



Figure 9. The directional brightness of a natural light field (A, one dominated by celestial sources) and an artificial light field (B, one dominated by a lighted luminaire) from the perspective of an observer on a beach. The length of each radiating line is proportional to the brightness of the direction. In the natural light field, the moon is conspicuous as a bright source, but it also illuminates the sky, water, and other objects. In the artificial light field, a glaring luminaire appears bright because of its closeness to the observer but does not provide enough light to illuminate other features. The luminaire produces a highly directed light field that has an overwhelming brightness in one direction.

"lost" hatchlings are preyed upon by beach crabs or shorebirds or become exhausted and dehydrated deep in nearby dune vegetation (REM and BEW, personal observations). The discovery of hundreds of dead loggerhead hatchlings beneath a mercury-vapor light at Melbourne Beach, Florida, serves as one example that indicates the cryptic nature of the problem (L. M. Ehrhart, personal communication). The number of hatchlings found in this case indicated that the light had been left on and had attracted hatchlings over many nights. As is often the case, the discovery of the pile of dried hatchlings came as a complete surprise to the caretaker of the property.

MISORIENTATION AND DISORIENTATION

Newly emerged sea turtle hatchlings crawl almost incessantly. For the most part, the effect of artificial lighting on hatchling behavior is not to alter latency, frequency, duration, or intensity of crawling, but rather to alter its efficacy—hatchlings on artificially lighted beaches tend to crawl in the wrong direction.

Hatchlings that are oriented away from the most direct ocean path are said to be "misoriented." Hatchlings on lighted beaches are frequently misoriented, sometimes as entire groups. These groups of hatchlings leave relatively straight tracks that often stream across the beach parallel to the surf line toward an artificial light source.

Hatchlings that are "unsure" about orientation direction demonstrate their uncertainty by frequently changing direction and circling. Hatchlings lacking directed orientation are said to be "disoriented." Similar "orientation circles" are also seen in hatchlings that have been blindfolded (Mrosovsky and Shettleworth, 1968) or placed in complete darkness (except for an infrared observation source; BEW, personal observation). Hatchlings often become disoriented by overhead light sources. Frequently, hatchlings that are misoriented toward an artificial light source become disoriented as they reach the source. Hatchlings also appear to become disoriented when they reach boundaries between artificially lighted areas and shadows on the beach. Turtles in this predicament exit the shadows toward the lighted beach sand, become exposed to the light from the artificial source itself, move toward the light source into the shadow, and may repeat this cycle until they become exhausted. This often explains the curious circling tracks that observers find in the center of the beach berm, away from any overhead light source.

Artificial light fields are produced by sources that are less intense than celestial sources, although they can appear very bright to an observer close to the light source (Verheijen, 1958, 1978). Other features that could contribute to the brightness of the light field (sky, clouds, landscapes, etc.) are relatively distant and the light reflected from them is dim when compared to the brightness of the source. Consequently, an observer near an artificial light source experiences a highly directed light field that is overwhelmingly dominated by the light source. For a hatchling near a lighted luminaire on a beach, the overwhelming brightness of the light source provides a "supernormal stimulus" that overrides tendencies to orient to other visual cues.

EFFECTS OF MOON PHASE AND MOONLIGHT

Some of the myths regarding the moon's effect on hatchling emergence and sea-finding can be dispelled here. For the most part, hatchling sea turtles do not emerge from nests according to a lunar cycle. The date of emergence is determined by the date eggs were deposited in the nest and the length of the incubation period. Although nesting cycles correlated with specific moon phases have been detected in olive ridleys (Cornelius, 1986) and to a lesser extent in loggerheads (Burney *et al.*, 1991), the timing of these cycles allows for hatchling emergence during all phases of the moon. Because hatchlings may emerge when no moon is visible, they must not depend on the moon to lead them seaward. Perceptions that hatchlings emerge only during the full moon and are led seaward by its light probably originated because hatchlings are most readily observed on bright, full-moon nights.

