



Item No. 57

# AGENDA ITEM REQUEST FORM

## Development Services

Department Submitting Request

## Kimberly Williams

Development Services

**REGULAR  
COMMISSION MTG**  
Meeting Dates - 7:00 PM

**DEADLINE TO  
Town Clerk**

**ROUNDTABLE  
MEETING**  
Meeting Dates - 7:00 PM

**DEADLINE TO  
Town Clerk**

**March 22, 2011**

(5:00 pm)

April 12, 2011

April 1 (5:00 pm)

\*Subject to Change

- |  |   |                                       |                                       |
|--|---|---------------------------------------|---------------------------------------|
| <input checked="" type="checkbox"/> Presentation | <input type="checkbox"/> Reports        | <input type="checkbox"/> Consent      | <input type="checkbox"/> Ordinance    |
| <input type="checkbox"/> Resolution              | <input type="checkbox"/> Quasi Judicial | <input type="checkbox"/> Old Business | <input type="checkbox"/> New Business |

**SUBJECT TITLE: Status Update for the 2011 Sea Turtle Season**

**EXPLANATION:**

Sea turtle nesting season begins each year on March 1 and ends on October 31. In preparation for this year's turtle season, staff began working in January by sending information packets to all beachfront property owners (Exhibit 1). Staff conducted an evening inspection on all lights visible from the beach in early February. After this inspection a second letter listing the potential violations was sent to each property owner (Exhibit 2). Staff began working with individual owners performing inspections and providing options for compliance at their request. On March 1, staff performed another inspection. Properties with lighting violations were issued written notices and informed of the specific lights in violation. Staff will be conducting inspections each month and working with each property owner to achieve compliance.

As always, Town and Florida Wildlife Conservation (FWC) staffs offer their time and assistance in providing property owners information on lighting regulations and inexpensive alternative solutions to help balance acceptable lighting for sea turtle and human safety (Exhibit 3). Although the codes have not changed over the last few years, staff continues to work with and inform property owners of different lighting problems that occur throughout the season. Examples of this: repositioned light fixtures, bulbs with increased wattage or bright lights brought into compliance making smaller ones more obvious.

- EXHIBITS:**
- Exhibit 1- Example letter and information packet
  - Exhibit 2- Example letter specific to property violations
  - Exhibit 3- Code sections and Information on solutions packet
  - Exhibit 4- Current summary report of activities

Reviewed by Town Attorney

Yes     No

Town Manager Initials CW

# Exhibit 1

Exhibit 1



**Town of Lauderdale-by-the-Sea**

Development Services  
4501 N. Ocean Drive  
Lauderdale-by-the-Sea, FL 33308  
Phone (954) 776-3611  
Fax (954) 776-3431

Date: 1/14/2011

Re: Sea Turtle Lighting

Dear Property Owner,

As you are aware, Sea Turtle nesting season is just around the corner. The season begins on March 1<sup>st</sup> of every year and ends October 31<sup>st</sup>. Town staff will be conducting an inspection in February to identify any lighting on your property that would/could affect sea turtle nesting. Town staff is proactively seeking your cooperation to help reduce sea turtle disorientations this year.

Attached for your convenience is a copy of Town Ordinance Chapter 30-313 (27). Please ensure that any lighting issues are addressed during the entire Sea Turtle season. The most common lights found in violation include: up-lighting on trees, interior, walkway and spot or flood lights. Therefore, we have enclosed an approved lighting fixture brochure from FWC (Florida Wildlife Commission) to help assist you in identifying acceptable and unacceptable lighting.

Staff would like to recognize and thank all the property owners for their hard work and effort put forth last season. If you have any questions or concerns regarding the lighting regulations, or want to schedule an on-site inspection with staff, please feel free to contact Development Services at (954) 776-3611.

Thank you for your participation.

Sincerely,

Kimberly Williams  
Senior Code Compliance Officer

## **FWC APPROVED SEA TURTLE LIGHTING**

All exterior lighting for the entire project area including structural and landscape lighting must be reviewed and approved by FWC regardless of whether or not the area is seaward of the CCCL

### **ACCEPTABLE FIXTURES**

All exterior fixtures on the seaward and the shore perpendicular sides of the building (and on the landward side of the building if they are visible from the beach) should be well shielded, full cut-off, downward directed type fixtures. All exterior fixtures on the landward side of the building should be downward directed only.

### **ACCEPTABLE LAMPS / BULBS AND OTHER LIGHT SOURCES**

Long wave length lights, e.g. those that produce light that measures greater than 560 nanometers on a spectroscope, are necessary for all construction visible from and adjacent to marine turtle nesting beaches. Bright white light, such as metal halide, halogen, fluorescent, mercury vapor and incandescent lamps will not be approved. Filters are unreliable and not allowed. Limited use of shorter wavelength lights may be approved in areas where direct and indirect light or glow could not possibly be visible from the beach upon approval by FWC.

