The STFL Ordinance also avoids to the greatest extent possible the regulation of human behavior, such as manually turning lights out at a certain time, because these provisions are unpopular and difficult to enforce. Moreover, with new lighting technologies many behavior regulations are now unnecessary to adequately protect nesting sea turtles. The model ordinance seeks to be user friendly to local governments, developers, and coastal residents in order to meet both the safety and security needs of people and the protection of endangered and threatened sea turtles. The model ordinance is set forth below.

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City/County of \_\_\_\_\_, Florida

Chapter \_\_\_\_.

#### SEA TURTLE FRIENDLY LIGHTING ORDINANCE

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ORDINANCE NUMBER 20XX-XX

LAND DEVELOPMENT CODE

AN ORDINANCE OF THE CITY/COUNTY OF \_\_\_\_\_ AMENDING CITY/COUNTY CODE CHAPTER \_\_ PROVIDING FOR AMENDMENTS TO ADOPT SEA TURTLE FRIENDLY LIGHTING REQUIREMENTS; PROVIDING FOR REPEAL OF ORDINANCES; PROVIDING FOR TERRITORY EMBRACED; PROVIDING FOR SEVERABILITY; PROVIDING FOR INCLUSION INTO THE CODE OF ORDINANCES; PROVIDING FOR EFFECTIVE DATE.

**ARTICLE 1. BASIS OF ORIDNANCE**

**Section I. Findings Of Fact**

**Whereas, the City/County of \_\_\_\_\_** recognizes that artificial lighting of beaches is a serious threat to sea turtles and other species utilizing its beaches<sup>46</sup>; and

**Whereas, the City/County of \_\_\_\_\_** recognizes that nesting adult and hatchling sea turtles are negatively affected by artificial light cast onto the beaches<sup>47</sup>; and

**Whereas, the City/County of \_\_\_\_\_** recognizes that sea turtles are protected by federal and state law; and

**Whereas, the City/County of \_\_\_\_\_** recognizes that both its economy and the quality of life of its residents are enriched by a healthy sea turtle population; and

**Whereas, the City/County of \_\_\_\_\_** desires to minimize the detrimental impact on nesting sea turtle populations, and other list sensitive wildlife by implementing a system of rules and regulations that reduces the amount of artificial light intentionally or unintentionally cast onto beaches;

*Comment: These generic findings of fact are illustrative only. Findings of Fact should relate to specific context of the County or City adopting an STFL lighting ordinance and may include data on sea turtle nesting, and disorientation/misorientation if available. It may also include information on the qualitative and quantitative value of sea turtles to beachfront economies.*

**NOW, THEREFORE, BE IT ORDAINED, BY THE CITY COUNCIL/BOARD OF COUNTY COMMISSIONERS OF THE CITY/COUNTY OF \_\_\_\_\_ on this \_\_\_\_ DAY OF \_\_\_\_, 20\_\_ .**

**Section II. Title of Ordinance**

This ordinance shall be referred to as the City/County of \_\_\_\_\_ Sea Turtle Friendly Lighting Ordinance.

**Section III. Ordinance Purpose and Objectives**

The purpose of this Ordinance is to protect nesting sea turtles on the beaches in the City/County of \_\_\_\_\_

<sup>46</sup> WILDLIFE LIGHTING, FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION, (last accessed June 11, 2013) available at <http://myfwc.com/conservation/you-protect/lighting/>.

<sup>47</sup> Depledge, M. H., Godard-Codding, C.J., & Bowen, R. E., *Light Pollution In The Sea*, 60 MARINE POLLUTION BULLETIN, 1383 (2010); Longcore, T., & Rich, C., *Ecological Light Pollution*, 2 FRONTIERS IN ECOLOGY AND THE ENVIRONMENT 191 (2004); Witherington, B. E. *Behavioral Approaches To Conservation In The Wild* (1997).

\_\_\_\_\_ by ensuring that their nesting habitat is not degraded by artificial light.<sup>48</sup> The objective of the ordinance is to ensure artificial light does not interfere with sea turtle nesting and hatching events through the design and implementation of “sea turtle friendly” lighting systems that properly exclude the beach from their range. In order to further the objective of full implementation, this Ordinance also includes provisions designed to educate residents and beach users in the City/County of \_\_\_\_\_ on the benefits of sea turtle friendly lighting and provides for monthly inspections to ensure compliance with the acceptable lighting standards.

### **Section III. Ordinance Purpose and Objectives**

The purpose of this Ordinance is to protect nesting sea turtles on the beaches in the City/County of \_\_\_\_\_ by ensuring that their nesting habitat is not degraded by artificial light.<sup>49</sup> The objective of the ordinance is to ensure artificial light does not interfere with sea turtle nesting and hatching events through the design and implementation of “sea turtle friendly” lighting systems that properly exclude the beach from their range. In order to further the objective of full implementation, this Ordinance also includes provisions designed to educate residents and beach users in the City/County of \_\_\_\_\_ on the benefits of sea turtle friendly lighting and provides for monthly inspections to ensure compliance with the acceptable lighting standards.

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<sup>48</sup> There are two forms of artificial light that have the most significant impact on sea turtle nesting habitats. The first is “light trespass” (often called “obtrusive light”), which refers to light spilling out of the area it is intended to illuminate. The second is “glare,” which refers to unwanted source luminance or brightness from an observer’s perspective. Glare occurs when visual field brightness is greater than the luminance to which the eyes are adapted, regardless of whether this light actually illuminates the area in which the observer is located. Glare causes the eye to continually be drawn toward the bright source and may also prevent the observer from adequately viewing an intended target. For example, an outdoor artificial light on a building façade may not measurably illuminate the beach but may still be visible to sea turtle hatchlings. See Philip M. Garvey, *Environmental Impact of On-Premise Identification Sign Lighting With Respect to Potential Light Trespass, Sky Glow, Glare*, United States Sign Council Foundation, ii (2004); Douglas Mace, et al., *Countermeasures for Reducing the Effects of Headlight Glare*, AAA Foundation for Traffic Safety, 13 (2001). An effective lighting ordinance will ideally address both forms of artificial light in order to provide meaningful protection to sea turtle nesting habitats. Because glare, more so than light trespass, presents greater challenges for municipal or county enforcement officers (discussed in detail below), this model ordinance provides two alternative lighting standards to be applied within the Sea Turtle Friendly Lighting District. One standard addresses light trespass alone, while the second (demarcated with an asterisk) incorporates both light trespass and glare. [See footnote 2 for a note on the third major form of artificial light.]

<sup>49</sup> There are two forms of artificial light that have the most significant impact on sea turtle nesting habitats. The first is “light trespass” (often called “obtrusive light”), which refers to light spilling out of the area it is intended to illuminate. The second is “glare,” which refers to unwanted source luminance or brightness from an observer’s perspective. Glare occurs when visual field brightness is greater than the luminance to which the eyes are adapted, regardless of whether this light actually illuminates the area in which the observer is located. Glare causes the eye to continually be drawn toward the bright source and may also prevent the observer from adequately viewing an intended target. For example, an outdoor artificial light on a building façade may not measurably illuminate the beach but may still be visible to sea turtle hatchlings. See Philip M. Garvey, *Environmental Impact of On-Premise Identification Sign Lighting With Respect to Potential Light Trespass, Sky Glow, Glare*, United States Sign Council Foundation, ii (2004); Douglas Mace, et al., *Countermeasures for Reducing the Effects of Headlight Glare*, AAA Foundation for Traffic Safety, 13 (2001). An effective lighting ordinance will ideally address both forms of artificial light in order to provide meaningful protection to sea turtle nesting habitats. Because glare, more so than light trespass, presents greater challenges for municipal or county enforcement officers (discussed in detail below), this model ordinance provides two alternative lighting standards to be applied within the Sea Turtle Friendly Lighting District. One standard addresses light trespass alone, while the second (demarcated with an asterisk) incorporates both light trespass and glare. [See footnote 2 for a note on the third major form of artificial light.]