The light of the moon does, however, have an apparent effect on the degree of sea-finding disruption caused by artificial lighting. Reports of hatchling disorientation events (including misorientation and disorientation) in Florida are most common on nights surrounding the new moon (Figure 10; Salmon and Witherington, 1995). Compared to darker nights, moonlit nights have higher levels of ambient light that may lessen the relative contribution of artificial light sources to the light fields that hatch-

lings perceive. By reducing light-field directivity, moonlight may allow hatchlings to rely on shape cues that correctly reveal the seaward direction.

SWIMMING ORIENTATION

A hatchling's best chance to survive its first few hours is to escape from the beach and swim directly out to sea, away from the predator-rich waters near the shore (Frick, 1976; Ireland *et al.*, 1978; Salmon and Wyneken, 1987; Witherington and Salmon, 1992). In the open ocean, hatchlings can conserve energy by remaining inactive, and because of their distance from shore, their risk of being swept back onto land is small.

How artificial lighting affects swimming hatchlings is not well known. Hatchling sea turtles have been observed to exit the surf onto land where lighting is nearby (Daniel and Smith, 1977a; Carr and Ogren, 1960; Witherington, 1986); however, it is not clear how long these hatchlings were in the water. Limpus (1991) reported that "thousands" of green turtle hatchlings were seen swimming in circles next to a brightly lighted boat anchored off the nesting beach at Raine Island, Australia. Hatchlings affected by such lighting may linger in the lighted water and be preyed upon by fish that are also attracted to the lighted area. These incidents may leave little or no evidence.

In laboratory settings with other cues absent, loggerhead hatchlings will swim toward an artificial light source (O'Hara, 1980; Salmon and Wyneken, 1990). However, it is apparent from other laboratory work that hatchlings depend less on light cues and more on sea-wave and magnetic cues once they enter the water (Salmon and Lohmann, 1989; Lohmann *et al.*, 1990; Salmon and Wyneken, 1990; Wyneken *et al.*, 1990). Witherington (1991) observed that loggerhead hatchlings swimming from a lighted beach had a wider pattern of dispersal than did hatchlings from unlighted beaches, but he did not see evidence of disrupted orientation comparable to that seen on land. Further work is needed to determine how lighted ships and platforms may affect the survivorship of hatchlings and their dispersal from beaches.

Assessments: Discerning Problems Caused by Artificial Lighting

Lighting Inspections

WHAT ARE LIGHTING INSPECTIONS?

During a lighting inspection, a complete census is made of the number, types, locations, and custodians of artificial light sources that emit light visible from the beach. The goal of lighting inspections is to locate lighting problems and to identify the property owner, manager, caretaker, or tenant who can modify the lighting or turn it off.

WHICH LIGHTS CAUSE PROBLEMS?

Although the attributes that can make a light source harmful to sea turtles are complex, a simple rule has proven to be useful in identifying problem lighting under a variety of conditions:

An artificial light source is likely to cause problems for sea turtles if light from the source can be seen by an observer standing anywhere on the nesting beach.

If light can be seen by an observer on the beach, then the light is reaching the beach and can affect sea turtles. If any glowing portion of a luminaire (including the lamp, globe, or reflector) is directly visible from the beach, then this source is likely to be a problem for sea turtles. But light may also reach the beach indirectly by reflecting off buildings or trees that are visible from the beach. Bright or numerous sources, especially those directed upward, will illuminate sea mist and low clouds, creating a distinct glow visible from the beach. This "urban sky glow" is common over brightly lighted areas. Although some indirect lighting may be perceived as nonpoint-source light pollution, contributing light sources can be readily identified and include sources that are poorly directed or are directed upward. Indirect lighting can originate far from the beach.

Although most of the light that sea turtles can detect can also be seen by humans, observers should realize that some sources, particularly those emitting near-ultraviolet and violet light (e.g., bug-zapper lights, white electric-discharge lighting) will appear brighter to sea turtles than to humans. A human is also considerably taller than a hatchling; however, an observer on the dry beach who crouches to the level of a hatchling may miss some lighting that will affect turtles. Because of the way that some lights are par-

tially hidden by the dune, a standing observer is more likely to see light that is visible to hatchlings and nesting turtles in the swash zone.

