

SEA TURTLE HOMECOMING, CLASS OF 2010: A Proactive Coastal Conservation Agenda for Florida

NATIONAL WILDLIFE FEDERATION, FLORIDA WILDLIFE
FEDERATION, AND SEA TURTLE CONSERVANCY

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CONFRONTING GLOBAL WARMING

Report

Introduction



For the people who live near the Gulf of Mexico — and, indeed, for Americans everywhere — the catastrophic Deepwater Horizon oil spill during the summer of 2010 will be an event forever etched in our memories. It was a time of great uncertainty and fear about the plight of the region's coastal wetlands, beaches, and ocean waters and the many benefits that they provide for us all. But it also was a time in which our conservation ethic truly bloomed. One of the most compelling symbols of our love and concern for the species that share our coastal and marine systems was the unprecedented effort to relocate the nests of threatened and endangered sea turtles along the Gulf Coast to oil-free habitats on Florida's Atlantic Coast.

For sea turtles in the Gulf of Mexico, the Deepwater Horizon oil disaster could not have come at a worse time. During the peak summer months, beaches throughout the Gulf Coast host thousands of sea turtle nests with tens of thousands of eggs. Once hatched, the young sea turtles instinctively make their way into the sea, where they will live for several decades before returning to their natal beaches to nest, beginning the cycle anew. But with oil gushing into the Gulf and washing up on the region's wetlands and beaches, concern about the season's sea turtle offspring grew deep, galvanizing scientists, conservationists, and concerned citizens to coordinate a concerted strategy to excavate nests, transport and nurture the eggs, and then release tens of thousands of newly-hatched turtles into the Atlantic Ocean.

The joy of watching these hours-old sea turtles unwaveringly scurry into the dark ocean waters was well-earned confirmation that, when we put our minds to it, we can make a difference in the conservation of our natural world. But we cannot rest on our laurels. As news of the oil spill and its impacts has faded from the headlines and the thousands of volunteers who helped in the recovery effort have returned to their regular lives, many challenges remain, both on our coasts and in our oceans. Certainly, one must wonder: after hopefully surviving an onslaught of challenges at sea, what will the homecoming be like for these sea turtles 30 years from now as they return to Florida's shores? Will they find plentiful, healthy beaches free of artificial light, pollution, roads, and seawalls? Or will business-as-usual coastal development, coupled with the rapidly growing threats from climate change and sea-level rise, make our conservation successes today for naught?

The answers lie in whether we decide *now* to make the difficult but necessary choices to improve how we manage our coasts, our oceans, and our planet's climate. In this report, the National Wildlife Federation (NWF), Florida Wildlife Federation (FWF), and Sea Turtle Conservancy (STC) lay out a 4-part agenda that will require a strong and determined effort over the next few years to put coastal management in Florida on the right path. The decisions we make today on the following key actions *will* make the difference. Specifically, we can and must:

- 1. Uphold adequate funding and support** for the development and implementation of the Florida Beaches Habitat Conservation Plan and initiate a comprehensive reevaluation of the state's Coastal Construction Control Line Program and other coastal management policies.
- 2. Eliminate costly subsidies** that encourage inappropriate and harmful new construction and rebuilding in ecologically important and high hazard coastal areas by placing common sense limits on Florida's Citizens Property Insurance Corporation and National Flood Insurance Program coverage, and expanding the Coastal Barrier Resources System.
- 3. Enhance protection of less-developed coastal lands** by supporting targeted land acquisitions and increased incentives through a combination of public and private resources and programs, including Florida Forever, the federal Land and Water Conservation Fund, and ensuring that Deepwater Horizon oil spill funds are dedicated to coastal restoration.
- 4. Commit to meaningful strategies to combat climate change** by implementing recommendations established under Florida's 2008 Energy and Climate Change Action Plan and enacting strong federal energy and climate policy. This will significantly reduce the state's and nation's global warming pollution, promote cleaner, safer energy resources, and provide dedicated funding for safeguarding our natural systems and human communities in an era of climate change.

Ultimately, these actions will not only help ensure that the future for sea turtles and the many other species that depend on our coastal and marine habitats will thrive for generations to come, but they will foster safer communities, a flourishing economy, and a lasting recognition that our conservation actions truly can make a difference.