#### **ACCEPTABLE LAMPS**

- Low Pressure Sodium (LPS) 18w, 35w
- Red, orange or amber LED (true red, orange or amber diodes, NOT filters)
- True red neon
- Other lighting sources that produce light of 560 nm or longer

\*\*\*\*\* FWC approved lighting may be found at [http://myfwc.com/WILDLIFEHABITATS/seaturtle\\_index.htm](http://myfwc.com/WILDLIFEHABITATS/seaturtle_index.htm) \*\*\*\*\*

### **STATEMENT ABOUT POOL LIGHTS ON LIGHTING PLAN**

The plan shall reflect that the interior swimming pool and pool deck lights shall be turned off while the pool is closed during sea turtle nesting season (May 1 through October 31 in all counties except Brevard, Indian River, St. Lucie, Martin, Palm Beach and Broward counties where leatherback turtle nesting occurs during the period of March 1 through October 31). The use of an automatic timer is acceptable. This may be specified in the notes section on the drawing and should be included in the FDEP Permit Conditions. If the interior pool lights cannot be turned off at night because the pool deck is used at night, then interior pool lights shall be amber or red LED lamps.

### **STATEMENT ABOUT TURTLE GLASS ON LIGHTING PLAN**

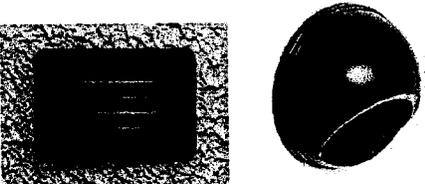
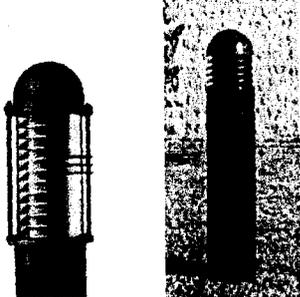
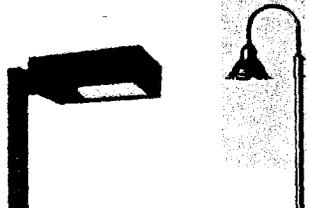
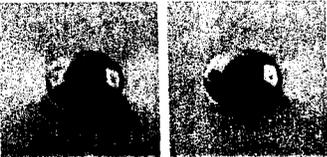
The plan shall reflect that tinted glass or film with a visible light transmittance value of forty-five (45) percent or less shall be applied to all windows and doors within line of sight of the beach. This includes the seaward and shore-perpendicular sides of the structure. This may be specified in the notes section on the Lighting Plan architectural drawing and should be included in the FDEP Permit Conditions.

### **TIMERS**

Timers may be used only for in-pool and pool deck lights when the pool is closed.

### **THE FOLLOWING ARE NOT ALLOWED**

- Private balcony lights
- Up lights
- Tree strap downlights
- Decorative lighting, not necessary for human safety or security
- Pond lights
- Dune walkover lighting
- Fountain lights on beach or shore perpendicular side of structure

|   |  |   |  |   |
|---|--|---|--|---|
| <p><b>Recessed and Wall Mounted Step Lights</b><br/>(louvered or downward directed)</p>  | <p>Red/orange/amber LED</p>  | <p>Wall Mount<br/>Maximum height 24 inches on Ground Floor only<br/>Above Ground Floor Max height 12 inches</p> | <p>Ground Floor and Second level, and pool Deck</p>                        | <p>If on perimeter of pool deck, must be mounted directed away from beach.</p>                                    |
| <p><b>Bollard</b><br/>(with downward directed louvers)</p>                               | <p>18w LPS<br/>Red/orange/amber LED</p>                                      | <p>Maximum height 42 in</p>   | <p>Parking areas, commercial walkway, landscape, pathway and pool Deck</p> | <p>180° to 270° beach side shields on any fixture on perimeter of pool deck or immediately adjacent to beach.</p> |
| <p><b>High Intensity Full Cut Off Pole Lights</b></p>                                   | <p>18-35 w LPS (if twin head, maximum of 36w total)<br/>Orange/amber LED</p> | <p>Pole - maximum height 12 feet</p>  | <p>Parking Area<br/>Landward side of structure only.</p>                   | <p>Beach Side shields and/or louvers for any fixture within line of sight of beach.</p>                           |
| <p><b>Paver Lights</b></p>   | <p>Red/orange/amber LED</p>  | <p>In Ground mount</p>  | <p>Parking areas, driveways, pathways, pool decks</p>                      |   |

|  |                         |   |   |  |
|--|-------------------------|---|---|--|
| <b>Water Feature Lighting</b>            | Red/orange/amber<br>LED | Light must be<br>downward or<br>horizontally<br>directed<br><br><u>DO NOT</u><br><u>direct light up</u> | Submerged lights are<br>only allowed on<br>landward side of<br>structure and only if<br>fully shielded from<br>beach by structure |  |
| <b>Underwater Swimming Pool Lighting</b> | Red/orange/amber<br>LED |   |   |  |

