Keeping Sea Turtles in the Dark

This text is provided courtesy of the National Fish and Wildlife Foundation.

Sea turtle hatchlings

Funding boosts efforts to cut light pollution along Florida's nesting beaches

Selling darkness in the Sunshine State can be tough.

Florida's beach communities sparkle at night with homes and condominiums decked out with beautiful lighting systems. Beachside resorts and businesses depend on artificial lighting to ensure safety and entertainment for guests and customers at night.

Wherever people live, work and play, nighttime lights follow. For decades, steadily increasing illumination along Florida's coasts has wreaked havoc on sea turtles, which rely on subtle, nighttime lighting cues to deposit eggs on beaches and make it safely to sea as hatchlings.

By the early 1990s, Floridians committed to turtle conservation understood how tenuous the situation had become. Suzi Fox, director of the Anna Maria Island Turtle Watch, remembers the bad days on her island community on the Gulf of Mexico just south of Tampa.

"There wasn't one half-block area in 7 miles where you could release a hatchling and have it go to the

sea," Fox said. "We didn't have any lighting ordinances back then, and people just didn't want to turn off their lights."

Throughout the 1990s and early 2000s, Fox and her fellow turtle conservationists chipped away at light pollution in Florida, which hosts more than 90 percent of all sea turtle nesting in the continental United States. Local governments began adopting turtle-friendly lighting ordinances, and conservation projects helped focus efforts along high-density nesting sites.

On Anna Maria Island, Fox and her group were making progress - until 2010, when the disastrous Deepwater Horizon oil spill threatened to wipe out everything they had been working toward.

"I've been doing sea turtle work for 30 years, and that 2010 spill dropped the bottom out of my world," Fox said. "But I'll tell you what - there has been a little silver lining, and it has really blossomed into something bigger."

That silver lining emerged in the years following the spill, when sea turtle conservation groups in Florida began tapping into unprecedented conservation funding offered by the National Fish and Wildlife Foundation.

For Anna Maria Island's sea turtles, Fox said, the difference sparked by NFWF funding "has been night and day."

"Before that first round of funding," Fox said, "there would be 10 disorientations in front of just one resort. Practically all of the hatchlings would go backward, year after year. They'd all wind up in a pool or out into the road and run over by cars.

"In the first year after those first projects - nothing. Everything went into the sea."

Residents along Florida's Gulf Coast seem to have come around, too, Fox said.

"People are learning how good it feels to do something for wildlife. They can see the difference these lighting projects makes for turtle nesting, and they can see that properties are still safe, well-lit and even more attractive at night. Just last night we had people out on the beach watching meteor showers, really enjoying the beauty of a dark beach. For many of them, it's like they've come back to a place they knew and enjoyed as a child - before all the development - and they want that for their children and grandchildren, too."

Armed with funding and the knowledge gained in such early projects, turtle experts are now steadily moving along Florida's Panhandle, expanding the darkness as they go.

Deadly disorientation

Sea turtles face threats to their survival from the moment they hatch out of their sandy nests to the ends of their often long lives.

Hatchlings that survive a gauntlet of land-, air- and sea-based predators must still contend with man-made threats. Fishing bycatch, loss of nesting habitat to development, boat strikes and even direct consumption of turtle meat and eggs have taken a heavy toll. Today, almost all sea turtles found in U.S. waters are federally listed as endangered; the loggerhead is listed as threatened.

Of all the man-made threats to sea turtles, artificial lighting near nesting beaches may be the most widespread and onerous, affecting both nesting females and legions of hatchlings.

"The exact number of hatchlings who are disoriented and die every year in Florida is unknown, but it's probably well over 100,000," said David Godfrey, executive director of the Florida-based Sea Turtle Conservancy. "When they pop out of an egg in a dark nest, their very first instinctive drive is to make it to the water and swim out as far as they can. In that moment, they're relying a little bit on the slope of the beach - they instinctively know to go downward - but they're relying even more on light. The visual cue they would typically use, the horizon out over the ocean, is always just a bit brighter, because of starlight and moonlight."

Even a single bright light near a nesting site can cause all of the hatchlings on a given beach, or most of them, to head inland, Godfrey said.

"They've got a finite amount of energy when they hatch, which they desperately need to get to the water and swim out to safety. When they get disoriented like that, they expend all of that energy scrambling around looking for the ocean. They become very vulnerable to predation, to dehydration, to being cooked in the sun, to being crushed by cars."