USFWS, Jennifer Strickland

Florida's Beaches – A Treasure for People and Sea Turtles Alike



As the saying goes, “life’s a beach” in Florida. Not only are the sandy beaches and coastal waters the crown jewel of the state’s recreation and tourism economy, but they are also important habitat for a plethora of fish and wildlife, especially for sea turtles. Among the hundreds of species that rely on our shores, sea turtles are true icons, and they are invaluable indicators of the interconnections between land and sea. In addition, what is good for sea turtles is good for beaches and beach users in Florida. Sea turtles and Floridians need the same things: dynamic and healthy beaches, pollution-free coastal waters, natural dunes, and the ecosystem services

these coastal systems provide.

Of the seven species of sea turtles that grace our planet, five are found in Florida, including the loggerhead, green, hawksbill, leatherback, and Kemp’s ridley. For three of these species, Florida’s beaches are the single most important nesting area in the United States. Overall, more than 90% of all sea turtle nesting in North America occurs on Florida’s beaches. There are as many as 50,000 to 85,000 loggerhead sea turtle nests each year in Florida¹ (each female lays about 3-6 nests per year), and several thousand green and leatherback sea turtle nests. The other two species, hawksbill and Kemp’s ridley sea turtles, nest very occasionally in

Florida but frequent Florida’s coastal waters year round. Like the other three species, they utilize Florida’s diverse marine habitats during migration, for forage and refuge, and as developmental habitats in their various life stages.

The unique behavior and complicated life history of sea turtles have made them tremendously popular among wildlife enthusiasts. Their ability to sense the earth’s magnetic field guides hatchlings away from the nesting beach and back again decades later to nest on beaches where they were hatched. They essentially fly through the ocean using their front flippers as stroking hydrofoils to propel them thousands of miles during migrations. Giants among sea turtles, leatherbacks can reach maturity at six to ten years, and are the deepest diving reptile on the planet. Loggerheads and greens may not reach reproductive age until two to three decades after emerging from their nest.

From late spring through summer, people from across the country come to Florida to take part in popular nighttime turtle nesting walks for a chance to view these special creatures. Many may witness hundreds of newly hatched half-dollar-size loggerhead or green turtles instinctively scurry to the sea, facing a gauntlet of challenges few survive, before they are mature enough to breed and start the cycle again. Some lucky people walking along a Florida beach may even have a chance to see a leatherback sea turtle nearly the size of a Volkswagen Beetle emerge from the ocean at the very beach where she hatched, dig a nest in the sand, lay her eggs, and then make her way back to the water.

SEA TURTLES AND THE HEALTH OF OUR COASTS AND OCEANS

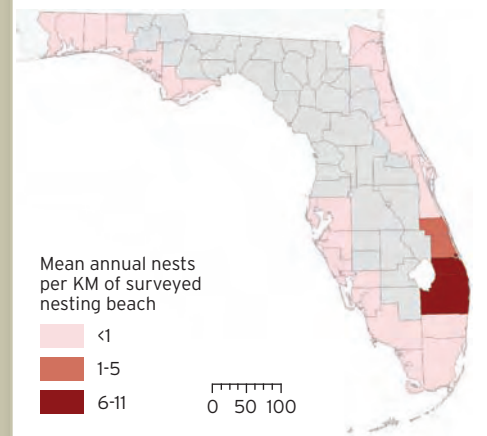
What few people may know is just how important these animals are to our coastal and marine ecosystems:^{2,3}

- **THE GREEN SEA TURTLE**, named for its greenish-colored body fat, is the only species of marine turtles that forages exclusively on plants as adults. Their favorite food is seagrass, and as they graze, green sea turtles help keep Florida's important seagrass beds healthy and productive.
- **THE LEATHERBACK SEA TURTLE** is the largest living turtle species in the world, measuring up to 6^{1/2} feet long and weighing as much as 2000 pounds. Leatherbacks primarily eat soft-bodied prey such as jellyfish. Perhaps not surprising given their size, a leatherback sea turtle can consume more than 400 pounds of jellyfish a day. This keeps jellyfish numbers in check, which in turn helps the region's finfish populations to thrive.
- **THE HAWKSBILL SEA TURTLE** plays a particularly important role in maintaining healthy coral reef ecosystems by eating predatory sponges, which can out-compete corals for space if their numbers get too large. With its colorful top shell (called a carapace), the hawksbill sea turtle is a beautiful addition to Florida's coral reefs and a favorite sight of divers and snorkelers.
- **THE LOGGERHEAD SEA TURTLE** is the most common sea turtle species in Florida. Loggerheads have large, powerful jaws that enable them to eat hard-shelled species, such as conchs and whelks, off the ocean floor. By breaking up the shells as they eat, loggerheads help deliver calcium to the marine ecosystem. As carnivores they play a critical role in the food chain. In addition, they support an array of up to 100 plants and animals that attach to their shells to ride through the world's oceans. The majority (80%) of loggerhead nesting in the U.S. occurs in just six Florida counties: Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward.
- **THE KEMP'S RIDLEY SEA TURTLE** is the rarest, smallest, and most limited in distribution of the sea turtles. A favorite foraging ground for Kemp's ridleys is along Florida's continental shelf, where they primarily eat crabs and other invertebrates, playing an important role in the coastal and marine food web.