Revised 5/5/09

**Sec. 30-313. - General provisions.**

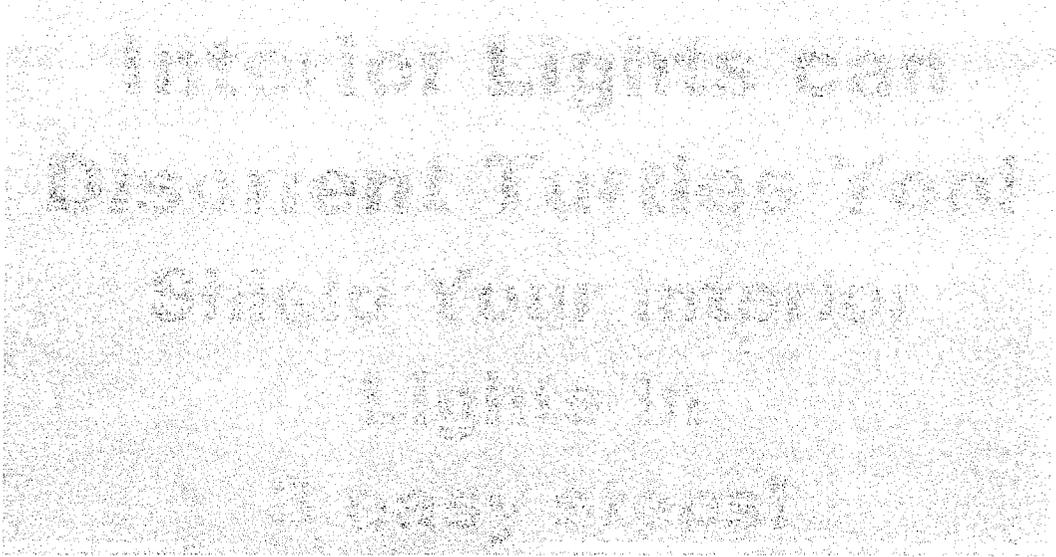
These general provisions shall govern development within the corporate limits of the Town, as follows:

(27)

*Lighting.* Where lighting facilities are provided for parking areas, they shall be designed and installed so as to reflect the light away from any contiguous residential zoned property. No lighting shall be installed, maintained or illuminated on public or private property that would directly illuminate the beach from sunset to sunup during the sea turtle nesting period from March 1 through October 31 of each year. Property owners are responsible for ensuring that all lighting along the beach is controlled so as not to illuminate the beach from sunset to sunup during this period.

Measures to be employed by property owners for the installation, maintenance and control of all lighting in a direct line of sight of the beach, including interior lights visible from the beach through windows, shall be consistent with the standards and guidelines contained in Chapter 62B-55 of the Florida Administrative Code and in Technical Report 97-06 of the Broward County Beach Lighting Management Plan, as amended from time to time. All site plans for new development and redevelopment along the beach shall be required to demonstrate that the proposed development or redevelopment will comply with this section by identifying the specific measures that will be employed to control lighting.

For existing development along the beach, property owners shall be required to immediately implement measures not involving any capital expenditures, such as switching-off exterior lights that illuminate the beach and closing existing draperies to shield interior lights during the turtle nesting period. By March 1, 2003, property owners shall implement all appropriate measures necessary to fully comply with this section.



**Sea Turtle Nesting Season  
March 1<sup>st</sup> thru October 31<sup>st</sup> 2011**

Easy as 1, 2, 3...



**Pull the blinds, Move a lamp and Flip a switch**

Controlling interior lighting is easy for Sea Turtle Season  
and has several benefits!

Pulling the blinds, moving lamps away from the windows and turning off lights when you leave a room will help protect your privacy and reduce sea turtle disorientations. Turning off lights when you leave a room not only saves money and electric but decreases what everyone can see in your home when the lights are on and it is dark outside. This will also preserve your view and the sea turtles view of the nighttime beach and sky! Ask yourself... Have you seen the moon and stars lately?



## Exhibit 2

Exhibit 2



**Town of Lauderdale-by-the-Sea**

Development Services  
4501 N. Ocean Drive  
Lauderdale-by-the-Sea, FL 33308  
Phone (954) 776-3611  
Fax (954) 776-3431

February 11, 2011

Palm Club Clubhouse  
C/O Property Mgr  
1438 S. Ocean Blvd  
Pompano Beach Fl 33062

Re: Sea Turtle Lighting

As you are aware, Sea Turtle nesting season commences on March 1<sup>st</sup>. On February 9<sup>th</sup>, 2011, a beach lighting survey was conducted by our office which revealed that there is lighting on your property that could affect sea turtle nesting.

The red/pink party bulb spot lights are in violation of Town Ordinance Chapter 30-313 (27). Please ensure that these light sources are changed to L.E.D bulbs and shielded or turned off during the entire Sea Turtle season which is from March 1<sup>st</sup> thru October 31<sup>st</sup>. A re-inspection of your property will be conducted in thirty (30) days to ensure compliance.

A lighting fixtures brochure was previously sent to help assist you in identifying acceptable and unacceptable lighting. If you have any questions or concerns regarding the lighting requirements, please feel free to contact Kim Williams at (954) 776-3611.

Thank you for your participation in this effort.

Sincerely,

Kim Williams  
Code Compliance Officer

# Exhibit 3

## Solutions: Solving Problems Caused by Artificial Lighting

### *Light as a Pollutant*

Light pollution has widespread effects. The terms "light pollution" and "photopollution" were originally used by astronomers (Dawson, 1984; Eakin, 1986) to describe the light that obliterates our scientific and recreational view of the night sky. Many of the same light sources that interfere with our enjoyment of the heavens on nightly beach walks also deter nesting and disrupt orientation in sea turtles. The biological effects of light pollution are just beginning to be realized and are not limited to sea turtles. Many animals—such as migrating birds and night-flying insects—depend on natural light for cues that guide orientation and are well-known victims of artificial lighting (Verheijen, 1985; Witherington, in press).

Solving problems caused by light pollution can be very different from solving problems caused by other pollutants. For instance, in theory, harmful light can be eliminated instantaneously by flipping a switch at the source. Light does not linger in the environment as do many polluting substances. However, some difficulty lies in recognizing light pollution and in agreeing upon which artificial lighting constitutes problem lighting. One person's environmental threat may be another person's safety and security.

