

IMPACTS OF COASTAL ROADWAY LIGHTING ON ENDANGERED AND THREATENED SEA TURTLES

PROBLEM STATEMENT

Florida's beaches are important rookery sites for the endangered green and leatherback turtles, and for the threatened loggerhead sea turtle. Preserving the habitat quality and integrity of the nesting beaches is one of many steps required to allow these creatures to recover from their unfortunate and continuous decline. Artificial lighting used to illuminate coastal roadways throughout the state is responsible for both a decline in nesting by females and the loss of thousands of light-disoriented hatchlings annually (i.e., in the presence of light, the hatchlings cannot locate the sea and are likely to be taken by predators, to die from desiccation or to be crushed by cars as they crawl inland over coastal roadways). The solution is light management, a potpourri of strategies that collectively have the effect of reducing light energy to the minimum required for vehicular and pedestrian safety, while also confining the light to the roadway itself.

OBJECTIVES

The goal of this project was to explore ways in which light management could be used by the FDOT to develop new engineering standards for roadways, while eliminating the influence of existing roadway lighting on adjacent sea turtle nesting beaches. This project had specific three objectives:

- inspect and classify the lighting impact posed by FDOT coastal roadways adjacent to sea turtle nesting beaches throughout the state,
- explore the utility of different light management techniques for correcting roadway lighting problems, including some alternative lighting systems, and
- develop methods to evaluate how nesting females and hatchlings respond to these corrections and alternatives.

FINDINGS AND CONCLUSIONS

All of the coastal roadways adjacent to Florida beaches where marine turtles nest were inspected to determine the severity of the lighting problems. A classification system was developed and used to produce maps of FDOT roadways: classes ranged from roads that pose no problems (lighting absent) to those that pose moderate to severe lighting problems. Sites that pose a moderate threat were used to test experimentally what effect reducing wattage and shielding street lights would have on hatchling orientation behavior. As expected, lighting modification

was most effective when the turtles were initially least affected by the lighting. Experiments were done to determine whether filtering street lighting (by excluding the shorter wavelengths) protected marine turtles. Filtered street lighting did not repel nesting females, but, unfortunately, it did disorient hatchlings, although to a lesser degree than did unfiltered lighting. Researchers have concluded that filtering light can have some benefit but should be used in conjunction with additional techniques of light management (such as lowering wattage and shielding). The impact that lowering wattage has on the motorist was not addressed in this study. Finally, researchers compared the sea-finding orientation of hatchlings at a nesting beach when they were exposed to various degrees of lighting: filtered street lighting, embedded roadway lighting, and no lighting (all lights turned off). The turtles' orientation behavior was normal when the lights were turned off or when the embedded roadway lights were on. However, they were disoriented when exposed to filtered lighting. Researchers therefore conclude that embedded lighting has great potential for rendering coastal roadways safe for vehicular traffic, and for doing so in a way that has no discernable impact upon marine turtles.

BENEFITS

The maps provided to FDOT should enhance and expedite FDOT's coordination with Federal (USFWS) and State (Florida Fish and Wildlife Conservation Commission) agencies, enabling them to make corrections to lighting standards consistent with the National Environmental Policy Act (NEPA). The classification system can be used to preserve and protect currently dark roadways from future photo-pollution. The identification and classification of coastal roadways needs to be used by the FDOT to further develop alternative lighting standards, implemented to retrofit offensive existing street lights and to improve street lighting proposed for other coastal roadways. The classification of coastal roadways is the first step in establishing "Sea Turtle Lighting Zones" whereby alternative FDOT Lighting Standards could be used for designing roadway lighting systems.

Protocols were developed to test specific light management options. They provide FDOT with the objective and quantitative methods required to determine which specific modifications might have utility, and whether they provide protection to marine turtles.

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