Sea turtles also play a special role in the beach ecosystem by transporting nutrients and energy from the marine environment to terrestrial ecosystems through their eggs and hatchlings.⁴ Even before sea turtle eggs hatch, they provide a source of nitrogen, phosphorus, and potassium to the beach system. Once hatched, the remaining shells and embryonic fluid also provide nutrients, as do any unhatched eggs as they decompose. Studies have shown that these nutrients are particularly important for dune vegetation.⁵ Finally, sea turtle eggs and hatchlings provide a source of food for a number of beach-combing predators, including raccoons, foxes, gulls, crows, crabs, and other creatures.

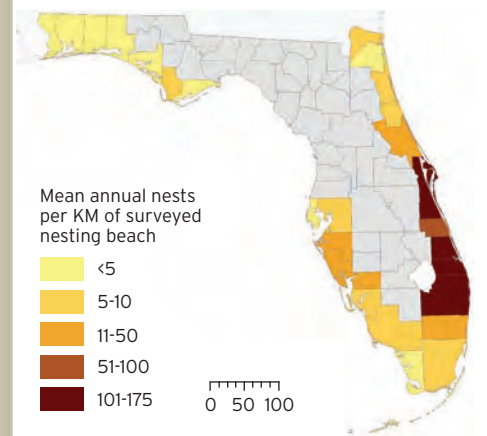
2005 - 2009 *Dermochelys Coriacea* (Leatherback) Nesting by County

Mean annual nests per kilometer of surveyed nesting beach



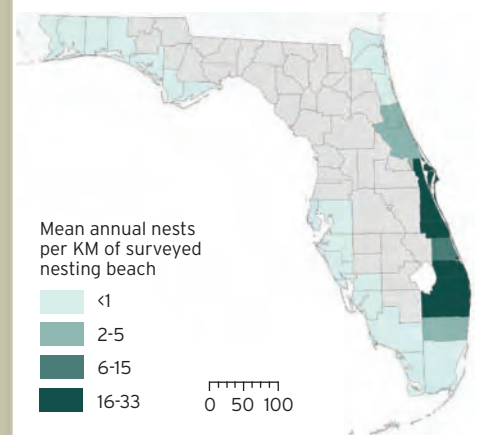
2005 - 2009 *Caretta Caretta* (Loggerhead) Nesting by County

Mean annual nests per kilometer of surveyed nesting beach



2005 - 2009 *Chelonia Mydas* (Green Turtle) Nesting by County

Mean annual nests per kilometer of surveyed nesting beach



Maps Data Source: Florida Fish and Wildlife Conservation Commission, Statewide Sea Turtle Nesting Beach Survey Program

The Struggle to Survive

Unfortunately, sea turtles around the world have been beleaguered by many stressors related to human activities, with the most recent being the challenges they face under a changing climate. Although they have outlived the dinosaurs, and evolved for over 250 million years,⁶ they are now threatened with possible extinction in some regions of the world and drastically reduced numbers in other areas due to human activities. Today, four of Florida's sea turtle species, including leatherback, green, hawksbill, and Kemp's ridley, are currently listed as "endangered" under the U.S. Endangered Species Act (ESA), and loggerheads may soon be reclassified from "threatened" to "endangered" given their generally decreasing nesting numbers and growing threats they, too, are facing.⁷

Despite considerable conservation efforts, Florida's sea turtles face significant stressors throughout their life cycle, both on land and in the ocean:

THREATS ON SHORE

Loss of habitat. The natural beauty and bounty that the Florida coast has to offer are the primary reasons so many people call Florida home and so many more come to the state each year to visit. Florida's sandy beaches are especially popular among residents, tourists, and developers, which has resulted in seemingly relentless coastal development. Florida allows development up to and on top of the frontal dunes, even on "critically eroding" beaches (which the Florida Bureau of Beaches and Coastal Systems defines as areas of the shoreline where "natural processes or human activity have caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost").⁸ All too often, this development has been detrimental to the very beaches that draw people to the coast in the first place by drawing

a line in the sand that is likely to be defended at almost any cost.