HOW SHOULD LIGHTING INSPECTIONS BE CONDUCTED?

Lighting inspections to identify problem light sources may be conducted either under the purview of a lighting ordinance (see Appendix H and the section below on sea turtle lighting ordinances) or independently. In either case, goals and methods should be similar.

GATHER BACKGROUND INFORMATION

Before walking the beach in search of lighting, it is important to identify the boundaries of the area to be inspected. For inspections that are part of lighting-ordinance enforcement efforts, the jurisdictional boundaries of the sponsoring local government should be determined. It will help to have a list that includes the name, owner, and address of each property within inspection area so that custodians of problem lighting can be identified. Plat maps or aerial photographs will help surveyors orient themselves on heavily developed beaches.

PRELIMINARY DAYTIME INSPECTIONS

An advantage to conducting lighting inspections during the day is that surveyors will be better able to judge their exact location than they would be able to at night. Preliminary daytime inspections are especially important on beaches that have restricted access at night. Property owners are also more likely to be available during the day than at night to discuss strategies for dealing with problem lighting at their sites.

A disadvantage to daytime inspections is that fixtures that are not directly visible from the beach will be difficult to identify as problems. Moreover, some light sources that can be seen from the beach in daylight may be kept off at night and thus present no problems. For these reasons, daytime inspections are not a substitute for nighttime inspections.

Descriptions of light sources identified during daytime inspections should be detailed enough so that anyone can locate the lighting. In addition to a general description of each luminaire (e.g., HPS floodlight directed seaward at top northeast corner of

the building at 123 Ocean Street), photographs or sketches of the lighting may be necessary. Descriptions should also include an assessment of how the specific lighting problem can be resolved (*e.g.*, needs turning off; should be redirected 90° to the east). These detailed descriptions will show property owners exactly which luminaires need what remedy.

NIGHTTIME INSPECTIONS

Surveyors orienting themselves on the beach at night will benefit from notes made during daytime surveys. During nighttime lighting inspections, a surveyor walks the length of the nesting beach looking for light from artificial sources. There are two general categories of artificial lighting that observers are likely to detect:

1. Direct lighting. A luminaire is considered to be direct lighting if some glowing element of the luminaire (*e.g.*, the globe, lamp [bulb], reflector) is visible to an observer on the beach. A source not visible from one location may be visible from another farther down the beach. When direct lighting is observed, notes should be made of the number, lamp type (discernable by color; Appendix A), style of fixture (Appendix E), mounting (pole, porch, *etc.*), and location (street address, apartment number, or pole identification number) of the luminaire(s). If exact locations of problem sources were not determined during preliminary daytime surveys, this should be done during daylight soon after the nighttime survey. Photographing light sources (using long exposure times) is often helpful.
2. Indirect lighting. A luminaire is considered to be indirect lighting if it is not visible from the beach but illuminates an object (*e.g.*, building, wall, tree) that is visible from the beach. Any object on the dune that appears to glow is probably being lighted by an indirect source. When possible, notes should be made of the number, lamp type, fixture style, and mounting of an indirect-lighting source. Minimally, notes should be taken that would allow a surveyor to find the lighting during a follow-up daytime inspection (for instance, which building wall is illuminated and from what angle?).

WHEN SHOULD LIGHTING INSPECTIONS BE CONDUCTED?

Because problem lighting will be most visible on the darkest nights, lighting inspections are ideally conducted when there is no moon visible. Except for a few nights near the time of the full moon, each night

of the month has periods when there is no moon visible. Early-evening lighting inspections (probably the time of night most convenient for inspectors) are best conducted during the period of 2–14 days following the full moon. Although most lighting problems will be visible on moonlit nights, some problems, especially those involving indirect lighting, will be difficult to detect on bright nights.