It may help to think of light pollution as being artificial light that is out of place. More often than not, light that is located in the area it was meant to illuminate causes little harm. This is certainly true for sea turtle nesting beaches: artificial light that illuminates dune properties without reaching the nesting beach itself is not a threat to sea turtles.

The most readily accepted strategy for solving light-pollution problems is to manage light rather than prohibit it. In most cases, light that causes problems for sea turtles has "spilled over" from sites it was intended to illuminate; this light "spillage" does not serve a useful purpose and should be managed. A program of light management can make it possible to solve light-pollution problems without resorting to "just say no" policies that may be intimidating to the public.

#### **USING BEST AVAILABLE TECHNOLOGY**

Light management for conserving sea turtles must have an identifiable goal; that is, light must be managed to some level that conservationists can recog-

nize. Unfortunately, there is no level of light intensity that one may use as this criterion. The level of artificial brightness necessary to deter nesting or misorient hatchlings varies greatly with the level of ambient light (moonlight) and with the availability of other visual cues (e.g., the amount of dune). Consequently, there is no one acceptable level of light for every sea turtle nesting beach under every set of lighting conditions.

Given the uncertainty over how to measure acceptable light, it is most productive to simply minimize light pollution as best we can. This is the concept behind the use of best available technology (BAT: a common strategy for reducing other forms of pollution by using the best of the pollution-reduction technologies available). Best available technology forms the basis of light management methods that reduce the effects of artificial lighting to the greatest extent practicable. Although there is no single "turtle-friendly" luminaire that would be best for all applications, there are methods one can use, and a set of characteristics that light sources should have, in order to minimize the threat of light pollution for sea turtles. As presented below, these light-management tactics include selecting some lights to be turned off, controlling light so that the level reaching the beach is minimized, and ensuring that the light that does reach the beach is the least disruptive color.

### *Effective Methods for Managing Light*

#### **TURN OFF PROBLEM LIGHTS**

Any strategy to reduce light pollution should begin with identifying those problem light sources (as defined previously in "Assessments") that can be switched off or eliminated. Many light sources illuminate areas that do not need to be lighted. These unnecessary light sources include the following:

1. Light sources illuminating areas that require no security. This includes the beach itself in most cases. Ocean beaches are often in public, not private, ownership and are not areas where property is normally stored.
2. Light sources that illuminate areas that are vacant or where there is no foot traffic.
3. Decorative lighting. This category of lighting usually has limited use for any purpose other than aes-

thetic enhancement. Decorative lighting near nesting beaches may be much more harmful to sea turtles than it is useful to people.

4. Light sources that provide more than adequate illumination for a particular function. Light illuminance levels necessary for safety and security are rather low (0.2–1.0 footcandles or 2–11 lux, recommended for fence security and parking areas) compared with the illuminance necessary for detailed work, comfortable reading, or outdoor entertainment (100–300 footcandles or 110–320 lux) (Kaufman and Christensen, 1987).

Unnecessary light sources near sea turtle nesting beaches should be eliminated, and the number of light sources that provide more than adequate illumination should be reduced. Lighting that is necessary for safety or security can be used when needed during early-evening hours and switched off the remainder of the night (see notes on timers and motion detectors below). Items valuable enough to require security lighting should be moved away from the beach.

Switching lights off can be the simplest, cheapest, and most straightforward way to solve lighting problems. Turning out the lights will result in energy, as well as sea turtle, conservation. Usually, property owners are able to switch lighting off on their own; however, large outdoor luminaires and the poles they are mounted on are sometimes leased from a power company and must be switched off by authorized company personnel at the request of the customer paying the electricity bill.

#### MINIMIZE BEACH LIGHTING FROM OUTDOOR SOURCES

Beach lighting from outdoor sources can be minimized in a number of ways that allow the function of the lighting to be retained or even enhanced:

1. Turn the lighting off, or better yet, remove the luminaire. Sometimes this is the only solution to the problem, and it is almost always the simplest and least expensive solution. Lighting does not need to be extinguished year-round, only during the nesting-hatching season.
2. Reduce the wattage of problem lighting. For a given lamp type (*e.g.*, high-pressure sodium vapor) and style of fixture (*e.g.*, floodlight), reducing the wattage of the luminaire (or lamp) will reduce the amount of light emitted. When changing lamp types or fixture styles, the manufacturer's data on luminance (typically given in lumens) should be consulted. A table outlining efficiency (lumens/watt) of various light sources is given in Appendix B.
3. Substitute luminaires that are better focused so that light can be concentrated where it is most needed. Lower-wattage directional luminaires can replace higher-wattage multidirectional luminaires. Luminaires should not be directed onto the nesting beach or onto any object visible from the beach (see Appendices D–F).
4. Shield light sources from the nesting beach. To be effective, light shields should be completely opaque, sufficiently large, and positioned so that light from the shielded source does not reach the beach. In most cases, light shields can be fashioned from materials that are inexpensive and easily obtained. Aluminum and galvanized-steel flashing, plywood, and some opaque plastics make excellent light shields. An effective, simple, and inexpensive way to shield luminaires with hemispherical globes (*e.g.*, cobrahead fixtures) is to line the inside of the seaward half of the globe with household aluminum foil (the foil is not likely to remain on the outside of the globe). Attempts to shield light by fastening tinted acrylic or acetate to luminaires or painting their globes are generally not effective because these materials are not sufficiently opaque. Tar-paper shields are effective only for a short time because they do not weather well. Good shielding should provide a cutoff angle of 90° or more. Although commercial light shields are available for some common outdoor fixtures (Luminaire Technologies, Inc., Hubbell Lighting, Inc.; Appendix G), customized light shields are often needed because luminaires come in so many different designs. Changing a light fixture to a more directional style is almost always a more efficient and permanent solution than shielding is.
5. Recess luminaires into roof soffits. Recessed sources will be more directional and, if directed downward, will be less visible from the beach than multidirectional lighting is (see Appendices D, E).
6. Lower pole-mounted luminaires or use low-mounted luminaires with louvered, bollard-type fixtures as a substitute for pole-mounted lighting. The lower a light source is mounted, the smaller the area it will illuminate. In addition, sources mounted lower will tend to have a greater degree of shielding from the beach by objects on the dune (vegetation, buildings, *etc.*). Sources mounted high on poles near the beach can be very difficult to shield from the beach. The post-like stature of bollard luminaires and the light-directing louvers with which they can be fitted make them ideal for keeping light close to the ground and off the beach.