By their nature, beaches are dynamic systems, advancing and retreating over time. In Florida, these natural processes have been disrupted by development, navigation inlets, and other human activities. Of the 1250 miles of Florida coastline, 825 miles are sandy beaches. Nearly half of those beaches are currently considered to be critically eroded.⁹ Most of this erosion is attributable to the state's engineered navigation inlets and the jetties used to stabilize those inlets, which interrupt the natural flow of sand along beaches thereby causing sand to accumulate in the inlet channel, against jetties, or within shoals at the mouth and interior of the inlet. Storms and inappropriate coastal development also contribute to shoreline retreat.

Beach armoring. As shoreline development in Florida continues to grow despite eroding beaches, property owners are increasingly compelled to try to defend their homes and businesses with seawalls, revetments and other armoring structures, and massive offshore rock piles called breakwaters. Permanent or "hard" armoring structures reduce a beach's natural resilience to respond to coastal storms by diminishing the beach/dune system's ability to retreat, feed downdrift beaches, and to recover from an erosive storm event.¹⁰ Armoring may also increase the vulnerability of adjacent unarmored properties by reflecting wave energy and increasing erosion in front of and around the structures, which only increases the demand for additional structures.

Shoreline armoring is perhaps the greatest immediate and direct threat to Florida's sea turtle nesting habitat. Armoring structures often force sea



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turtles to nest in sub-optimal areas closer to the shoreline, where the nests are more vulnerable to inundation by salt water.¹¹ Studies also suggest that fewer females tend to emerge onto beaches that front seawalls compared to adjacent unarmored beaches, and those that do emerge near seawalls are more likely to return to the ocean without nesting.¹² In addition, seawalls and other armoring structures exacerbate beach erosion, which can ultimately lead to the permanent loss of nesting habitat. Surprisingly, there is currently no comprehensive inventory of the full extent of shoreline armoring on Florida's coast. Accordingly, it is extremely difficult — if not impossible — to assess the full extent of the threats they currently pose to sea turtles, let alone those likely from any additional armoring in the future. Understanding the cumulative impacts of coastal armoring is necessary to ameliorating the threat they pose to natural beach processes, and the sea turtles and other fish and wildlife species that depend on them.

Artificial light. Artificial lighting — even flashlights — illuminating the beach at night can cause real problems for both nesting sea turtles and their hatchlings.¹³ During nesting season, too much light on the beach at night can increase the number of “false crawls,” whereby females that have emerged from the ocean to lay their eggs either simply turn around and go back to sea or abandon their nesting attempt. For the newly hatched turtles, which use the light of the broad ocean horizon as an important cue to help guide them toward the sea, artificial light can cause them to become disoriented and crawl aimlessly in circles or head inland instead of down to the surf. If they remain on the beach for too long, they face a much greater risk of being eaten by predators or dying of exhaustion or starvation.

Predation. In general, predation of sea turtles, particularly their eggs and hatchlings, is part of nature. Many species of fish and wildlife rely on turtles as sources of food, from crabs and birds to foxes and sharks. However, as human development has encroached adjacent to beaches, some predators — both native and non-native — have dramatically increased their numbers. For instance, having unsecured trash cans near the beach, or leaving trash on or near the beach, can invite hungry raccoons, skunks, rats, and dogs, which ultimately may find and destroy nearby sea turtle nests. In fact, raccoons alone destroy many thousands of sea turtle eggs in Florida each year.¹⁴

THREATS IN THE OCEAN

Harmful fishing practices. Once sea turtles make it to the ocean, their lives are by no means secure. For decades, harmful fishing practices have been a major source of mortality for juvenile and adult sea turtles around the world.¹⁵ Historically, one of the major culprits has been shrimping, which at one time killed tens of thousands of sea turtles a year by drowning when caught in shrimp nets.¹⁶ In an effort to address this significant threat, the National Oceanic and Atmospheric Administration (NOAA) worked with the shrimping industry to develop Turtle Excluder Devices (TEDs) — a special cage with a trap release door designed to allow shrimp to flow into trawler nets while excluding sea turtles. Regulations now help ensure the use of TEDs in most U.S. waters, and U.S. officials have also been working with the international community to increase their use by other countries.¹⁷ However, while sea turtle mortality in the U.S. shrimp trawl fishery has been significantly reduced since the late 1980s, problems remain. Even with proper TED use, multiple recaptures in areas of intense fishing can be fatal to sea



turtles. In addition, enforcement of TED laws remains problematic in some areas.¹⁸