A set of daytime and nighttime lighting inspections before the nesting season and a minimum of three additional nighttime inspections during the nesting-hatching season are recommended. The first set of day and night inspections should take place just before nesting begins. The hope is that managers, tenants, and owners made aware of lighting problems will alter or replace lights before they can affect sea turtles. A follow-up nighttime lighting inspection should be made approximately two weeks after the first inspection so that remaining problems can be identified. During the nesting-hatching season, lighting problems that seemed to have been remedied may reappear because owners have been forgetful or because ownership has changed. For this reason, two midseason lighting inspections are recommended. The first of these should take place approximately two months after the beginning of the nesting season, which is about when hatchlings begin to emerge from nests. To verify that lighting problems have been resolved, another follow-up inspection should be conducted approximately one week after the first midseason inspection.

WHO SHOULD CONDUCT LIGHTING INSPECTIONS?

Although no specific authority is required to conduct lighting inspections, property managers, tenants, and owners are more likely to be receptive if the individual making recommendations represents a recognized conservation group, research consultant, or government agency. When local ordinances regulate beach lighting, local government code-enforcement agents should conduct lighting inspections and contact the public about resolving problems.

WHAT SHOULD BE DONE WITH INFORMATION FROM LIGHTING INSPECTIONS?

Although lighting surveys serve as a way for conservationists to assess the extent of lighting problems on a particular nesting beach, the principal goal of those conducting lighting inspections should be to ensure that lighting problems are resolved. To resolve lighting problems, property managers, tenants, and owners should be given the information they need to make proper alterations to light sources. This information

should include details on the location and description of problem lights, as well as on how the lighting problem can be solved. One should also be prepared to discuss the details of how lighting affects sea turtles. Understanding the nature of the problem will motivate people more than simply being told what to do.

Monitoring Sea Turtle Behavior

In part, the behavior of nesting sea turtles and their hatchlings on the beach can be monitored by studying the tracks they leave in the sand. This evidence can reveal how much and where nesting occurs and how well oriented hatchlings are as they attempt to find the sea from their nest. Monitoring this behavior is one way to assess problems caused by artificial lighting, but it is no substitute for a lighting inspection program as described above. Many lighting problems may affect sea turtles and cause mortality without their leaving conspicuous track evidence on the beach.

SEA TURTLE NESTING

On many beaches, sea turtle biologists make early-morning surveys of tracks made the previous night in order to gather information on nesting. With training, one can determine the species of sea turtles nesting, the success of their nesting attempts, and where these attempts have occurred. These nesting surveys are one of the most common assessments made of sea turtle populations.

Because many factors affect nest-site choice in sea turtles, monitoring nesting is not a very sensitive way to assess lighting problems. However, changes that are observed in the distribution or species composition of nesting can indicate serious lighting problems and should be followed with a program of lighting inspections if one is not already in place.

HATCHLING ORIENTATION

Although hatchlings are more sensitive to artificial lighting than are nesting turtles, the evidence they leave behind on the beach is less conspicuous. Evidence of disrupted sea-finding in hatchlings (hatchling disorientation) can vastly underrepresent the extent of a lighting problem; however, this evidence can be useful in locating specific problems between lighting inspections. There are two ways one can use hatchling-orientation evidence to help assess lighting problems:

HATCHLING-ORIENTATION SURVEYS

Of the two methods, hatchling-orientation surveys, which involve measuring the orientation of hatchling tracks at a sample of sites where hatchlings have emerged, provide the most accurate assessment. Because the jumble of hatchling tracks at most emergence sites is often too confused to allow individual tracks to be measured, simple measures of angular range (the width that the tracks disperse) and modal direction (the direction that most hatchlings seem to have gone) are substituted. If the sampling of hatchling emergence sites does not favor a specific stretch of beach or a particular time of the lunar cycle, data from these samples can be an accurate index of how well hatchlings are oriented (Witherington *et al.*, 1996).

HATCHLING DISORIENTATION REPORTS

Although many cases of hatchling disorientation go unnoticed, some are observed and reported. The evidence of such events includes numerous circling tracks, tracks that are directed away from the ocean, or the carcasses of hatchlings that have succumbed to dehydration and exhaustion. Because reporters often discover this evidence while conducting other activities, such as nesting surveys, the events reported often include only the most conspicuous cases. Although these reports have a distinct coverage bias, they can still yield valuable information.