#### **Section IV. Definitions**

1. **Artificial light** means the light emanating from any human-made device.<sup>50</sup>
2. **Beach** means the zone of unconsolidated material that extends landward from the mean low water line to the place where there is marked change in material or physiographic form, or to the line of permanent vegetation.<sup>51</sup>
3. **Cumulatively** means illumination by numerous artificial light sources that as a group illuminate any portion of the beach.
4. **Directly illuminate** means illumination as the result of an artificial light source and visible to an observer standing on the beach.
- 4.1 **\*Directly visible** means the point source of an artificial light (e.g. bulb, lamp, or glowing element) are visible to an observer standing on the beach.
5. **Dune** means any mound, bluff or ridge of loose sediment, usually sand-sized sediment, lying upland of the beach and deposited by any natural or artificial mechanism, which may be bare or covered with vegetation and is subject to fluctuations in configuration and location.<sup>52</sup>
6. **Egress lighting** means emergency lighting used in commercial buildings as a safety precaution for power outages that allows individuals to safely navigate their way out of the building.
7. **Fully shielded** means that a light fixture is constructed in such a manner that the point source of light of the fixture is not directly visible from the beach.
8. **Full cut-off** means a lighting fixture constructed in such a manner that all light emitted by the fixture, either directly from the point source, or indirectly by reflection or refraction from any part of the point source, is projected below the horizontal plane as determined by photometric test or certified by the manufacturer.
9. **Glare** means unwanted source luminance or brightness visible to the eye of an observer located on the beach, regardless of the observer's distance from the light source or whether the light source measurably illuminates any area of the beach.<sup>53</sup>
10. **Illuminance** means the amount of light projected from a source that reaches a surface from any distance, lighting fixture array, or direction.<sup>54</sup>

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<sup>50</sup> Fla. Admin. Code 62B-55.002 (2012). In addition to light trespass and glare, a third form of artificial light, “sky glow,” may also have a negative effect on sea turtle nesting habitats. Sky glow refers to general sky brightness caused by the scattering of electric light into the atmosphere, most notably from outdoor lighting in urban areas. Illuminating Engineering Society of North America, *Addressing Obtrusive Light (Urban Sky Glow and Light Trespass) in Conjunction with Roadway Lighting*, Technical Manual TM-10-00, 1 (2000, reaffirmed 2011). Sky glow has long been a concern of astronomers and measures have been taken to reduce its effects. See generally the work of the International Dark Sky Association, available at [www.darksky.org](http://www.darksky.org). This form of artificial light, however, is beyond the scope of this model ordinance.

<sup>51</sup> Fla. Admin. Code 62B-33.002 (2012).

<sup>52</sup> *Id.*

<sup>53</sup> Definition adapted from: Philip M. Garvey, *Environmental Impact of On-Premise Identification Sign Lighting With Respect to Potential Light Trespass, Sky Glow, Glare*, United States Sign Council Foundation, ii (2004).

<sup>54</sup> *Id.* at 5.

11. **Illuminate** means that more than zero footcandles of artificial light can be measured.
12. **Indirectly illuminate** means illumination as a result of an artificial light source when the artificial light source is not visible to an observer standing on the beach, but the lumen output is reaching the beach. This definition does not include illumination generated from interior lighting that conforms to the requirements of Section II.7 under Article III of this ordinance (requiring tinted windows).
- 12.1 **\*Indirectly visible** means visible as a result of the reflection of the point source of an artificial light (e.g. bulb, lamp, or glowing element) on structures, buildings, or landscaping visible to an observer standing on the beach. This definition does not include illumination generated from interior lighting that conforms to the requirements of Section II.7 under Article III of this ordinance (requiring tinted windows).
13. **Light trespass** means light spilling out of the area purposefully illuminated.
14. **Long wavelength** means a luminaire emitting light wavelength of 580 nanometers or greater.
15. **Luminance** means the physical measure of the stimulus, which produces the sensation of brightness.<sup>55</sup>
16. **Nesting season** means the period from May 1 through October 31 of each year for all areas within the City/County of all counties except Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward. Nesting season for Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward counties means the period from March 1 through October 31 of each year (*due to the earlier nesting times for Leatherback Sea Turtles in these counties*).<sup>56</sup>
17. **Nighttime** means the locally effective time period between sunset and sunrise.<sup>57</sup>
18. **Outdoor area** means any portion of a property that could have an artificial light source not attached to a permanent structure, and is not primarily lighting a parking area or roadway.
19. **Point source** means the bulb, lamp, or glowing elements of a fixture from which light is emitted.
20. **Sea turtle** means any turtle, including all life stages from egg to adult, of these species: Green (*Chelonia mydas*), Leatherback (*Dermochelys coriacea*), Loggerhead (*Caretta caretta*), Hawksbill (*Eretmochelys imbricata*), and Kemp's Ridley (*Lepidochelys kempi*).<sup>58</sup>
21. **Tinted glass** means any glass treated to achieve an industry-approved, inside-to-outside light transmittance value. Such transmittance is limited to the visible spectrum (400-700 nanometers) and is measured as the percentage of light that is transmitted through the glass.

## **ARTICLE II. SEA TURTLE LIGHTING DISTRICT**

### **Section I. Applicability**

1. An overlay district, known as the *Sea Turtle Friendly District*, is hereby established within the City/County of \_\_\_\_\_.

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<sup>55</sup> *Id.* at ii.

<sup>56</sup> *Id.*

<sup>57</sup> Fla. Admin. Code 62B-55.002 (2012).

<sup>58</sup> Fla. Admin. Code 62B-33.002 (2012).

2. The *Sea Turtle Friendly District* shall include all properties within the City/County of \_\_\_\_\_ that may directly, indirectly, or cumulatively illuminate the beach with artificial light at any time, and regardless of whether those properties are beachfront properties.
- 2.1 \*The *Sea Turtle Friendly District* shall include all properties within the City/County of \_\_\_\_\_, regardless of whether those properties are beachfront properties, that either 1) directly, indirectly, or cumulatively illuminate the beach with artificial light at any time or 2) whose artificial lighting may directly or indirectly be visible to an observer standing on the beach, regardless of whether the light illuminates the beach.
3. The provisions of this Ordinance apply to all buildings and related infrastructure, including landscaping, as well as all other activities within the *Sea Turtle Friendly District*.

**[Comment:** This model ordinance establishes an overlay district for the purpose of implementing the ordinance. None of the ordinances reviewed used this approach and the ordinance could be applied by simply consolidating (2) and (3) above and making it applicable to:

- “all properties within the City/County of \_\_\_\_\_ that may directly, indirectly, or cumulatively illuminate the beach with artificial light at any time, and regardless of whether those properties are beachfront properties.” **OR**
- \*“all properties within the City/County of \_\_\_\_\_, regardless of whether those properties are beachfront properties, that either 1) directly, indirectly, or cumulatively illuminate the beach with artificial light at any time or 2) whose artificial lighting may directly or indirectly be visible to an observer standing on the beach, regardless of whether the light illuminates the beach”

However, creating a district may have other benefits, including incorporating other Sea Turtle Friendly practices not related to lighting, as well as raising awareness through signage, and so on].

## **Section II. Annual Public Notice**

At least thirty days prior to the commencement of every sea turtle nesting season, the City/County of \_\_\_\_\_ shall provide written notice of the provisions contained in this Ordinance to each property within the *Sea Turtle Friendly District*.

## **ARTICLE III. LIGHTING PROVISIONS**

### **Section I. Standards Applicable to All Lighting in the *Sea Turtle Friendly District***

#### **Alternative 1:**

All lighting in the *Sea Turtle Friendly District* shall be designed so that the point source of light or any reflective surface of the light fixture shall not directly, indirectly, or cumulatively illuminate the beach.

**[Comment to Alternative 1.** Alternative 1 provides an objective standard by which to control illuminance of the beach caused by artificial light, where illuminance is defined as the amount of light projected from a source that reaches a surface from any distance, lighting fixture array, or direction.<sup>59</sup> To measure illuminance, one measures the light that reaches a surface at some distance from the source.<sup>60</sup> Such a standard is easily measured in the field by an average light meter (such as a meter purchased from a camera

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<sup>59</sup> Philip M. Garvey, *Environmental Impact of On-Premise Identification Sign Lighting With Respect to Potential Light Trespass, Sky Glow, Glare*, United States Sign Council Foundation, 5 (2004).

<sup>60</sup> *Id.*

store).<sup>61</sup>

An ordinance that focuses exclusively on the objectively measurable illuminance of a beach, however, addresses only the issue of light trespass, that is, light that spills out of the area purposefully illuminated; the negative effects of glare are left unregulated by Alternative 1.<sup>62</sup> Technical reports in the field of light engineering have acknowledged the limitations inherent in local ordinances that address only light trespass problems: “While such regulations enable easy measurement by municipal officials, they do little to help those who are troubled by ‘bright’ luminaire that may be located blocks—even miles—away in an otherwise dark field of view.”<sup>63</sup> While Alternative 1 provides an objective measurement for enforcement of lighting standards within the Sea Turtle Friendly District, it fails to address potential negative impacts of glare generated by light sources *visible* from the beach but that do not necessarily *illuminate* the beach.]