7. Redirect luminaires away from the nesting beach. Even sources that are poorly directional can be redirected so that most of their brightness is pointed away from the beach.
8. Reposition luminaires to take advantage of natural light screens. Necessary luminaires should be positioned on the landward side of any buildings or vegetation.
9. Install timers to switch off lighting when it is no longer needed in the evening. This tactic by itself is only minimally effective in solving lighting problems because both nesting and hatchling emergence can occur throughout the night. To be most effective, timers should be set to turn lights off in the early evening, no more than one hour after dusk. People tend to function poorly as "timers" because of forgetfulness, procrastination, and other human foibles.
10. Install motion-detector switches. Lighting connected to a motion-detector switch comes on when the fixture itself is approached and then switches off after a set time following the last detected motion. Thus, the light source is on only when it is needed for safety or security. If possible, the length of time that lighting remains on should be set at no more than 30 seconds. This type of lighting should not be used in high-traffic areas visible from the beach. Motion-detector switches are generally a better solution to lighting problems than timers are, are relatively inexpensive, and are widely available (Appendix D). However, motion detectors can be used only with incandescent lighting (yellow bug-light bulbs work well with motion detectors).
11. Install visors or louvers to stadium lighting. Stadium lighting—intense broad-spectrum lighting that is typically mounted as multiple units on tall poles—can pose lighting problems that are particularly difficult to solve. This type of lighting should not be used near sea turtle nesting beaches during the nesting-hatching season. Because stadium lighting tends to be both outwardly directed and intense, it can produce a glow that affects nesting beaches many kilometers away. This glow can be reduced by fitting individual luminaires with louvers or visors that reduce the amount of light shining upward and laterally (Hubbell Lighting, Inc.; Appendix G).
12. Replace conspicuous lighting on beach-access ramps with hidden, walkway-only lighting. Because lighting meant to illuminate beach-access ramps is often conspicuously located out on the beach itself, it can be difficult to shield properly. Other than turning this lighting off, the best solution to the problems caused by this lighting is to use hidden light sources that light only the walking surface of the ramp. A good way to hide ramp lighting is to use small light sources (e.g., light-emitting diodes) within strips that are sunken within grooves along the edges of the ramp's walking surface (Appendix E).
13. Plant native dune vegetation as a light screen. Planting light-blocking vegetation on the primary dune can help alleviate problems caused by light that is not managed by the techniques outlined above. To be most effective, vegetation should be near the crest of the dune closest to the beach, which is where woody, well-established vegetation normally grows. Salt-tolerant, bushy, densely leaved native plants are the most suitable. See the discussion on light screens below.

### MINIMIZE BEACH LIGHTING FROM INDOOR SOURCES

Light from indoor sources can also cause problems for sea turtles. The criteria for identifying problems caused by indoor lighting are the same as those for identifying problems caused by outdoor lighting. Indoor light is a problem if it is visible from the beach.

Indoor lighting from buildings that are close to the beach, are very tall, or have large sea-side windows causes the greatest problem for sea turtles. Because indoor lighting is usually not meant to light the outdoors, the unwanted effects of indoor lighting can easily be eliminated without compromising the intended function of the lighting by doing the following:

1. Turning off lighting in rooms that are not in use. Reminder notices placed on switches in oceanfront rooms can help in this effort.
2. Relocating moveable lamps away from windows that are visible from the beach.
3. Tinting or applying window treatments to windows visible from the beach so that light passing from inside to outside is substantially reduced. A good tinted glass or window-tinting treatment will reduce visible light from the inside to 45% or less (transmittance  $\leq 45\%$ ). Window glass may be either tinted during its manufacture or tinted later with an applied film. Window treatments (shading materials) are less permanent and can reduce light transmittance more than tints and films can. A complete blocking of light is ideal. See Appendix G for companies offering tinted glass and window treatments.
4. Closing opaque curtains or blinds after dark to

completely cover windows visible from the beach. This is an inexpensive solution because most home windows have curtains or blinds to provide privacy to the occupants.