Hatchling-disorientation reports can help researchers immediately identify light-pollution problems. Although not every hatchling that is misled by lighting may be observed and reported, each report constitutes a documented event. When reports are received by management agencies or conservation groups, action can be taken to correct the light-pollution problem at the specific site recorded in the report. To facilitate the gathering of this information, standardized report forms should be distributed to workers on the beach who may discover evidence of hatchling disorientation. The following is a list of information that should be included on a standardized hatchling-disorientation report form:

1. Date and time (night or morning) that evidence was discovered.
2. Observer's name, address, telephone number, and affiliation (if any). The reporter may need to be contacted so that information about the event can be verified and the site can be located.
3. Location of the event and the possible light sources

responsible. Written directions to the locations should be detailed enough to guide a person unfamiliar with the site. The reporter should judge which lighting may have caused the sea-finding disruption, a decision that may involve knowledge about lighting that was on during the previous night and the direction(s) of the tracks on the beach. If possible, the type of lighting responsible

should be identified (*e.g.*, a high-pressure-sodium street light).

4. The number of hatchlings of each species involved in the event. Unless carcasses or live hatchlings are found, the species and numbers involved will be an estimate.
5. Additional notes about the event.

Lighting Ordinances: How an Idea Becomes a Law

Acts of local, state, and national governments are often essential to ensure that light management on nesting beaches, justified by scientific information and supported by the public, becomes a reality. By adopting light-management legislation, government makes a long-term commitment to protect sea turtles from the harmful effects of artificial lighting. Light-management laws are necessary because some individuals will not correct lighting problems unless they are required to do so. Legislation can force action when needed and, on many nesting beaches, may be the only means to completely resolve light-pollution problems.

In addition to providing a public mandate, legislation can establish specific criteria for determining which artificial light sources constitute a problem and how this lighting should be modified to resolve the problem. Legislation ensures that lighting problems are handled in a fair and even-handed manner throughout coastal areas.

What follows is a step-by-step guide to initiating, passing, and implementing legislation to protect sea turtles from light pollution. The strategy presented is largely based upon successful efforts in Florida, USA, but it provides a framework that can be generally applied elsewhere.

1. BECOME FAMILIAR WITH THE ISSUES

Those accepting responsibility for promoting lighting legislation should become familiar with all related issues: specific effects of artificial lighting on sea turtles, recommended methods of correcting problem lights, local nesting patterns of sea turtles, observed and/or potential lighting problems on local beaches, and details of existing lighting legislation that can be used as a model.

Van Meter (1992) provides a good general overview of sea turtle biology for nonbiologists, and the National Research Council (1990) offers a detailed account of sea turtle conservation issues. For some beaches, specific information on sea turtle nesting, hatchling orientation, and existing lighting can be obtained from local researchers and conservationists or from published reports. For poorly known beaches, much of this information will need to be gathered. General information on lighting and its effect on sea turtles can be found within this manual. Various environmental groups, biologists, and resource managers (see Appendix I) may be contacted for information concerning legislation adopted in other areas. "Florida's Model Standards for Beach-

front Lighting" are included in this manual (Appendix H) as an example of minimum guidelines for protecting sea turtles from the effects of lighting.

2. DEVELOP A SUMMARY DOCUMENT OF RELEVANT LOCAL ISSUES

It is helpful to summarize relevant information in a single document that can be used to develop presentations to the public and to educate government officials. Ask a person or group familiar with lighting issues to review the summary to ensure that all of the pertinent information is covered.

3. DEVELOP A PRESENTATION

A presentation developed from the summary document should be directed toward those unfamiliar with the subject. Remember that many in the audience will know little about sea turtles, how threatened they are, and why they need to be protected. Have succinct answers ready for the most basic questions, as well as for the most difficult ones (see Appendix J).