Artificial lights near nesting beaches also threaten adult female sea turtles hauling out to nest.

As they're approaching a beach from the sea, these females instinctively seek out dark places to deposit their eggs. Bright lights can deter females from coming ashore at all. If they come ashore despite the lights, they can be lured away from the sea.

Evidence of sea turtle disorientation along Florida's Atlantic and Gulf coasts can be heart-rending and grisly. Hatchlings often leave confused, zig-zagging tracks in the sand before heading inland to be crushed on a nearby roadway. Gigantic adult females sometimes wind up in a resort's swimming pool, or under the wheels of a vehicle.

Expanding the darkness

Throughout its history, NFWF has worked to bolster sea turtle numbers and maximize conservation investments by awarding competitive grants to a range of organizations operating in southeastern and Gulf Coast states, as well as in nearby countries where sea turtles migrate. NFWF-funded projects have focused on habitat restoration, nest relocations, predator control, bycatch avoidance and public outreach.

In 2009, NFWF launched a 10-year strategy to guide conservation investments that measurably improve the recovery of seven sea turtle populations in the Western Hemisphere: leatherbacks, Kemp's ridleys, loggerheads, and hawksbills in the Northwest Atlantic; and leatherbacks, loggerheads and hawksbills in the Eastern Pacific.

Various projects by groups with funding from NFWF have increased the productivity of more than 100 miles of priority nesting beaches, allowing hundreds of thousands of new hatchlings to make it to the sea. Additionally, in-water efforts to implement safer fishing gear practices reduced sea turtle bycatch 50-100 percent in the United States and some neighboring countries, saving thousands of turtles each year.

NFWF-funded projects focus on all aspects of the turtle life cycle, from nesting beaches to in-water interactions with fisheries, but there are other important pieces in the conservation puzzle. Many other conservation teams both large and small are working to increase the available science, educate the public on key issues and improve management of these threatened and endangered species.

The cumulative effects of all sea turtle conservation efforts made headlines when scientists announced record-breaking numbers of nests at many Southeast beaches. The news was especially good for green sea turtles, which were in serious jeopardy just 20 years ago when only 455 nests were recorded in the Archie Carr refuge on Florida's Atlantic coast. After significant conservation efforts and management protection, this population is recovering its former numbers, with 12,026 green turtle nests counted at the Archie Carr refuge in 2015.

Ramped-up conservation efforts following the Deepwater Oil Spill are expected to multiply these successes by giving increasing numbers of turtles even better nesting habitats. In quick action following the 2010 disaster, NFWF established the Recovered Oil Fund for Wildlife to help protect endangered sea turtles and thousands of migratory birds. One project involved the relocation of turtle eggs directly threatened by oil washing ashore.

Local turtle experts and NFWF staffers established key focal areas for conservation efforts that would mitigate the damage to turtles caused by the oil spill. At the top of the list: eliminating light pollution along nesting beaches.

"We knew sea turtles were being disoriented, and we had good evidence and guidance from researchers on what could be done with lighting," Godfrey said. "There were a variety of products already on the market, amber or red LEDs for example, that had already been reviewed and approved by state researchers as turtle-friendly lighting."

In addition to implementing conservation projects on a massive scale, new funding offered the opportunity to do something unprecedented in Florida, Godfrey said. Investments by various entities, including state and federal agencies and the spill-related Natural Resource Damages Trustees, had helped dim the lights at beaches along public lands. But, Godfrey said, there had never been a large, focused effort to help private property owners convert their lights.

"This was the first time that a pool of money was available for various groups to go out, meet with property owners, show them evidence of problem lights, show them the types of lights that would fix it, and then tell them that we're going to help them pay for it. All they had to do was let us do it. It was a really unique position to be in, helping big condos or resorts or businesses cover that expense, and providing the guidance to do it right."

These early projects, Godfrey said, provided ample evidence of success.

"Turtles were disorienting less, the lights last longer, and the people who live there actually like it. There's no security issue, and they're saving tons of money on exterior lighting bills. That first shot of funding showed that turtle-friendly light management is effective, it works, people like it, and the turtles respond the way we hoped they would."

On Anna Maria Island, Fox's group also found success. The group retrofitted commercial and residential private properties with lower-frequency, turtle-friendly lighting. New research into the latest technologies - LEDs, light shields and other technologies and techniques - helped establish the most

cost-effective practices for property owners to comply with nighttime lighting ordinances.