**\*Alternative 2:**

All lighting in the Sea Turtle Friendly District shall be designed so that the point source of light or any reflective surface of the light fixture shall not directly, indirectly, or cumulatively illuminate the beach, nor shall it be directly or indirectly visible to an observer standing on the beach.

[**Comment to Alternative 2.** Alternative 2 addresses both forms of artificial light that may affect sea turtle nesting habitats, illuminance *and* glare. Under Alternative 2, illuminance may be measured objectively with a light meter as under Alternative 1. However, glare (light visible from the beach that does not necessarily illuminate the beach) presents a challenge for objective measurement by municipal or county enforcement officers in relation to sea turtle nesting habitats.

Light engineers have studied the issue of glare primarily in the contexts of light pollution and roadway safety. Technical reports in this field identify two primary categories of glare, namely disability glare (created by a light so bright, such as the headlights of another car, that it results in a measurable reduction in a driver’s ability to perform visual tasks)<sup>64</sup> and discomfort glare (created by a bright light that causes a level of subjective discomfort or annoyance).<sup>65</sup> Engineers have created formulas by which to identify objective thresholds for ordinances addressing disability glare using measures of light source luminance (a different measure than *illuminance*) and background luminance.<sup>66</sup> In contrast, discomfort glare is a highly subjective measurement dependent on the sensitivity of the driver.<sup>67</sup>

Although objective thresholds for light brightness causing disability glare may be set in the context of roadway safety, the disability/discomfort distinction does not apply to sea turtle nesting habitats. In relation to sea turtles, “there is no single, measurable level of artificial brightness on nesting beaches that is acceptable for sea turtle conservation.”<sup>68</sup> Research suggests that if a light can be seen by an observer on the

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<sup>61</sup> Carl Shaflick, *Environmental Effects of Roadway Lighting*, Department of Civil Engineering of the University of British Columbia, 9 (1997).

<sup>62</sup> See footnote 1, *supra*.

<sup>63</sup> Illuminating Engineering Society of North America, *Addressing Obtrusive Light (Urban Sky Glow and Light Trespass) in Conjunction with Roadway Lighting*, Technical Manual TM-10-00, 2 (2000, reaffirmed 2011).

<sup>64</sup> Douglas Mace, et al., *Countermeasures for Reducing the Effects of Headlight Glare*, AAA Foundation for Traffic Safety, 15 (2001).

<sup>65</sup> *Id.* at 16.

<sup>66</sup> *Id.*

<sup>67</sup> Philip M. Garvey, *Environmental Impact of On-Premise Identification Sign Lighting With Respect to Potential Light Trespass, Sky Glow, Glare*, United States Sign Council Foundation, 17 (2004).

<sup>68</sup> Blair E. Witherington and R. Erik Martin, *Understanding, Assessing, and Resolving Light-Pollution Problems on Sea Turtle Nesting Beaches*, Florida Marine Research Institute and the Florida Fish and Wildlife Conservation Commission, v (2000).

beach, then the light can affect sea turtles.<sup>69</sup> This includes both light *directly* visible from the beach and light reaching the beach *indirectly* by reflecting off trees and buildings.<sup>70</sup>

This no tolerance policy on light reaching the beach presents a challenge for objective enforcement of the ordinance, as a determination as to whether light is directly or indirectly visible from the beach naturally depends on the particular ocular sensitivities of each individual enforcement officer or reporting citizen. However, subjective enforcement methods of this nature have been upheld by Florida courts.

Although there is not yet case law in Florida addressing a challenge to a lighting ordinance, a helpful analogy may be drawn between the lighting ordinance’s “directly or indirectly visible” measurement and a common standard contained in Florida noise ordinances and statutes, “plainly audible.” In *State v. Catalano* 104 So. 3d 1069 (Fla. 2012), the Florida Supreme Court resolved a split between the 5<sup>th</sup> DCA and 2<sup>nd</sup> DCA as to whether the “plainly audible” standard used for the regulation of noise levels was unconstitutionally vague, overbroad, arbitrarily enforceable, or impinging on free speech rights. The Court stated that to withstand constitutional scrutiny for vagueness, “statutes do not have to set determinate standards or provide mathematical certainty.”<sup>71</sup> Instead, a statute must “provide persons of common intelligence and understanding adequate notice of the proscribed conduct.”<sup>72</sup> The Court held that the “plainly audible” standard met this requirement:

Although it is true that each police officer may have different auditory sensitivities, the “plainly audible” beyond twenty-five feet standard provides fair warning of the prohibited conduct and provides an objective guideline—distance—to prevent arbitrary and discriminatory enforcement so that basic policy matters are not delegated to policemen, judges, and juries for resolution on an ad hoc and subjective basis.<sup>73</sup>

The Court went on to discuss numerous other cases within the state and around the country in which similar statutes were upheld in the face of vagueness challenges.<sup>74</sup>

The “plainly audible” statute in *Catalano* was struck down, however, for the alternative reason that it swept too broadly and infringed on the right to play amplified music, an established fundamental right protected under the Free Speech Clause of the First Amendment.<sup>75</sup> In order to avoid invalidation of the lighting ordinance on this ground, a local government may consider including an exception to the ordinance’s prohibitions for sources of light that may implicate fundamental rights such as an art installation. It is unlikely a court would classify the typical lighting of property as a fundamental right.

## **Section II. Exterior Lighting Affixed to Structures**

1. All lighting affixed to the exterior of permanent structures shall be long wavelength and fully shielded.
2. All non-egress lighting affixed to the exterior of permanent structures shall not directly, indirectly, or cumulatively illuminate the beach.

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<sup>69</sup> *Id.* at 16.

<sup>70</sup> *Id.*

<sup>71</sup> *State v. Catalano* 104 So. 3d 1069, 1076 (Fla. 2012).

<sup>72</sup> *Id.* at 1075.

<sup>73</sup> *Id.* at 1076.

<sup>74</sup> *See, e.g., Davis v. State*, 272 Ga. 818, 820 (2000) (finding that a statute which prohibits amplified sound from a vehicle which is “plainly audible” at 100 feet is not vague and stating that it would belie credibility to find that persons of ordinary intelligence do not know what it means for amplified sound to be “plainly audible” at a distance greater than one-hundred feet).

<sup>75</sup> *State v. Catalano* 104 So. 3d 1069, 1080 (Fla. 2012).

- 2.1 \*All non-egress lighting affixed to the exterior of permanent structures shall not directly, indirectly, or cumulatively illuminate the beach, nor shall it be directly or indirectly be visible to an observer standing on the beach.
3. Lighting at egress points shall be limited to the minimum number of fixtures and footcandles necessary to meet federal, state, and local safety requirements.<sup>76</sup>
4. Lighting affixed to the exterior of permanent structures shall consist of either<sup>77</sup>:
  - a. Wall or ceiling down-light fixtures, equipped with a well-recessed light source and interior dark-colored, non-reflective baffles or louvers, mounted at a maximum height, measured from the bottom of fixture, of eight feet above the adjacent floor or deck, or
  - b. Louvered wall fixtures, equipped with downward-directed louvers that completely hide the light source, with the bottom of fixture mounted 12 inches or less above the adjacent floor or deck, or
  - c. Bollard-type fixtures, which do not extend more than 42 inches above the adjacent floor or deck, measured from the bottom of fixture, equipped with downward-directed louvers that completely hide the light source, and externally shielded on the side facing the beach.
5. Balcony lights on the seaward and shore-perpendicular sides of permanent structures shall be turned off at all times during nighttime in sea turtle nesting season.
6. Interior locations including but not limited to stairwells, elevators, parking garages, or courtyards that allow light to escape through windows or other openings shall not directly, indirectly, or cumulatively illuminate the beach.
- 6.1 \*Interior locations including but not limited to stairwells, elevators, parking garages, or courtyards that allow light to escape through windows or other openings shall not directly, indirectly, or cumulatively illuminate the beach, nor shall they be directly or indirectly visible to an observer standing on the beach.
7. All windows and glass doors on the seaward and shore-perpendicular sides of any structures shall be designed for a light transmittance value<sup>78</sup> of 15% or less through the use of tinted glass, window film, or screens.
8. Emergency lights shall be on a separate circuit and activated only during power outtages or other situations in which emergency lighting is necessary for public safety.