### **USE ALTERNATIVE, LONG-WAVELENGTH LIGHT SOURCES**

Where efforts to dim, redirect, or block light have not been entirely effective, some errant light may reach the beach. An additional strategy to reduce the effects of artificial lighting is to ensure that any light reaching the beach has spectral properties that make it minimally disruptive to sea turtles. Minimally disruptive light sources have a spectral distribution that excludes short-wavelength (ultraviolet, violet, blue, and green) light. These long-wavelength light sources will have a minimal effect on sea turtles, but because they are not completely harmless, they should not be used without light-management techniques.

### **LOW-PRESSURE SODIUM VAPOR**

The spectral properties of low-pressure sodium-vapor (LPS) lighting make this type of lamp the least disruptive to sea turtles among commonly used, commercially available light sources. This assessment comes from studies of nesting and hatchling loggerheads and green turtles, along with limited evidence from studies of hatchling hawksbills and olive ridleys. Because light from LPS sources is not completely ignored by sea turtles, LPS should be considered as a substitute for more disruptive light sources rather than as a replacement for beach-darkening efforts.

LPS light has greater effects on some species than on others. Loggerhead hatchlings have not been observed to have sea-finding substantially disrupted by LPS lighting in the field, whereas green turtle hatchlings are substantially affected under some conditions. Although LPS lighting is predicted to have a minimal effect on loggerhead hatchlings, it is not true that LPS—because of the loggerhead hatchlings' aversion to yellow light—will reduce the attraction of other, adjacent, lights on the nesting beach. To improve loggerhead sea-finding on a lighted beach, illuminance from additional LPS lighting would need to be considerably higher than what is typical for outside lighting.

### **YELLOW FILTERS, BUG LIGHTS, AND RED LED'S**

Lamps that are tinted yellow to reduce the emission of insect-attracting short-wavelength light (bug lights) can also be minimally disruptive to sea turtles. Bug lights are poorer alternatives than LPS lighting

but are less expensive (initially) and more widely available than LPS lighting. True bug lights are incandescent lamps, but some yellow-tinted fluorescent tubes are available (Appendix C) and should be used in place of white fluorescent tubes.

Amber or yellow filters installed in light fixtures vary greatly in effectiveness and can fade, increasing the transmission of short-wavelength light over time. Yellow, dichroic "long-pass" filters are an exception to this rule—they exclude short wavelengths well and generally do not degrade with time (but can degrade with high heat). To affect sea turtles the least, dichroic filters should exclude all wavelengths (have a stop-band) below 520 nm.

Red light-emitting diodes (LEDs) are too small to light large areas but can be used for walkways and steps. The red light of LEDs remains a true, narrow-band red for the life of the lamp and is probably one of the light sources least visible to sea turtles. The red light from LEDs has the added benefit of not degrading the night vision of people visiting the beach. As people walk to the beach along a pathway lighted with red LED lamps, their eyes can adjust to the darkness, leaving them better able to see by moonlight and starlight once they reach the unlighted beach.

### **HOW TO CHOOSE AN ALTERNATIVE LIGHT SOURCE**

Selecting appropriate alternative lighting may seem to be a complex task. For example, which would be least harmful to sea turtles, a 15-watt white bulb or a 35-watt LPS luminaire? Unfortunately, we have no reliable formula that can be used to calculate how much each light source will affect sea turtles. We do know, however, that if spectral emissions are equivalent, reducing intensity will reduce effects, and if intensities are similar, substituting less attractive sources (like LPS) will also reduce effects. A sound strategy, therefore, would be to reduce effects on sea turtles by manipulating both intensity and color. As few lights as practicable should be used, and for lighting applications that are deemed essential, long-wavelength light sources (LPS, bug lights, etc.) should replace more disruptive light sources and intensity should be reduced by using lamps of minimal wattage that are housed within well-directed fixtures aimed down and away from the beach. Rather than attempt to answer the example question posed above, one should explore additional available technology that will best suit one's lighting needs. If a 15-watt white bulb is truly sufficient for the lighting requirement, then a 15- to 25-watt bug-light bulb may be a more appropriate choice than a 35-watt LPS

luminaire, which would emit approximately 20 times the light of the white bulb.

#### USE LIGHT SCREENS AND ENHANCE DUNE PROFILE

Both laboratory and field experiments have suggested that the silhouette of the dune can influence sea-finding in hatchlings (Limpus, 1971; Salmon *et al.*, 1992), and it is clear that sea-finding problems are exacerbated where the dune profile is low or the dune is sparsely vegetated (Ferris, 1986; Witherington, 1990; Reiners *et al.*, 1993). Whether by providing visual cues, blocking light, or both, enhancing the silhouette of the dune can reduce lighting problems. Methods include the following:

1. Planting native vegetation on the dune. Unlike artificial light screens, vegetation will grow, enhance the dune habitat for other animals, and may provide more natural orientation cues for hatchlings.
2. Erecting artificial light screens on the dune where immediate, short-term light blocking is needed. Artificial screens should be positioned so that they do not impede nesting. Sturdy "shade cloth" and "privacy fencing" can make effective light screens. Artificial light screens can be used to block light until planted vegetation thickens to fill in gaps.
3. Filling in and replanting dune cuts, pathways, and washout areas. Misoriented hatchlings and adult turtles often exit the beach through these lighted gaps in the dune.
4. Providing emerging hatchlings shielded pathways from nest to surf. On the loggerhead nesting beach at Cape Canaveral Air Force Station, Florida, workers have been able to correct hatchling orientation in lighted areas by shading the dune side of nests and laying 10-cm-high walls of lumber from nest to high-tide line (Leach, 1992). These tactics should be used only as stop-gap measures to reduce hatchling mortality while other light-management efforts are made.