A good presentation should include a brief description of sea turtles and their plight. Be sure to distribute materials with photographs or to project slides that show what sea turtles look like. Supportive materials (e.g., slides, pamphlets, booklets) may be available from environmental groups or government agencies (see Appendix I). The presentation should clearly justify the need for legislation. Use the presentation as an opportunity to allay fears. Point out that light-management legislation is not meant to prohibit lighting near the beach; the goal of light management is to preserve useful light and reduce harmful light. Address the misconceptions that lighting modifications will cause beaches to become less safe and will cost large sums of money (see Appendix J). Lastly, review in the presentation some practical methods for assessing and correcting problem lighting. Because it may take years to pass effective legislation, the education provided by these public presentations may be the only impetus for improving local lighting conditions while legislation is pending.

4. WRITE A PRELIMINARY DRAFT OF THE LEGISLATION

A preliminary draft of legislation should address all of the relevant issues heretofore discussed. The "Florida Model Standards for Beachfront Lighting" (Appendix H) and legislation from other areas may be used as guides for writing the draft legislation. A person or group familiar with lighting issues should review the draft to make sure that all important points are covered.

5. SOLICIT SUPPORT FOR LEGISLATION

Public support for lighting legislation is essential. In small communities, support can be garnered at town meetings and from individual contacts with coastal residents and business owners. In larger communities, one should begin public-awareness campaigns on a broad scale by making presentations to local environmental groups, civic organizations, homeowners associations, and other groups, especially those with members who may be affected by the legislation. Pamphlets or fliers distributed by hand or by mail will reach many of those not attending meetings and presentations.

Be patient and diplomatic when interacting with an audience. Concerns of those who may be skeptical, whether justified or imagined, should be thoroughly addressed. Responses to many common questions and concerns about beach-darkening efforts are listed in Appendix J.

Presentations should be reevaluated regularly based on audience reaction. If a particular concept is obviously not clear to the audience at the end of the presentation, then the explanation of that concept probably needs to be modified.

The internet, radio, television, and the press can be quite valuable in getting the message out. As in other presentations to the public, it is helpful to give a short, standardized message that includes the basic elements discussed above. It is also valuable to distribute written news releases to the electronic and print media.

6. EDUCATE GOVERNMENTAL STAFF

Whether the need for lighting legislation is originally identified by government planning or environmental staff or it has been introduced by an outside group, the knowledgeable support of local government staff is critical. If staff are not well versed in the relevant issues, they should be provided with the pertinent background information (the summary document discussed above, a copy of this manual, names and addresses of sea turtle biologists familiar with lighting issues, etc.).

Local government staff can be extremely helpful by providing guidance on how to properly format legislation and how to best approach government officials in order to pass legislation. Unfortunately, government environmental and planning departments may be greatly understaffed and may be overwhelmed by new issues. For this reason, assist the staff whenever possible, avoid unnecessary demands on their time, and by all means, demonstrate an appreciation for their efforts.

7. EDUCATE ELECTED OFFICIALS

Personal meetings with elected officials may be very effective in gaining support for legislation, but certain guidelines should be followed. First and foremost, be well prepared. Before meeting with elected officials, make sure that each of the six tasks above has been completed and be able to answer some difficult questions concerning the proposed legislation. Additionally, be ready to demonstrate that there is public support for the legislation; it will be an important factor in convincing an elected official to vote in favor of the legislation. A representative of a large group or coalition will often have more influence than an individual acting alone.

When discussing issues with elected officials, be cordial, factual, and succinct. Most officials have to meet with many people during the course of a day and will appreciate amiable brevity. Cover the major points and be prepared to expound on them when asked. Bring along support material that can be left with the official. This will allow the official, at his or her convenience, to become more familiar with the finer details of the proposed legislation. Lastly, offer to answer any questions the official may have in the future and be sure to leave your name, address, and telephone and fax numbers.

8. MAKE A FORMAL RECOMMENDATION TO ADOPT THE LEGISLATION

A formal recommendation usually involves placing the proposed legislation on the agenda of the commission, board, or council that advises elected officials on new legislation. For example, in Florida, before a lighting ordinance is considered by a county commission, it is usually reviewed by a county planning and zoning board, a development review board, or other appointed board. That board then makes recommendations to the county commission concerning the proposed ordinance. Local government planning and environmental staff should be consulted on how to arrange to place the proposed legislation on the appropriate agenda.