### **Section III. Outdoor Areas**

1. All lighting of outdoor areas shall be long wavelength and fully shielded.
2. Outdoor lighting that projects light upward shall be prohibited.
3. Lighting of outdoor areas shall consist of either<sup>79</sup>:

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<sup>76</sup> See Fla. Building Code, Chapter 10, Section 1006.

<sup>77</sup> [Adapted from] “Multi-Family, Public Facility and Commercial Lighting Guidelines” in *Marine Turtle Lighting Guidelines*, Florida Department of Environmental Protection (2013) (unpublished draft on file with the authors).

<sup>78</sup> Light Transmittance Value means the percentage of light that is transmitted through the glass from the inside to the outside of the window or door. See Fla. Admin. Code 62B-55.002 (20) (2012).

- a. Ground-level downward-directed fixtures, equipped with interior dark-colored, non-reflective baffles or louvers, mounted either with a wall mount on walls or piles facing away from the beach, or
  - b. Bollard-type fixtures, which do not extend more than 42 inches above the adjacent floor or deck, measured from the bottom of fixture, equipped with downward-directed louvers that completely hide the light source, and externally shielded on the side facing the beach.
4. Lighted signs shall not be located on the seaward and shore-perpendicular sides of any structures, and shall not directly, indirectly, or cumulatively illuminate the beach.
    - 4.1 \*Lighted signs shall not be located on the seaward and shore-perpendicular sides of any structures, and shall not directly, indirectly, or cumulatively illuminate the beach, nor shall they be directly or indirectly visible to an observer standing on the beach.
  5. Pond lights and fountain lights shall not be located on the seaward and shore-perpendicular sides of any structures, and shall not directly, indirectly, or cumulatively illuminate the beach.
    - 5.1 \*Pond lights and fountain lights shall not be located on the seaward and shore-perpendicular sides of any structures, shall not directly, indirectly, or cumulatively illuminate the beach, nor shall they be directly or indirectly visible to an observer standing on the beach.
  6. Fire pits shall be located landward of the most seaward dune and shielded with an opaque structure or partition, and shall not directly, indirectly, or cumulatively illuminate the beach.
    - 6.1 \*Fire pits shall be located landward of the most seaward dune and shielded with an opaque structure or partition, and shall not directly, indirectly, or cumulatively illuminate the beach, nor shall they be directly or indirectly visible to an observer standing on the beach.

#### **Section IV. Parking Areas And Roadways**

1. All lighting of parking areas and roadways shall be long wavelength, fully shielded, and full cut-off.
2. Parking area and roadway lighting shall be shielded from the beach via vegetation, natural features, or artificial structure rising from the ground that prevent artificial light sources, including but not limited to vehicular headlights, from directly, indirectly, or cumulatively illuminating the beach.<sup>80</sup>
  - 2.1 \*Parking area and roadway lighting shall be shielded from the beach via vegetation, natural features, or artificial structure rising from the ground that prevent artificial light sources, including but not limited to vehicular headlights from directly, indirectly, or cumulatively illuminating the beach and that ensure such light is not directly or indirectly visible to an observer standing on the beach.
3. Lighting of roadways shall produce no more than 1.0 footcandles (on average) of light in any location.<sup>81</sup>
4. Lighting of parking areas and roadways shall consist of either<sup>82</sup>:

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<sup>79</sup> [Adapted from] “Landscape Lighting Guidelines” in *Marine Turtle Lighting Guidelines*, Florida Department of Environmental Protection (2013) (unpublished draft on file with the authors).

<sup>80</sup> [Adapted from] “Parking Area and Roadway Lighting Guidelines” in *Marine Turtle Lighting Guidelines*, Florida Department of Environmental Protection (2013) (unpublished draft on file with the authors).

<sup>81</sup> *Id.* at Table 7.3.1.

<sup>82</sup> [Adapted from] “Parking Area and Roadway Lighting Guidelines” in *Marine Turtle Lighting Guidelines*, Florida Department of Environmental Protection (2013) (unpublished draft on file with the authors).

- a. Ground-level downward-directed fixtures, equipped with interior dark-colored, non-reflective baffles or louvers, mounted either with a wall mount on walls or piles facing away from the beach, or
  - b. Bollard-type fixtures, which do not extend more than 42 inches above the adjacent floor or deck, measured from the bottom of fixture, equipped with downward-directed louvers that completely hide the light source, and externally shielded on the side facing the beach, or
  - c. Embedded roadway lighting systems, or
  - d. Pole-Mounted Lights, if required, which shall adhere to the restrictions located in subsection (5).
5. Pole-mounted lights shall only be used in parking areas and roadways when mounting the lights at lower elevations cannot practicably comply with minimum light levels set forth in applicable federal and state laws designed to protect public safety. If required, pole-mounted lights shall be:
- a. Located on the landward sides of buildings in locations that will not directly, indirectly, or cumulatively illuminate the beach,
  - a.1 \*Located on the landward sides of buildings in locations that will not directly, indirectly, or cumulatively illuminate the beach, or in which they will not directly or indirectly be visible to an observer standing on the beach.
  - b. Mounted no higher than 12 feet above the ground on arterial roadways or 20 feet above the ground if required on Department of Transportation right-of-ways<sup>83</sup>, and
  - c. Full cut-off, downward-directed onto non-reflective surfaces.
6. Equipment yards, storage yards, and temporary security lights shall also adhere to the lighting restrictions contained in this Section.

**Section V. Pool Areas**

- 1. Lighting of pool decks, pool facilities, swimming pools, and spas shall be long wavelength and fully shielded.
- 2. Above-water lighting of pool decks, pool facilities, swimming pools, and spas shall be turned off during nighttime in sea turtle nesting season when closed. The use of an automatic timer is acceptable.
- 3. Above-water lighting of pool decks, pool facilities, swimming pools, and spas shall otherwise adhere to the applicable requirements for acceptable light fixtures contained in Section 1 and Section 2 of this Part.
- 4. Underwater lighting of pools or spa light shall:
  - a. Be downward-directed,
  - b. Not directly, indirectly, or cumulatively illuminate the beach, and
  - c. Produce no more than 0.5 footcandles of light above the water surface.

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<sup>83</sup> *Id.*

- 4.1 \*Underwater lighting of pools or spa light shall not directly, indirectly, or cumulatively illuminate the beach, nor shall it be directly or indirectly visible to an observer standing on the beach.

#### **Section VI. Pier Structures**

1. Lighting of pier structures projecting over the beach or over water shall be:
  - a. Long wavelength and fully shielded, and
  - b. Mounted as low to the deck as possible to prevent light pollution or spillage beyond the walking surface, and
  - c. Shall consist of:<sup>84</sup>
    1. Recessed railing down-light fixtures, equipped with downward-directed louvers and interior dark-colored, non-reflective baffles, or
    2. Bollard-type fixtures, which do not extend more than 42 inches above the adjacent floor or deck, measured from the bottom of fixture, equipped with downward-directed louvers that completely hide the point source of light, and externally shielded on the side facing the beach, or
    3. Embedded lighting systems.

#### **Section VII. Dune Crossovers And Beach Access Points**

1. Lighting of dune crossovers and beach access points shall be prohibited.<sup>85</sup>

#### **Section VIII. Special Events, Motor Vehicles, and Temporary Lighting**

1. Lighting associated with a special event that may directly, indirectly, or cumulative illuminate the beach shall not be authorized during nighttime in sea turtle nesting season.
  - 1.1 \*Lighting associated with a special event that may directly, indirectly, or cumulatively illuminate the beach or directly or indirectly be visible to an observer standing on the beach, shall not be authorized during nighttime in sea turtle nesting season.
2. The operation of all motorized vehicles, except emergency and law enforcement vehicles or those permitted on the beach for sea turtle conservation or other research and conservation, shall be prohibited on the beach at nighttime during sea turtle nesting season.<sup>86</sup>
3. All temporary construction lighting shall be<sup>87</sup>:

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<sup>84</sup> [Adapted from] “Pier Lighting” in *Marine Turtle Lighting Guidelines*, Florida Department of Environmental Protection (2013) (unpublished draft on file with the authors).