#### A COMPREHENSIVE STRATEGY FOR MINIMIZING EFFECTS OF ARTIFICIAL LIGHTING

There are many options for lessening the effects of artificial lighting on sea turtles, but in order to have them employed, a comprehensive strategy is needed to educate stakeholders, pass legislation, enforce laws, and monitor the nesting beach.

1. Education. Efforts should begin with making those

able to solve lighting problems (individuals, corporations, or governments) aware of the problems and possible solutions. Public awareness is a prerequisite for legislative action and can foster results that extend beyond what can be mandated by government. Many of the organizations listed in Appendix I are authorities on educating the public on conservation issues. Stories in the news media, distribution of pamphlets and fliers (see Appendix I for sources), presentations at community gatherings, and door-to-door campaigns can make the public aware of the need for darker nesting beaches (Limpus *et al.*, 1981; Witherington, 1986).

Well-rounded and long-term educational efforts should include the next generation of sea turtle conservationists. Nurturing in school-age children an appreciation of sea turtles and other features of the natural world is a vital conservation investment.

2. Legislation. While public awareness is important for fostering beach-darkening efforts, light-management legislation is often necessary to complete the task. Light-management laws represent serious commitment to protecting sea turtles from artificial lighting and ensure that this conservation effort will be community-wide. See Appendix H and the discussion on legislation below.
3. Prevention and enforcement efforts. It is far easier to solve light-pollution problems during preliminary planning, before projects are constructed and before lighting is installed. Legislation should require that a central, knowledgeable authority review development plans so that any new lighting near a nesting beach does not become a problem for sea turtles. Solutions to existing lighting problems should also be enforced. Where existing lighting problems are complex or difficult to solve, grace periods can be granted; however, flagrant lighting problems caused by easily identifiable sources should be remedied quickly. Issuing warnings and levying fines can ensure that lighting problems are solved promptly. Ideally, warnings should be issued prior to the nesting and hatchling seasons so that problems can be solved before nesting is deterred and hatchlings are killed.
4. Know your nesting beach. Lighting problems can be detected more quickly if observers are familiar with the activities of sea turtles and humans on the beach. Lighting problems can be cryptic. Results of lighting inspections, nesting surveys, and hatchling disorientation reports should be assessed regularly.

**62B-55.007 Model Standards For Existing Beachfront Lighting.**

In order to provide the highest level of protection for nesting marine turtles and their hatchlings, local governments should adopt all of the following standards for existing artificial beachfront lighting sources:

(1) Existing artificial light fixtures shall be repositioned, modified, or removed so that:

- (a) The point source of light or any reflective surface of the light fixture is not directly visible from the beach;
- (b) Areas seaward of the frontal dune are not directly or indirectly illuminated; and
- (c) Areas seaward of the frontal dune are not cumulatively illuminated.

(2) The following measures shall be taken to reduce or eliminate the negative effects of existing exterior artificial lighting:

- (a) Reposition fixtures so that the point source of light or any reflective surface of the light fixture is no longer visible from the beach;
- (b) Replace fixtures having an exposed light source with fixtures containing recessed light sources or shields;
- (c) Replace traditional light bulbs with yellow "bug" type bulbs **not exceeding 50 watts; FWC recommends AMBER BULBS**
- (d) Replace non-directional fixtures with directional fixtures that point down and away from the beach;
- (e) Replace fixtures having transparent or translucent coverings with fixtures having opaque shields covering an arc of at least 180 degrees and extending an appropriate distance below the bottom edge of the fixture on the seaward side so that the light source or any reflective surface of the light fixture is not visible from the beach;
- (f) Replace pole lamps with low-profile, low-level luminaries so that the light source or any reflective surface of the light fixture is not visible from the beach;
- (g) Replace incandescent, fluorescent, and high intensity lighting with the lowest wattage low pressure sodium vapor lighting possible for the specific application;
- (h) Plant or improve vegetation buffers between the light source and the beach to screen light from the beach;
- (i) Construct a ground level barrier to shield light sources from the beach. Ground-level barriers must not interfere with marine turtle nesting or hatchling emergence, or cause short- or long- term damage to the beach/dune system;
- (j) Permanently remove or permanently disable any fixture which cannot be brought into compliance with the provisions of these standards.

(3) The following measures shall be taken to reduce or eliminate the negative effects of interior light emanating from doors and windows within line-of-sight of the beach:

- (a) Apply window tint or film that meets the standards for tinted glass;
- (b) Rearrange lamps and other moveable fixtures away from windows;
- (c) Use window treatments (e.g., blinds, curtains) to shield interior lights from the beach; and
- (d) Turn off unnecessary lights.

*Specific Authority 161.63 FS. Law Implemented 161.163 FS. History: New 3-30-93, Formerly 16B-55.007*

Sec. 30-313. - General provisions.

These general provisions shall govern development within the corporate limits of the Town, as follows:

(27)

*Lighting.* Where lighting facilities are provided for parking areas, they shall be designed and installed so as to reflect the light away from any contiguous residential zoned property. No lighting shall be installed, maintained or illuminated on public or private property that would directly illuminate the beach from sunset to sunup during the sea turtle nesting period from March 1 through October 31 of each year. Property owners are responsible for ensuring that all lighting along the beach is controlled so as not to illuminate the beach from sunset to sunup during this period.