Longline fishing is also a major concern. This commercial practice of fishing employs the use of thousands of baited hooks on lines up to 40 miles long.¹⁹ Although research has found that longline bycatch rates of sea turtles is relatively low, the sheer extent of longline gear in our oceans suggests that the overall impact is substantial.²⁰ It is estimated that longline encounters injure or kill tens of thousands of sea turtles around the world each year.²¹ In U.S. waters, concerns over longline bycatch of sea turtles, especially loggerheads, have led to changes in some fishing practices, including the increased use of alternative gear and bait.²² However, recent studies indicate that the numbers of sea turtles taken as bycatch in some longline fisheries, including the Gulf of Mexico Commercial Reef Fishery, have far exceeded the numbers deemed acceptable by the National Marine Fisheries Service (NMFS), prompting a number of new management strategies.²³ Ongoing monitoring efforts and assessments of the cumulative impacts of harmful fishing practices are necessary to ensure that new and existing regulations are as effective as possible.

Marine pollution and debris. A plastic bag floating in the water can

look like a jellyfish to a hungry sea turtle. While it may seem to some people that dumping trash and pollution into our vast oceans is just a drop in the bucket, marine pollution and debris can create havoc for fish and wildlife. It is estimated that our oceans now contain more than 100 million tons of plastic debris, much of which has been inadvertently washed into the sea from our beaches and through storm drains.²⁴ One of the reasons sea turtles are particularly susceptible to harmful debris is that they can't regurgitate an object once it is ingested. In some cases, the debris can decompose and create gases in the turtle's body, causing it to float and lose the ability to submerge — a phenomenon sometimes referred to as "bubble butt."

Oil spills. The potential for oil to impact sea turtles and their habitat is evidenced by the presence of nearly 4,000 oil and gas platforms in the Gulf of Mexico off the coasts of Texas, Louisiana and Mississippi, as of 2006.²⁵ Oil spills threaten sea turtles at every stage of their life cycle: from egg to adulthood.²⁶ Even small amounts of oil on sea turtle eggs can prevent them from hatching. If hatchlings do emerge on oiled beaches, they can suffer surface exposure to toxic oil as they make their trek toward the water. Once in the ocean, young turtles spend much of their time on the surface where they are likely to run into an oil slick. Oil can also smother Sargassum seaweed or seagrass beds which provide important habitat for young turtles. Adult sea turtles are prone to ingesting oil, mistaking it for food, and exhibit little avoidance of oiled waters.

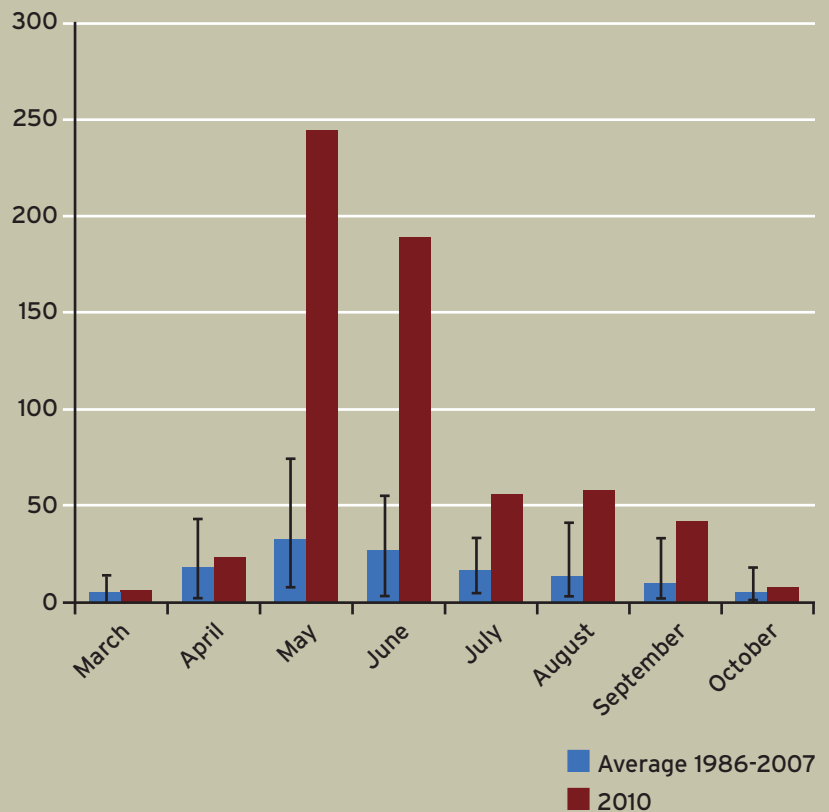
The tragic April 2010 explosion of BP's Deepwater Horizon oil rig resulted in 4.2 million barrels of oil spilling into the Gulf of Mexico.²⁷ Sadly, by November 2010 more than 600 sea turtles were found dead in the oil spill area.²⁸ The rate of sea turtle

strandings (dead or alive turtles found stranded along the shoreline) in the oil spill area averaged greater than six times the long-term average (1986-2007) through August 15th (see Figure 1).²⁹