<sup>85</sup> The prohibition of lighting on dune crossovers and beach access points is the most protective approach for sea turtles and is recommended by the Florida Fish and Wildlife Conservation Commission, the agency responsible for lighting permit review. DEP’s proposed *Marine Turtle Lighting Guidelines* section on Dune Crossovers and Beach Accesses currently provides for some lighting landward of the landward toe of the most seaward dune. *Marine Turtle Lighting Guidelines*, Florida Department of Environmental Protection (2013)(unpublished draft on file with the authors). Such a provision may be difficult to remain in compliance with - given the shifting nature of Florida’s beach dune system.

<sup>86</sup> See Fort Lauderdale, Broward County, Florida, Municipal Code Ord.C-03-9, §6-47 (2012).

<sup>87</sup> [Adapted from] “General Lighting Guidelines” in *Marine Turtle Lighting Guidelines*, Florida Department of Environmental Protection (2013) (unpublished draft on file with the authors).

- a. Long wavelength and fully shielded,
- b. Turned off during nighttime in sea turtle nesting season, or if temporary lighting is deemed necessary during sea turtle nesting season it shall be allowed from 6:00am to 9:00pm, must be restricted to the minimal amount necessary, and shall incorporate all the standards of this Section,
- c. Mounted less than eight feet above the adjacent floor or deck, measured from the bottom of fixture, and
- d. Restricted to the minimal number of footcandles necessary to conform to the applicable construction safety regulations.

3.1 \*All temporary construction lighting shall be turned off during nighttime in turtle nesting season.

**ARTICLE IV. COMPLIANCE AND ENFORCEMENT PROCEDURES**

**Section I. Beach Lighting Inspector**

1. A position, known as the City/County of \_\_\_\_\_ *Beach Lighting Inspector*, is hereby established.

[**Comment:** While the model creates a beach lighting inspector, local governments may choose to identify someone already on its staff, such as a code enforcement officer, for the position. It is most important that the designated individual receive appropriate training].

2. It shall be the duty of the City/County Manager to appoint the *Beach Lighting Inspector*. The *Beach Lighting Inspector* shall have the necessary training and technical knowledge to enable them to effectively carry on the duties of this office.

3. The *Beach Lighting Inspector* shall be responsible for:

- a. Inspecting the entire beach within the jurisdictional boundaries of the City/County of \_\_\_\_\_ every month during sea turtle nesting season to determine the extent of compliance with this Ordinance.
- b. In the event of the finding of a violation at a particular public or private property, conducting further inspections at the property every night beginning on the night after the deadline date given on the written notice of violation. These follow-up inspections shall continue until the lighting has been brought into compliance with this Ordinance.

4. It shall be unlawful for any person to interfere with, or in any manner hinder the *Beach Lighting Inspector*, or any of their assistants, while in the discharge of their duties under the terms of this Ordinance.

5. It shall be unlawful for any person to knowingly conceal or disable any lighting on a property before it has been inspected by the *Beach Lighting Inspector*.

**Section II. Notice of Violation**

1. Upon finding any violation of this Ordinance, the *Beach Lighting Inspector* shall deliver a written notice of the violation of this Ordinance to the property owner and direct said owner to promptly remove or cure such lighting arrangement not in compliance with this Ordinance.
2. The time allowed for making the repairs shall be stated in the notice and should the responsible party neglect or refuse to remove or cure the unacceptable lighting arrangement within the specified time stated in the notice, the party so offending shall commit a violation of this Ordinance and be punished as provided in Section 3 of this Part.

**Section III. Penalties**

1. Any person who takes any action or omission in violation of any provision of this Ordinance and fails to cure such violation after proper notice is provided, shall be subject to a fine of up to \$250 per day per violation for initial violations, and \$500 per day per violation for repeat violations.<sup>88</sup> All penalties incurred as a result of violation of this Ordinance shall continue to accrue until such violations are cured.
2. The City/County of \_\_\_\_\_ shall have the right to encumber such property in violation of this Ordinance with a lien for an amount equal to the total amount of fines owed at the time such lien is recorded.

**Section IV. Sea Turtle Friendly Fund**

1. A Sea Turtle Friendly Fund is hereby established within the City/County of \_\_\_\_\_.
2. All funds collected as a result of the issuance of fines under Section 3 of this Part shall be deposited in the Sea Turtle Friendly Fund. The funds in this account shall be used for:
  - a. Grants to property owners for the installation of light systems that comply with this Ordinance and reduce the amount of artificial beach lighting,
  - b. Educational materials to inform the general public on the threats of artificial lighting to sea turtles, including but not limited to signs, door knockers, pamphlets, stickers, public service announcements, and other awareness campaigns, and
  - c. Other reasonable efforts to protect the sea turtle population within the City/County of \_\_\_\_\_, including but not limited to research and conservation projects.
3. The City/County of \_\_\_\_\_ may contribute funding from other sources into the Sea Turtle Friendly Fund for uses consistent with the purposes set forth above.

**ARTICLE V. OTHER CLAUSES**

**Section I. Conflict With Other Ordinances**

If this Ordinance conflicts with any other ordinance or requirement of the City/County of \_\_\_\_\_, unless such ordinance is specifically directed at public safety, then this Ordinance shall control during sea turtle nesting season.

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<sup>88</sup> See Fla. Stat. § 162.09(2)(a) (2012).

**Section II. Severability**

If any Article, Part, or Section of this Ordinance is invalidated for any reason, the effected portion may be eliminated or modified to correct the reason of invalidation, if feasible without materially altering or negating the Ordinance Goals and the principles of Sea Turtle Friendly Lighting.

**Section III. Effective Date**

The City/County of \_\_\_\_\_ Sea Turtle Friendly Lighting Ordinance shall become effective upon recommendation by \_\_\_\_\_ and approval by the \_\_\_\_\_.

#### **IV. Model Guidelines for Incorporation into Governing Documents for Planned Communities: Condominiums, Cooperatives and Homeowners' Associations: Sea Turtle Friendly Lighting Guidelines**

These Sea Turtle Friendly Lighting Guidelines (STFL Guidelines) for planned communities are divided into a number of sections to apply the general principles of Sea Turtle Friendly Lighting to all sources of artificial light affecting the beaches. Adding these guidelines, which serve as covenants, codes and restrictions to a community association's bylaws would provide additional, privately enforced, safeguards. Acquiring a building permit for new beach development could be conditioned upon the adoption of the STFL Guidelines into the original bylaws. Potential funding for existing development to retrofit their lighting to meet Sea Turtle Friendly Lighting standards can also provide an incentive for voluntary adoption of the guidelines by amendment to bylaws.

By adopting STFL Guidelines, an association can help minimize the harm to nesting sea turtles in their community. The Clinic attempted to create the most effective, yet concise set of guidelines possible for all parties to easily understand. The STFL Guidelines are intended to have broad applicability to both new and existing developments of single-family homes, condominiums, or other forms of ownership governed by an association. Additionally, the Clinic considered the perspective of developers, builders, and architects and worked to accommodate them by using standard industry language, while complying with the Florida Building Code standards. The Clinic sought to make the STFL Guidelines as comprehensive and comprehensible as possible by dividing the provisions between different specific locations on a typical property. However, the goal was to accomplish comprehensiveness without sacrificing aesthetic values and while avoiding the regulation of human behavior. Provisions such as "lights out" at a certain time are both unreliable and unpopular, and are no longer necessary provided a building incorporates the modern lighting technologies found within the STFL Guidelines. Therefore, developers and property owners wishing to include the STFL Guidelines in their legal documents, which may include a declaration of covenants, conditions, and restrictions (HOA) or Declaration of Condominium; articles of incorporation; bylaws; rules and restrictions; and architectural standards (collectively, "Governing Documents"), may be confident that the property will reduce harm to nesting sea turtles. Adopting the STFL Guidelines empowers associations to protect threatened and endangered sea turtles by reducing harmful light pollution. Moreover real dollar savings can be realized by employing new lighting technologies.