Measures to be employed by property owners for the installation, maintenance and control of all lighting in a direct line of sight of the beach, including interior lights visible from the beach through windows, shall be consistent with the standards and guidelines contained in Chapter 62B-55 of the Florida Administrative Code and in Technical Report 97-06 of the Broward County Beach Lighting Management Plan, as amended from time to time. All site plans for new development and redevelopment along the beach shall be required to demonstrate that the proposed development or redevelopment will comply with this section by identifying the specific measures that will be employed to control lighting.

For existing development along the beach, property owners shall be required to immediately implement measures not involving any capital expenditures, such as switching-off exterior lights that illuminate the beach and closing existing draperies to shield interior lights during the turtle nesting period. By March 1, 2003, property owners shall implement all appropriate measures necessary to fully comply with this section.

## **FWC APPROVED SEA TURTLE LIGHTING**

**All exterior lighting for the entire project area including structural and landscape lighting must be reviewed and approved by FWC regardless of whether or not the area is seaward of the CCCL**

### **ACCEPTABLE FIXTURES**

All exterior fixtures on the seaward and the shore perpendicular sides of the building (and on the landward side of the building if they are visible from the beach) should be well shielded, full cut-off, downward directed type fixtures. All exterior fixtures on the landward side of the building should be downward directed only.

### **ACCEPTABLE LAMPS / BULBS AND OTHER LIGHT SOURCES**

Long wave length lights, e.g. those that produce light that measures greater than 560 nanometers on a spectroscope, are necessary for all construction visible from and adjacent to marine turtle nesting beaches. Bright white light, such as metal halide, halogen, fluorescent, mercury vapor and incandescent lamps will not be approved. Filters are unreliable and not allowed. Limited use of shorter wavelength lights may be approved in areas where direct and indirect light or glow could not possibly be visible from the beach upon approval by FWC.

### **ACCEPTABLE LAMPS**

- Low Pressure Sodium (LPS) 18w, 35w
- Red, orange or amber LED (true red, orange or amber diodes, NOT filters)
- True red neon
- Other lighting sources that produce light of 560 nm or longer

\*\*\*\*\* FWC approved lighting may be found at [http://myfwc.com/WILDLIFEHABITATS/seaturtle\\_index.htm](http://myfwc.com/WILDLIFEHABITATS/seaturtle_index.htm) \*\*\*\*\*

### **STATEMENT ABOUT POOL LIGHTS ON LIGHTING PLAN**

The plan shall reflect that the interior swimming pool and pool deck lights shall be turned off while the pool is closed during sea turtle nesting season (May 1 through October 31 in all counties except Brevard, Indian River, St. Lucie, Martin, Palm Beach and Broward counties where leatherback turtle nesting occurs during the period of March 1 through October 31). The use of an automatic timer is acceptable. This may be specified in the notes section on the drawing and should be included in the FDEP Permit Conditions. If the interior pool lights cannot be turned off at night because the pool deck is used at night, then interior pool lights shall be amber or red LED lamps.

### **STATEMENT ABOUT TURTLE GLASS ON LIGHTING PLAN**

The plan shall reflect that tinted glass or film with a visible light transmittance value of forty-five (45) percent or less shall be applied to all windows and doors within line of sight of the beach. This includes the seaward and shore-perpendicular sides of the structure. This may be specified in the notes section on the Lighting Plan architectural drawing and should be included in the FDEP Permit Conditions.

### **TIMERS**

Timers may be used only for in-pool and pool deck lights when the pool is closed.

### **THE FOLLOWING ARE NOT ALLOWED**

- Private balcony lights
- Up lights
- Tree strap downlights
- Decorative lighting, not necessary for human safety or security
- Pond lights
- Dune walkover lighting
- Fountain lights on beach or shore perpendicular side of structure

## Exhibit 4

**Sea Turtle Season 2011 Current Summary Report of Activities**

- 01/14/2011 Mailed 1<sup>st</sup> generic reminder letter to all property owners along the beach that would be in violation of Town Ordinance come March 1<sup>st</sup> with a copy of the Town Ordinance, flyers regarding interior lighting and a brochure of FWC approved lighting fixtures. (73)  
(Attached Exhibit 1)
- 02/09/2011 Performed first initial inspection to ascertain whether or not any property owners have implemented measures to comply with Town Ordinance.
- 02/10/2010 Mailed 2<sup>nd</sup> letter specific to lights in violation on individual parcels from the 02/09/11 inspections.  
(30)  
(Attached Exhibit 2)
- 03/01/2010 Performed 2<sup>nd</sup> inspection. Notices of Violation were completed that week.
- 03/08/2011 Issued (22) notices of violation to properties in violation at the North end of Town and gave out a copy of the Broward County code section and Technical Report section to assist with solutions.  
(Attached Exhibit 3)
- 03/09/2011 Issued (25) notices of violation to properties in violation at the South end of Town and gave out a copy of the Broward County code section and Technical Report section to assist with solutions.

**Night meetings with property owners**

- 2/25/2011 Seawatch and Sea Ranch Lakes North  
3/14/2011 Costa Del Sol and Nautilus  
3/15/2011 Rei'd Costa del sol, el mar condos, aruba, 4312 el mar, high noon and seafoam