In an attempt to save at least as many of these threatened and endangered animals as possible from the impacts of the oil spill, conservation organizations and volunteers worked

with U.S. Fish and Wildlife Service (FWS) and the Florida Fish and Wildlife Conservation Commission (FWC) during the summer's peak nesting season to relocate thousands of sea turtle eggs in the vicinity of the spill to Florida's east coast. Impacts to turtle's prey species and to the habitats turtles rely on, such as the hundreds of thousands of acres of seagrass beds around Florida's Gulf Coast are still unknown.

FIGURE 1. MONTHLY SEA TURTLE STRANDINGS IN 2010 COMPARED TO LONG-TERM AVERAGES



The monthly sea turtle strandings in the oil spill area were considerably higher than long-term monthly averages, even exceeding the maximum number of stranded sea turtles ever reported for the months of May through September.³⁰ In March, prior to the spill, sea turtle strandings were average and in October 2010 strandings returned to average levels after the spill was capped and oil continued to degrade. Sea turtle strandings were also caused by drowning in commercial fishing nets and other causes.

*The black error bars represent the maximum and minimum number of strandings over the 22 years of records.

GLOBAL WARMING: THE LAST STRAW?

The many existing stressors to sea turtles make them all the more vulnerable to global warming and associated climate change, which has become the defining conservation issue of the 21st century. Changes in climate are increasingly evident:

- The average temperature in the southeastern United States has risen about 2° F since 1970.³¹
- Tropical and subtropical sea surface temperatures increased by an average of 0.5° F between the 1950s and 1990s, and this trend is projected to continue.³²
- The destructive potential of Atlantic hurricanes has increased since 1970, correlated with an increase in sea surface temperature. In addition, an increase in average summer wave heights along the U.S. Atlantic coastline since 1975 has been attributed to a progressive increase in hurricane power. The intensity of hurricanes is likely to increase during this century with higher peak wind speeds, rainfall intensity, and storm surge height and strength.³³
- Even with no increase in hurricane intensity, coastal inundation and shoreline retreat are expected to increase as sea-level rise accelerates, which is one of the most certain and most costly consequences of climate change.³⁴ Recent estimates suggest that global sea level will rise as much as 3.74 feet by the 2090s.³⁵
- Higher concentrations of carbon dioxide (CO₂) in the atmosphere are causing acidification of ocean waters. If CO₂ concentrations continue to increase at the current rate, the oceans will become relatively more acidic (will have a lower pH) than they have been in millions of years.³⁶



These changes will have a profound impact on Florida's already beleaguered sea turtles and the coastal and marine habitats essential to their survival:

Higher average air temperatures.

Sea turtle clutches are highly sensitive to temperature.³⁷ The optimal temperature range for successful incubation is between 77-95° F. The sex of turtle hatchlings depends on the temperature — embryos incubating at high temperatures (above about 88° F) are more likely to become females and those at lower temperatures (below about 82° F) are more likely to become males. If average air temperatures along Florida's coasts increase due to climate change, studies suggest that populations of loggerhead sea turtles could become almost all female in some areas.³⁸ Unless nesting areas farther north continue to produce sufficient numbers of male sea turtle offspring, scientists worry that there could be a reduction in the reproductive success of loggerheads in the western Atlantic as global warming continues. In areas where average temperatures are already

close to the upper threshold for incubation, including southern Florida, increased temperatures could also lead to high rates of mortality.

Higher ocean temperatures.

Warmer ocean temperatures affect sea turtles both directly and indirectly. Changes in ocean temperatures provide an important cue for sea turtle behavior such as nesting and migration. In fact, changes in sea turtle behavior in some areas have sent a strong signal that global warming may already be having an impact on the animals. For example, researchers have discovered that loggerhead sea turtles are laying their eggs 10 days earlier than they did 15 years ago, a trend that corresponds with a 1.4° F increase in the average May sea surface temperature over the same period.³⁹ Higher average ocean temperatures are also likely to affect sea turtles indirectly through changes in available food sources. Increased sea surface temperatures have been known to contribute to episodic die-offs of sponges and seagrasses, which are important foods for hawksbill and green sea turtles, respectively.^{40,41}

More-intense storms. Just as tropical storms and hurricanes can have a profound impact on Florida's coastal communities, major storms can devastate sea turtle nesting sites. If a sufficient number of alternative sites are available, the ultimate impact on sea turtle populations may not be significant. However, as the number of optimal sites declines, so too does the resilience of sea turtles to withstand extreme weather events. Several studies suggest that cyclical loss of nesting beach and decreased hatching success could occur with greater frequency, although the impacts are likely to vary by species and location.^{42,43,44,45,46} An increase in storm frequency and intensity will also result in increased erosion and consequently more coastal armoring to protect structures.