##### **A. Overview of Planned Communities**

Beachfront development has been a major force in Florida's economy for decades. Driven by the high demand to live on waterfront property, much of this development along the coastline is some form of predominantly residential construction. Whether single-family homes, cooperative apartments or condominiums, most are administered by an association with some level of enforcement capability for maintaining community standards as outlined in the Governing Documents. Memberships in such associations are usually mandatory though there are some homeowners' associations that are voluntary. Florida Statutes specifically permit the creation of associations and provide the applicable rules these legal entities operate under.<sup>89</sup> In general, an

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<sup>89</sup> See Chapter 617, Florida Statutes, for non-profit corporations, Chapter 718, Florida Statutes, for condominium associations, Chapter 719, Florida Statutes, for cooperative associations, and Chapter 720, Florida Statutes, for homeowner's associations.

association is a registered corporation responsible for the governance of a particular community based on a set of documents created by the developer or the association members called Governing Documents. Florida Statutes also address the required and optional elements to be included in the Governing Documents.

Different forms of ownership, i.e. condominium, cooperative or HOA, call for a variety of materials to be included in the Governing Documents, but all ownership types permit restrictions on the use of property by owners in the association. For example, rules contained within condominium bylaws are a common device to, among other things, provide for “restrictions on and requirements for the use, maintenance, and appearance of the units and the use of the common elements.”<sup>90</sup> If there is a provision within Governing Documents that are illegal or against public policy, that provision could be deemed invalid. In a planned community, each property owner, unit owner or tenant is governed by and must comply with the Governing Documents.<sup>91</sup> The model STFL Guidelines are a set of covenants, conditions and restrictions that could be incorporated into the community’s Governing Documents. Adding such provisions into a community’s Governing Documents makes them enforceable as the “law” of the community, and they are permanent unless amended or repealed by the association or extinguished such as by termination or Marketable Record Title Act.<sup>92</sup> If properly adopted, these model STFL Guidelines would run with the land and apply to subsequent owners. Associations generally have the power to fine or bring legal enforcement actions against any owners who are not in compliance with the community’s Governing Documents.<sup>93</sup>

## **B. Incorporating These Rules into Associations**

### **1) New Developments**

Before construction of a new residential community commences, the developer is free to design any artificial lighting system that complies with the law. The inclusion of STFL Guidelines should be incorporated into the Governing Documents at the inception of a project. Many developers retain amendment powers in Governing Documents prior to transition of control of an association so long as fundamental rights and obligations are not modified. Since these guidelines could be construed as an architectural design change, it is crucial that an attorney be consulted to determine the appropriate way to incorporate these guidelines into existing Governing Documents even for Developer’s with liberal amendment powers.

### **2) The Amendment Process for Associations**

Since the vast majority of associations whose lighting may affect sea turtle nesting are already in existence, incorporating the STFL Guidelines into existing Governing Documents is a

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<sup>90</sup> Fla. Stat. § 718.112 (3) (b) (2012)

<sup>91</sup> Fla. Stat. § 718.303 (1) (2012); Fla. Stat. § 720.305 (1) (2012)

<sup>92</sup> Donna Berger and Gary A. Poliakoff, *The Reinstatement of Covenants, Conditions, and Restrictions Extinguished by the Marketable Record Title Act*, 79 FL BAR JOURNAL 14 (2005). Accessed on May 28, 2013

<http://www.floridabar.org/DIVCOM/JN/JNJournal01.nsf/8c9f13012b96736985256aa900624829/a8a8da7514a6718885256ff10060df88!OpenDocument>

<sup>93</sup> See, e.g. Fla. Stat. § 718.111(3) (2012); Fla. Stat. § 720.303(1) (2012)

key method of achieving compliance with existing laws and protection of sea turtles. Post-recording of a Declaration, the Developer often has some level of amendment power. Post transition of control of the association from the developer to the third party owners, amendments must ordinarily be adopted by a quorum of the members of an association. Quorum requirements vary greatly. In the event that the Governing Documents don't have an amendment procedure, the applicable Florida statute will likely provide substitute rules for amendments. It is necessary for existing communities to confer with their counsel to determine the applicable amendment process for incorporating the sea turtle guidelines as amendment processes vary greatly depending on the time of recording of the document and which document in the Governing Documents are to be amended. For example, many communities will want to adopt these guidelines as stand-alone rules. However, if a portion of the guidelines conflicts with a provision in a Declaration, the guideline or portion thereof will not be enforceable. Because many of the provisions in the guidelines relate to design guidelines it is necessary to carefully review all portions of the Governing Documents to ensure consistency and enforceability. Furthermore, the amendment process is an important tool due to its flexibility, which will allow for the community to continually update their lighting restrictions as Sea Turtle Friendly Lighting technology continues to improve. The model STFL Guidelines are set forth below.

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### **Model Sea Turtle Friendly Lighting Guidelines**

The goal of these guidelines is to educate coastal community residents on proper methods of lighting that protect nesting sea turtles on the beaches, while also ensuring the safety and security needs of nearby residents. By following three simple principles, ***Keep it Low, Keep it Long, and Keep it Shielded***, a community can implement a lighting program that minimizes the harmful impacts of artificial light pollution on sea turtle habitats.

The first principle, ***Keep it Low***, refers to the mounting height of a lighting fixture, and it should be mounted as low as possible on the structure. This principle also refers to the amount of lumen output from the light source, which should be as low as possible for the intended purpose. The second principle, ***Keep it Long***, refers to the concept that sea turtles are less disturbed by longer wavelengths of light. The optimal wavelength is 580 nanometers greater. In order to achieve this principle, lamp fixtures should be fitted with long-wavelength bulbs such as amber or red LED bulbs. The final principle, ***Keep it Shielded***, refers to shielding the bulb, lamp, or glowing lens from view of the beach and using full-cut off fixtures to ensure that all the light is directed downward towards the ground and not out onto the beaches.

#### **1. Definitions**

- 1.1** “**Artificial light**” means the light emanating from any human-made device.<sup>94</sup>
- 1.2** “**Beach**” means the zone of unconsolidated material that extends landward from the mean low water line to the place where there is marked change in material or physiographic form, or to the line of permanent vegetation.<sup>95</sup>
- 1.3** “**Cumulatively**” means illumination by numerous artificial light sources that as a group illuminate any portion of the beach.

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<sup>94</sup> Fla. Admin. Code 62B-55.002 (2012).

<sup>95</sup> Fla. Admin. Code 62B-33.002 (2012)

- 1.4 **“Directly illuminate”** means illumination as the result of an artificial light source and visible to an observer standing on the beach.
- 1.5 **“Dune”** means any mound, bluff or ridge of loose sediment, usually sand-sized sediment, lying upland of the beach and deposited by any natural or artificial mechanism, which may be bare or covered with vegetation and is subject to fluctuations in configuration and location.<sup>96</sup>
- 1.6 **“Fully shielded”** means a lighting fixture constructed in such a manner that all light emitted by the fixture, either directly from the lamp or a diffusing element, or indirectly by reflection or refraction from any part of the luminaire, is projected below the horizontal as determined by photometric test or certified by the manufacturer. Any structural part of the light fixture providing this shielding must be permanently affixed.<sup>97</sup>
- 1.7 **“Illuminate”** means that more than zero footcandle of artificial light can be measured at any location.
- 1.8 **“Indirectly illuminate”** means illumination as a result of artificial light source when artificial light source is not visible to an observer standing on the beach, but the lumen output is reaching the beach. This definition does not include illumination generated from interior lighting that conforms to the requirements of Section 2.7 of these guidelines (requiring tinted windows).
- 1.9 **“Long wavelength”** means a luminaire emitting light wavelength of 580 nanometers or greater.
- 1.10 **“Nesting season”** means the period from May 1 through October 31 of each year for all counties except Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward. Nesting season for Brevard, Indian River, St. Lucie, Martin, and Palm Beach and Broward counties means the period from March 1 through October 31 of each year (*due to the earlier nesting times for Leatherback Sea Turtle in these counties*).<sup>98</sup>
- 1.11 **“Nighttime”** means the locally effective time period between sunset and sunrise.<sup>99</sup>
- 1.12 **“Outdoor area”** means any portion of a property that could have an artificial light source not attached to a permanent structure, and is not primarily lighting a parking area or roadway.
- 1.13 **“Sea turtle”** means any turtle, including all life stages from egg to adult, of the species: Green (*Chelonia mydas*), Leatherback (*Dermochelys coriacea*), Loggerhead (*Caretta Caretta*), Hawksbill (*Eretmochelys imbricata*), and Kemp's Ridley (*Lepidochelys kempi*).<sup>100</sup>
- 1.14 **“Tinted glass”** means any glass treated to achieve an industry-approved, inside-to-outside light transmittance value. Such transmittance is limited to the visible spectrum (400-700 nanometers) and is measured as the percentage of light that is transmitted through the glass.