If the legislation must be reviewed by an appointed board (as described above), it would be helpful to arrange personal meetings with board members prior to the public meeting at which the proposed legislation will be considered. In these personal meetings, follow the same guidelines as those for meeting with elected officials.

Prior to the public meeting, contact supporters of the legislation (especially those representing large local organizations) and encourage them to meet with, write to, or call local officials. It is also critical

that they attend the meeting to voice their support. Experts on sea turtle biology and conservation may be particularly well received. Supporters should discuss issues and coordinate their comments before the meeting so that their presentations will not be contradictory and so that different speakers can emphasize different points.

At the public meeting, follow the guidelines for meeting with elected officials (*i.e.*, be prepared, factual, concise, cooperative, cordial, and diplomatic). Also, be aware of and adhere to the proper protocol for public comment. Individual board members should have been provided with background materials and the justification for the proposed legislation; therefore, presentations at the public meeting should be principally a concise review of the main points. Because it is important for board members to be made aware of strong public support for the proposed legislation, supporters should attend in force and many should be prepared to speak. If board members have technical questions about any aspect of the legislation, the individual most qualified to answer the question should do so.

It is of tremendous help to have the support of local environmental and planning staff. Board members will be familiar with staff and will usually place considerable weight on their judgment (hence the importance of working with staff from the beginning).

If controversy over the legislation develops, the board may require one or more public workshops in order to resolve the controversial aspects of the legislation. The legislation then may be given a final review by the board and forwarded to the elected body (*e.g.*, county commission) along with specific recommendations. The process comes to a climax with a vote by the elected body during a public meeting. Because the legislation can be modified at any one of these public workshops or meetings, supporters should participate in each of these steps.

With a concerted effort by supporters, the chances of seeing light-management legislation through to official promulgation are good. Although the arguments for lighting regulations on sea turtle nesting beaches are themselves compelling, a resolute show of public support counts most heavily. The importance of this support cannot be overstated. Even if initial efforts to pass legislation fail, the support fostered during the attempt will convince many to begin addressing the problem themselves and will provide a strong base for future legislative efforts.

9. AFTER THE LEGISLATION IS ADOPTED GET THE WORD OUT

After lighting legislation is adopted, it will be necessary for the local government to send notice of the new legislation to owners of coastal property, informing them of the associated regulations and the time period (often until the next nesting season) during which they must comply. The notice should also inform property owners of the criteria that will be used to determine compliance, the name and address of a contact person within local government, and some general suggestions for bringing lighting into compliance.

CONDUCT LIGHTING INSPECTIONS AND ENFORCE REGULATIONS

For light-management legislation to be effective, comprehensive lighting inspections are needed (see the previous section on lighting inspections). At least one inspection should be made prior to the deadline for compliance stated in the ordinance. Lighting that is not in compliance should be identified so that property owners can be notified in sufficient time to correct the problem. After the deadline for compliance, follow-up lighting inspections should be conducted. Owners of problem lighting identified during the follow-up inspection should be sent a second notice. Reference should be made to the first notice, and a final deadline for compliance should be explicitly stated. Generally, this final deadline would be the end of the aforementioned grace period. Noncompliance beyond the deadline should result in enforcement action (*e.g.*, a fine) unless there are extenuating circumstances.

STAY INVOLVED

After legislation has been adopted and problem lighting has been identified and brought into compliance, it will pay to remain vigilant. As problems with lighting are generally ongoing, so too should be the solution. Vigilance will reduce forgetfulness and apathy and will uncover changes that may make the original legislation less effective, such as amendments that weaken the legislation and discontinuation of lighting inspections or enforcement.

It is important to stay aware of the activities of local government because legislation may be amended at any time; be prepared to address the issues of lighting legislation as they arise. Attending public meetings and preserving contacts with local government staff are key ways to keep abreast of the actions and inactions that may affect light-management efforts.

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