Working on private properties was key, Fox said, as homes often outnumber businesses along the state's Gulf Coast. Before those projects began, she added, property owners thought they'd have to pay thousands of dollars to comply with lighting ordinances.

"Once it was established that only a couple hundred bucks could make a huge difference, people were knocking down our door. People started to change their own properties, even without grant funding, to match their neighbors."

And now, after decades of NFWF-funded conservation work and the recent funding boosts, Fox's group and others like it around Florida are reporting incredible progress in addressing nighttime disorientations, one of the most daunting man-made threats to sea turtles. When Fox and local codes enforcement officers look over Anna Maria Island's beaches at night, they're astonished at how far they've come.

"In between the grant-funded buildings, everybody else has come into compliance," she said. "Now we have blocks, whole cities, with turtle-friendly lighting."

Keeping Sea Turtles in the Dark

Video provided courtesy of the National Fish and Wildlife Foundation.

[VIDEO TRANSCRIPT]

The life of a sea turtle is one that is just fraught with danger. The babies hatch out and you have this little frenzy of activity as these babies struggle to get up to the surface of the sand. Then they run the gauntlet down the beach; so many different types of animals want to eat them. And then they hit the water. And you'd think that would be fine, but it's just the same in the water.

My name is Michael Brothers. I'm the manager of the Marine Science Center in Ponce Inlet, Florida. The Marine Science Center's sea turtle hospital is the place where injured and sick sea turtles are brought in for rehabilitation, and of course, the best part, eventual release back to the wild. Since June of 2002 we've taken care of over 16,000 sea turtles.

We see a whole array of injuries and illnesses that cause an animal to come in to our hospital. So Luke, he came in with monofilament wrapped around his front flipper, to the point where it was just hanging off by a little bit of muscle and skin. So we just went in, anaesthetized him, cut off that last little part, and sewed it up so it would heal. We're hoping we'll be able to get him back out in the wild here in the next month.

Not only these larger sea turtles are in our hospital right now, but we also have some hatchlings. When hatchlings hatch out, they have a kind of built-in desire to head towards the light on the ocean. That's why they can get disoriented with other types of light, and it can cause them to go the other direction towards land. We know that these baby sea turtles are not going to survive if we just put them in the ocean. The only way to give them even a chance is to get them back where they're supposed to be at this stage in their life-- back out to the weed line. And the only way to the weed line is to get a boat and get out off shore.

It's wonderful for the Marine Science Center and for all of us who work here to be able to make a real difference. The estimates are that only one in 10,000 make it all the way to adulthood. So, we will at least give these three a chance. And hopefully one of these days in 20 or 25 years, these animals will find their way back to this beach, and we'll get a new generation from the females laying their eggs.

conservation

con · ser · va · ti

Definition

noun

1. the protection of natural resources such as soil, water, or forests from harm.

Water conservation is important for people's health.

Advanced Definition

noun

1. the act of preserving and protecting from loss, destruction, or waste.
2. the preservation of a resource, esp. a natural resource such as soil, water, or forests, from loss, pollution, or waste.

Spanish cognate

conservación: The Spanish word *conservación* means conservation.

These are some examples of how the word or forms of the word are used:

1. The Journey Through Hallowed Ground Coalition, an association of more than 100 **conservation** groups, wants to strike a balance between development and preservation.
2. Habitat destruction threatens Borneo's wildcats. Scientists have called for increased **conservation**, or protection, of the rain forest habitat on Borneo-the world's third largest island.
3. Around the world, thousands of animals are in danger of becoming extinct, or dying out. Luckily, **conservation** programs, including one called EDGE of Existence, hope to prevent that from happening.
4. According to Care for the Wild International, elephants need all the protection they can get. The wildlife **conservation** group recently released a report stating that poachers slaughter between 6,000 and 12,000 elephants each year.
5. Billions of dollars are spent in the U.S. alone to control invasive species each year. Tim Male, vice president of **conservation** policy at Defenders of Wildlife, says the country should do even more to fight nonnative species.
6. "Getting rid of zoos would be a tragedy for all animals," says Steve Feldman, senior vice president of the Association of Zoos and Aquariums. He says zoos play a major role in educating people about animals and promoting wildlife **conservation**.
7. Because of overhunting and habitat loss, tree kangaroos are endangered. In 2009, after Dabek and her team spent 10 years working with hunters and landowners on the Huon Peninsula, the community set aside more than 70,000 hectares (173,000 acres) of forest for **conservation**.
8. She wanted Houston to be called the "Energy **Conservation** Capital of the World." She started a "Bike to Work Day" to encourage people to drive less. Driving less means people use less gasoline. That means less carbon dioxide is released into the atmosphere.

development de · vel · op · me

Definition

noun

1. an important event.