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<sup>96</sup> Fla. Admin. Code 62B-33.002 (2012).

<sup>97</sup> INTERNATIONAL DARK SKY ASSOCIATION, OUTDOOR LIGHTING CODE HANDBOOK, available at [http://www.nofs.navy.mil/about\\_NOFS/staff/cbl/OLCHB1.14/lc-hb-v1-14.html#shieldrecog](http://www.nofs.navy.mil/about_NOFS/staff/cbl/OLCHB1.14/lc-hb-v1-14.html#shieldrecog).

<sup>98</sup> Fla. Admin. Code 62B-33.002 (2012).

<sup>99</sup> Fla. Admin. Code 62B-55.002 (2012).

<sup>100</sup> Fla. Admin. Code 62B-33.002 (2012).

## 2. Exterior Lighting Affixed To Structures

- 2.1 All lighting affixed to the exterior of permanent structures shall be long wavelength and fully shielded.
- 2.2 All non-egress lighting affixed to the exterior of permanent structures shall not directly, indirectly, or cumulatively illuminate the beach.
- 2.3 Lighting at egress points shall be limited to the minimum number of fixtures and footcandles necessary to meet federal, state, and local safety requirements.<sup>101</sup>
- 2.4 Lighting affixed to the exterior of permanent structures shall consist of either<sup>102</sup>:
  - 2.4.1 Wall or ceiling down-light fixtures, equipped with interior dark-colored, non-reflective baffles or louvers, mounted at a maximum height of eight feet above the adjacent floor or deck, as measured from the bottom of fixture, or
  - 2.4.2 Louvered wall fixtures, equipped with downward-directed louvers that completely hide the light source, with the bottom of fixture mounted 12 inches or less above the adjacent floor or deck, or
  - 2.4.3 Bollard-type fixtures, which do not extend more than 42 inches above the adjacent floor or deck, measured from the bottom of fixture, equipped with downward-directed louvers that completely hide the light source, and externally shielded on the side facing the beach.
- 2.5 Balcony lights on the seaward and shore-perpendicular sides of permanent structures shall be turned off at all times during nighttime in sea turtle nesting season.
- 2.6 Interior locations including but not limited to stairwells, elevators, parking garages, or courtyards that allow light to escape through windows or other openings shall not directly, indirectly, or cumulatively illuminate the beach.
- 2.7 All windows and glass doors on the seaward and shore-perpendicular sides of any structures shall be designed for a light transmittance value<sup>103</sup> of 15% or less through the use of tinted glass, window film, or screens.
- 2.8 Emergency lights shall be on a separate circuit activated only during power outtages or other situations where emergency lighting is necessary for public safety.

## 3. Outdoor Areas

- 3.1 All lighting of outdoor areas shall be long wavelength and fully shielded.
- 3.2 Outdoor lighting that projects light upward shall be strictly prohibited.
- 3.3 Lighting of outdoor areas shall consist of either<sup>104</sup>:

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<sup>101</sup> See Fla. Building Code, Chapter 10, Section 1006.

<sup>102</sup> [Adapted from] “Multi-Family, Public Facility and Commercial Lighting Guidelines” in MARINE TURTLE LIGHTING GUIDELINES, FLA. DEP’T OF ENVTL. PROT. (2013).

<sup>103</sup> *Light Transmittance Value* means the percentage of light that is transmitted through the glass from the inside to the outside of the window or door. See Fla. Admin. Code 62B-55.002 (20) (2012).

- 3.3.1 Ground-level downward-directed fixtures, equipped with interior dark-colored, non-reflective baffles or louvers, mounted either with a wall mount on walls or piles facing away from the beach, or
- 3.3.2 Bollard-type fixtures, which do not extend more than 42 inches above the adjacent floor or deck, measured from the bottom of fixture, equipped with downward-directed louvers that completely hide the light source, and externally shielded on the side facing the beach.
- 3.4 Lighted signs shall not be located on the seaward and shore-perpendicular sides of any structures, and sign lighting shall not directly, indirectly, or cumulatively illuminate the beach.
- 3.5 Pond lights and fountain lights shall not be located on the seaward and shore-perpendicular sides of any structures, and shall not directly, indirectly, or cumulatively illuminate the beach.
- 3.6 Fire pits shall be located landward of the of the primary dune and shielded so that they do not directly, indirectly, or cumulatively illuminate the beach.

#### 4. Parking Areas and Roadways

- 4.1 All lighting of parking areas and roadways shall be long wavelength and fully shielded.
- 4.2 Parking area and roadway lighting shall be shielded from the beach using vegetation, natural features or artificial structures rising from the ground which prevent artificial light sources, including but not limited to vehicular headlights, from directly, indirectly, or cumulatively illuminating the beach<sup>105</sup>.
- 4.3 Lighting of roadways shall produce no more than 1.0 footcandles of light in any location.<sup>106</sup>
- 4.4 Lighting of parking areas and roadways shall consist of either<sup>107</sup>:
  - 4.4.1 Ground-level downward-directed fixtures, equipped with interior dark-colored, non-reflective baffles or louvers, mounted either with a wall mount on walls or piles facing away from the beach, or
  - 4.4.2 Bollard-type fixtures, which do not extend more than 42 inches above the adjacent floor or deck, measured from the bottom of fixture, equipped with downward-directed louvers that completely hide the light source, and externally shielded on the side facing the beach, or
  - 4.4.3 Pole-mounted lights, if required, which shall adhere to the restrictions located in section 4.6.
- 4.5 Pole-mounted lights shall only be used in parking areas and roadways when mounting the lights at lower elevations cannot practicably comply with minimum light levels set forth in applicable

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<sup>104</sup> [Adapted from] “Landscape Lighting Guidelines” in MARINE TURTLE LIGHTING GUIDELINES, FLA. DEP’T OF ENVTL. PROT. (2013).

<sup>105</sup> [Adapted from] “Parking Areas and Roadway Lighting Guidelines” in MARINE TURTLE LIGHTING GUIDELINES, FLA. DEP’T OF ENVTL. PROT. (2013).

<sup>106</sup> See Florida Department of Transportation, “Topic #625-000-007, Plans Preparation Manual, Volume 1” Table 7.3.1 (Rev. 2013), available at <http://www.dot.state.fl.us/rddesign/PPMManual/2013/Volume1/2013Volume1.pdf>

<sup>107</sup> [Adapted from] “Parking Areas and Roadway Lighting Guidelines” in MARINE TURTLE LIGHTING GUIDELINES, FLA. DEP’T OF ENVTL. PROT. (2013).

state and federal laws, rules, and regulations designed to protect public safety. If required, pole-mounted lights shall be:

**4.5.1** Located on the landward sides of buildings in locations that will not be directly, indirectly, or cumulatively illuminate the beach.

**4.5.2** Mounted no higher than 15 feet above the ground on arterial roadways or 20 feet above the ground if required on Department of Transportation right-of-ways<sup>108</sup>, and

**4.5.3** Full cut-off, downward-directed onto non-reflective surfaces.

**4.6** Equipment yards, storage yards, and temporary security lights shall also adhere to the lighting restrictions contained in this section.

## **5. Pool Areas**

**5.1.** Lighting of pool decks, pool facilities, swimming pools, and spas shall be long wavelength and fully shielded.

**5.2.** Above-water lighting of pool decks, pool facilities, swimming pools, and spas shall be turned off during nighttime in sea turtle nesting season when closed. The use of an automatic timer is acceptable.

**5.3.** Above-water lighting of pool decks, pool facilities, swimming pools, and spas shall otherwise adhere to the applicable requirements for acceptable light fixtures contained in Section 2 and Section 3 of this part.

**5.4.** Underwater lighting of pools or spa light shall:

**5.4.1.** Be downward-directed,

**5.4.2.** Not directly, indirectly, or cumulatively illuminating the beach, and

**5.4.3.** Providing no more than 0.5 foot candles of light above the water surface.

## **6. Pier Structures**

**6.1.** Lighting of pier structures projecting over the beach or over water shall be long wavelength and fully shielded.

**6.2.** Lighting of pier structures projecting over the beach or over water shall be mounted as low to the deck as possible to prevent light pollution or spillage beyond the walking surface.