Sea-level rise. Accelerating sea-level rise will continue to have a significant impact on Florida's sea turtle nesting

beaches, particularly in areas where existing or future coastal development and shoreline armoring reduce the natural resilience of beach habitat to recover from storms and extreme high tides. Even at the lower range of projected sea-level rise for the coming decades, Florida will experience increased beach erosion and associated shoreline recession.⁴⁷ In 2006, NWF and FWF modeled the potential impacts of sea-level rise at a number of coastal sites in Florida, including some key sea turtle nesting areas along the state's central Atlantic Coast. The study found that parts of the region could see a 49-80% decline in the area of ocean beach under a relatively moderate 15-inch rise in sea level, which is well within the range projected during this century.⁴⁸

Ocean acidification. Acidification of ocean waters is eroding the basic mineral building blocks for the shells

and skeletons of calcareous, reef-building organisms such as shellfish and corals, as well as a number of important microorganisms that are a foundation for the marine food web.^{49,50} Although scientists are still in the early stages of understanding what the consequences of ocean acidification will mean for marine ecosystems, the implications for the health of our oceans and the species they support could be dire.⁵¹ Among the systems that appear at greatest risk are coral reefs, which are important forage areas for hawksbill sea turtles.⁵² Some studies suggest that a decline in the health of coral reefs could lead to a comparative advantage for predatory sponges, which in turn could benefit hawksbills.^{53,54} However, research has also found that, like corals, sponges are vulnerable to higher ocean temperatures and could ultimately face declining populations as a result of global warming.⁵⁵

A Proactive Coastal Conservation Agenda



USFWS, Bonnie Straw

Through our actions, we can improve the outlook for sea turtles. After having existed on earth for millions of years, their future now depends on us. It would be a tragedy if our children never experience the thrill of witnessing one of these prehistoric creatures slowly crawling out of the ocean on a warm moonlit night to lay eggs for its own future generations.

While there are many things that individuals, communities, and our government can do to address the numerous threats to sea turtles, the most important actions will require collective foresight, the right investments, and determination. Despite the best intentions and efforts

of people in Florida and across the country who have been tirelessly working to restore and protect sea turtles and their habitats, it seems that every step forward is met with two steps back. Ongoing pressures, from coastal development and commercial fishing to continued dependence on fossil fuels to meet our energy needs, put the short-term economic gains that we associate with these activities above the long-term stewardship of the natural systems that sustain us all. Indeed, these need not be mutually exclusive endeavors, but achieving both will require a more holistic way of thinking about how we manage our coasts, our oceans, and our climate.

Action 1.

UPHOLD ADEQUATE FUNDING AND SUPPORT FOR THE DEVELOPMENT AND IMPLEMENTATION OF THE FLORIDA BEACHES HABITAT CONSERVATION PLAN AND INITIATE A COMPREHENSIVE REEVALUATION OF THE STATE'S COASTAL CONSTRUCTION CONTROL LINE PROGRAM AND OTHER COASTAL MANAGEMENT POLICIES.



Today, Florida has a tremendous opportunity to make fundamental and important changes in how it manages coastal development by capitalizing on crucial protections under the U.S. Endangered Species Act (ESA). The development of a comprehensive Florida Beaches Habitat Conservation Plan (FBHCP) is an important step in ensuring that coastal development activities regulated under Florida's coastal management policies, particularly the Coastal Construction Control Line Program, protect the health and well-being of coastal communities while at the same time protecting the beach and doing as little harm as possible to sea turtles and other ESA-listed species.⁵⁶

The Coastal Construction Control Line (CCCL) Program is a key element of Florida's coastal management policy. It was established in 1978 to preserve and protect the state's

beach/dune system from imprudent construction and still provide reasonable use of private property.⁵⁷ The design and placement of construction seaward of the CCCL, which corresponds to the landward reach of a 100-year storm surge, is regulated by the Florida Department of Environmental Protection (DEP) and authorized by statute. Under the CCCL Program, DEP's Bureau of Beaches and Coastal Systems issues permits for activities (including new construction and rebuilding, beach berm and dune restoration, post-storm emergency permitting activities, coastal armoring, public infrastructure, and beach cleaning activities) that may impact sandy beaches in the 25 Florida counties that have a CCCL and participate in the program.⁵⁸