   The president spoke about the latest developments in the war.

2. the act of building or working on something until it is done.

   The development of the new mall took several years.

Advanced Definition

noun

1. the process of developing or bringing to a completed state.

   A frog is called a tadpole during the early stage of its development.

   The development of the new highway took several years.

2. the state of being developed.

3. an event or happening of consequence.

   They will report on the latest developments in the war.

4. a group of houses or other structures, usu. built by the same person or company.

These are some examples of how the word or forms of the word are used:

1. Solar-powered cars have been in **development** for a long time, and many believe they are a viable solution to pollution.
2. It builds large apartment buildings or housing **developments** for people who cannot afford to live elsewhere. Sometimes there is not enough affordable housing for all the people who need it.
3. Scientists plot those changes on a timeline, starting with a chimpanzee-like ancestor and ending with modern humans. Toumai's humanlike face and chimp-sized brain suggest that the **development** of hominids was not so simple.
4. The Hoover Dam has been a key factor in the **development** of major American cities like Las Vegas and Los Angeles because of the availability of electricity it provides to those sections of the Southwestern states of the U.S.

5. Perhaps if concrete barriers had been in place, flooding would not have reached beach residences and apartment complexes so easily. These barriers are meant to mimic formations found naturally in nature, such as rock jetties, floodplains, brush, marshlands, and trees. These features have been polished away by residents and **developers**, hoping to create a more pristine living space right next to the ocean.

6. This research was also valuable in medicine. Pasteur was able to prove that germs in the body cause illnesses. He also discovered that animals could be resistant to certain diseases if they have been exposed to the disease in a very minute amount. This paved the way for the **development** of vaccinations. Vaccinations keep humans from contracting certain illnesses such as rabies, smallpox, and chickenpox.

Name: _____ **Date:** _____

1. What do sea turtle hatchlings rely on to make it safely to the sea after they hatch?

A. subtle, nighttime lighting cues

B. the loud roar of ocean waves

C. the scent of seaside air

D. the direction of the sun

2. What is one effect that artificial lighting near beaches has on sea turtle hatchlings?

A. It causes them to become scared of human activity as they make their way to sea.

B. It causes them to become disoriented and unable to make it safely to sea.

C. It causes them to burrow back into the sand in order to hide from the light.

D. It causes them to make it to sea more quickly, keeping them safer from predators on land.

3. Artificial lights near nesting beaches can be dangerous for adult female sea turtles who try to lay eggs on land. What evidence from the text supports this conclusion?

A. "Of all the man-made threats to sea turtles, artificial lighting near nesting beaches may be the most widespread and onerous."

B. "Bright lights can deter females from coming ashore at all. If they come ashore despite the lights, they can be lured away from the sea."

C. "Even a single bright light near a nesting site can cause all of the hatchlings on a given beach, or most of them, to head inland."

D. "Evidence of sea turtle disorientation along Florida's Atlantic and Gulf coasts can be heart-rending and grisly."

4. Conservationists have worked to reduce light pollution and increase the use of turtle-friendly lighting along beaches. What is one effect of these efforts?

A. The number of sea turtle disorientations has gone down.

B. The number of sea turtle nests has gone down.

C. The number of sea turtle disorientations has gone up.

D. The number of houses and buildings on Florida beaches has gone up.

5. What is the main idea of this text?

A. Many threats have led to sea turtles becoming endangered, including fishing bycatch, the loss of sea turtle nesting habitats, and artificial lighting near nesting beaches.

B. Conservationists have helped sea turtles in Florida escape predators in the ocean by relocating them dangerous areas to safer areas of the sea.

C. Conservationists have helped sea turtles in Florida avoid disorientation by reducing light pollution and increasing the use of turtle-friendly lighting along beaches.

D. Conservationists have recently become aware of the dangers facing sea turtles, and are spending more and more money to help save sea turtles from going extinct.

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