**6.3.** Lighting of pier structures projecting over the beach or over water shall consist of:<sup>109</sup>

**6.3.1.** Recessed railing down-light fixtures, equipped with downward-directed louvers and interior dark-colored, non-reflective baffles, or

**6.3.2.** Bollard-type fixtures, which do not extend more than 42 inches above the adjacent floor or deck, measured from the bottom of fixture, equipped with downward-directed louvers

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<sup>108</sup> *Id.*

<sup>109</sup> [Adapted from] "Pier Lighting" in MARINE TURTLE LIGHTING GUIDELINES, FLA. DEP'T OF ENVTL. PROT. (2013).

that completely hide the light source, and externally shielded on the side facing the beach, or

**6.3.3. Embedded lighting systems.**

**7. Dune Crossovers and Beach Access Points**

**7.1.** Lighting of dune crossovers and beach access points shall be prohibited.<sup>110</sup>

**8. Special Events, Motor Vehicles, and Temporary Lighting**

**8.1.** Lighting associated with a special event that may directly, indirectly, or cumulatively illuminate the beach shall not be authorized during nighttime in nesting season.

**8.2.** The operation of all motorized vehicles, except emergency and law enforcement vehicles or those permitted on the beach for sea turtle conservation or other research and conservation, shall be prohibited on the beach at nighttime during nesting season.<sup>111</sup>

**8.3.** All temporary construction lighting shall be:<sup>112</sup>

**8.3.1.** Long wavelength and fully shielded,

**8.3.2.** Turned off during nighttime in nesting season, or if temporary lighting is deemed necessary during nesting season it shall be allowed from 6:00am to 9:00pm, must be restricted to the minimal amount necessary and shall incorporate all the standards of this section.

**8.3.3.** Not mounted more than eight feet above the ground, measured at the bottom of fixture, and

**8.3.4.** Restricted to the minimal number of footcandles necessary to conform to the applicable construction safety regulations.

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<sup>110</sup> The prohibition of lighting on dune crossovers and beach access points is the most protective approach for sea turtles and is recommended by the Florida Fish and Wildlife Conservation Commission, the agency responsible for lighting permit review. DEP's proposed *Marine Turtle Lighting Guidelines* section on Dune Crossovers and Beach Accesses currently provides for some lighting landward of the landward toe of the most seaward dune. Marine Turtle Lighting Guidelines, Florida Department of Environmental Protection (2013)(unpublished draft on file with the authors). Such a provision may be difficult to remain in compliance with - given the shifting nature of Florida's beach dune system.

<sup>111</sup> See BROWARD COUNTY, FLA., CODE § 46-97 (2012).

<sup>112</sup> [Adapted from] "General Lighting Guidelines" in MARINE TURTLE LIGHTING GUIDELINES, FLA. DEP'T OF ENVTL. PROT. (2013).

## V. Conclusion

The vast majority of coastal local governments in Florida have enacted local legislation focused on creating a balance between the need for development, the safety and security of residents, as well as visitors, and the protection of sea turtles. Sea turtle lighting ordinances can be found in 21 of 27 (78%) counties with nesting habitat. Additionally many municipalities in counties without lighting ordinances have enacted their own lighting legislation. However, the Clinic's Content Analysis reveals that most local ordinances are out of date and do not adequately protect sea turtles. Lighting technology has advanced since Florida's local governments first implemented lighting ordinances, and since the DEP adopted the first model lighting ordinance by rule in 1993. For example, less than 10% of ordinances surveyed require lights to be long wavelength (580 nm), which is end of the light spectrum least detrimental to sea turtles. Recent advances in available lighting technology, such as LED's in red and amber, and design practices, such as fixtures being fully shielded, have been proven to significantly decrease the impacts of artificial light on sea turtles.

A strong ordinance is one that uses sea turtle friendly lighting principles as its touchstone - ***Keep it Low; Keep it Long; Keep it Shielded***. A strong ordinance relies more heavily on state of the art lighting technology, while minimizing behavioral regulation, and incorporates public education and outreach coupled with strong and meaningful "on the ground" enforcement. A key provision missing from many of the ordinances surveyed is the provision for compliance inspections, both prior to and during the nesting season. This should be coupled with adequate training for compliance and enforcement officers. In addition, the affected public should be notified prior to the nesting season in order to give them reasonable time to come into compliance.

The Model Sea Turtle Friendly Ordinance and Model Guidelines for Planned Communities presented here reflected the latest thinking in Sea Turtle Friendly Lighting design. However, these are models. Local governments and communities should always reflect upon their unique circumstances and draft their governance documents in accordance with local needs.

Appendix A  
**County and Municipality Ordinance Policy Score Table**

County name	Municipality Name	Sea Turtle Friendly Lighting Principles Component	Implementation Component	Total Policy Score
Sarasota County		33	47	81
Sarasota County	Venice	36	42	78
Indian River County	Vero Beach	29	39	68
Bay County	Mexico Beach	35	33	68
Franklin County		35	33	68
Sarasota County	City of Sarasota	28	39	67
Duval County	Neptune Beach	28	39	67
St. John's County		30	37	67
Okaloosa County	Destin	34	31	64
Brevard County	Cape Canaveral	31	31	62
Gulf County		28	33	62
Manatee County	Anna Maria Island	28	33	61
Miami-Dade	Miami Beach	39	22	61
Miami-Dade County	Key Biscayne	36	25	61
Indian River County	Indian River Shores	21	36	57
Walton		28	28	56
Broward County	Hollywood	32	22	55
Charlotte County		21	33	54
Manatee County	Bradenton Beach	21	33	54
Bay County	Panama City Beach	25	28	53
Broward County	Ft. Lauderdale	33	19	52
Martin County		25	26	51
Volusia County		20	31	51
Miami-Dade County	Golden Beach	33	17	50
St. John's County	St. Augustine	22	28	50
Brevard County		35	14	49
Lee County		24	25	49
Volusia County	New Smyrna	19	28	46
Bay County		26	19	46
Lee County	Bonita Springs	26	19	45
Monroe County		34	11	45
Brevard County	Cocoa Beach	23	22	45
Flagler County		20	25	45
Flagler County	Flagler Beach	19	25	44
Pinellas County	St. Pete Beach	36	6	41
Santa Rosa County		19	22	41

County name	Municipality Name	Sea Turtle Friendly Lighting Principles Component	Implementation Component	Total Policy Score
Broward County		19	22	41
Pinellas County	Madeira Beach	15	25	40
Martin County	Jupiter Island	18	22	40
Collier County	Marco Island	20	19	40
Monroe County	Key West	25	14	39
Pinellas County	Redington Beach	14	25	39
Sarasota County	Longboat Key	17	20	37
Pinellas County	Indian Rocks Beach	15	22	37
Brevard County	Indialantic	19	17	36
Duval County	Jacksonville Beach	19	17	36
Monroe County	Marathon	36	0	36
Broward County	Dania Beach	25	11	36
Monroe County	Village of Islamorada	24	11	35
Lee County	Sanibel Island	35	0	35
Palm Beach County		21	14	34
Pinellas County	Treasure Island	15	19	34
Nassau County	Fernandina Beach	31	3	34
Palm Beach County	Town of Palm Beach	12	19	32
Broward County	Hillsboro Beach	18	14	32
Palm Beach County	Delray Beach	9	22	31
Collier County		14	17	31
Brevard County	Satellite Beach	18	11	29
Broward County	Hallandale Beach	28	0	28
St. Lucie County		21	6	27
St. Lucie County	Fort Pierce	21	6	27
Palm Beach County	South Palm Beach	12	14	26
Lee County	Ft. Myers Beach	9	17	26
Brevard County	Melbourne Beach	20	6	26
Nassau County		20	6	26
Palm Beach County	Highland Beach	8	17	25
Broward County	Pompano Beach	23	0	23
Indian River County		16	6	22
Manatee County	Holmes Beach	17	4	21
Pinellas County	North Redington Beach	17	3	19
Indian River County	Orchid	13	6	18
Broward County	Deerfield Beach	18	0	18
Palm Beach County	Ocean Ridge	18	0	18
Pinellas County	Clearwater	15	3	17
Palm Beach County	Boca Raton	17	0	17
Broward County	Lauderdale by the Sea	16	0	16

County name	Municipality Name	Sea Turtle Friendly Lighting Principles Component	Implementation Component	Total Policy Score
Collier County	Naples	13	3	16
Brevard County	Harbour Beach	15	0	15
Pinellas County	Indian Shores	15	0	15
Pinellas County	Dunedin	11	0	11
Palm Beach County	Gulf Stream*	7	0	7
Palm Beach County	Juno Beach	4	0	4