By law, DEP must address the potential impacts of these activities on sea turtles when considering

whether or not to grant CCCL permits. In some cases, however, unintentional (incidental) impacts (take) to federally-listed threatened and endangered species may occur under otherwise lawful activities — an event defined under the ESA as "incidental take." Under the ESA, anyone must obtain a permit if their otherwise lawful activity will result in the incidental take of an ESA listed species, like sea turtles. The FWC evaluates activities proposed for CCCL permits to determine whether there is a reasonable likelihood of incidental take in regards to sea turtles. If so, applicants must submit an application for an Incidental Take Permit (ITP) to the FWS. The ITP requires that a Habitat Conservation Plan be developed by the applicant and approved by FWS. In this context, the purpose of the HCP is to minimize and mitigate the impacts of permitted activities on sea turtles or other listed

species to the best extent possible.

To date, however, the ITP and HCP development for ESA-listed coastal species in Florida has been localized, piecemeal, time consuming, and cumbersome. Currently, there are 6 counties in Florida that have existing or pending ITPs and HCPs for a variety of activities impacting coastal species, including sea turtles. One major problem with this piecemeal approach is that the potential cumulative statewide or regional impacts of activities that might be permitted under the CCCL Program are likely to be underestimated or missed altogether. For example, while one seawall proposed by a property owner may have a minor impact on the nesting beach, the cumulative impact of miles of seawalls can destroy long stretches of nesting beach and render the area unsuitable for nesting. Similar harmful

cumulative impacts arise from beach front lighting, beach raking and cleaning, and other statewide CCCL permitted activities. Furthermore, given the continuing pressures for coastal development in Florida, the instances of take are expected to increase. The DEP has therefore decided to pursue a federal ITP to protect the state from liability resulting from incidental take that might result from its actions. This requires the development of a statewide HCP. The DEP has determined that the best approach is to create a single, wide-ranging HCP that will take a proactive approach to addressing cumulative impacts to listed species from all coastal activities regulated by the CCCL Program.⁵⁹ The culmination of this endeavor is the FBHCP.

While the details of the Plan are still

under development, the FBHCP will help ensure local governments and private property owners remain in compliance with the ESA while eliminating the need to pursue local or individual ITPs.⁶⁰ For county and local governments, the FBHCP will also streamline the CCCL permitting process and improve the consistency of permitting requirements throughout the state. Continued funding and support for the development of this Plan should be a priority for Florida.

In addition to the development of the FBHCP, a number of changes in the CCCL Program are also warranted. The laws and rules governing beachfront development are complicated. Several recommended changes to the CCCL are listed here. However, a complete reevaluation of the program should be undertaken with the goal of enhancing the long-term protection of the coastal system and decreasing the loss of life and property along the shoreline.

■ **The process of resetting the CCCL after major storm events must be streamlined.** In principle, the CCCL should be periodically reevaluated after major erosive storm events to ensure that the regulatory line is functioning as intended to protect property and the beach/dune system. When the CCCL is deemed inadequate due to coastal erosion, it should be reset landward. In practice, however, this process takes several years, and between the time the state determines the line to be inadequate and the time it is reestablished farther landward, many homes may be constructed and shorelines may be armored in these high hazard areas without the necessary regulatory oversight of the CCCL Program.

■ **Revise provisions under the 30-year erosion rule.** While the



Action 2.

CCCL Program generally prohibits construction seaward of the 30-year “erosion projection line” (the projected location of the shoreline in 30 years based on historical erosion data), there are notable exceptions for shore protection structures, piers, intake/discharge structures, and, most importantly, single-family homes. These exceptions actually allow the building of new structures even farther seaward than the existing established line of buildings. There are a number of needed changes to the 30-year erosion projection rule that could enhance the protection of the beach and limit construction on those lands that are projected to be gone in 30 years.

- **Incorporate climate change into all aspects of the state’s beach management policies and particularly in the CCCL Program.** The CCCL Program does not take sea-level rise and more extreme storms due to climate change into consideration, which in all likelihood will render the current 30-year erosion line ineffective in its limited ability to restrict high-risk shoreline development. Equally troubling is that the state’s beach rebuilding policies (renourishment) also fail to address climate change.

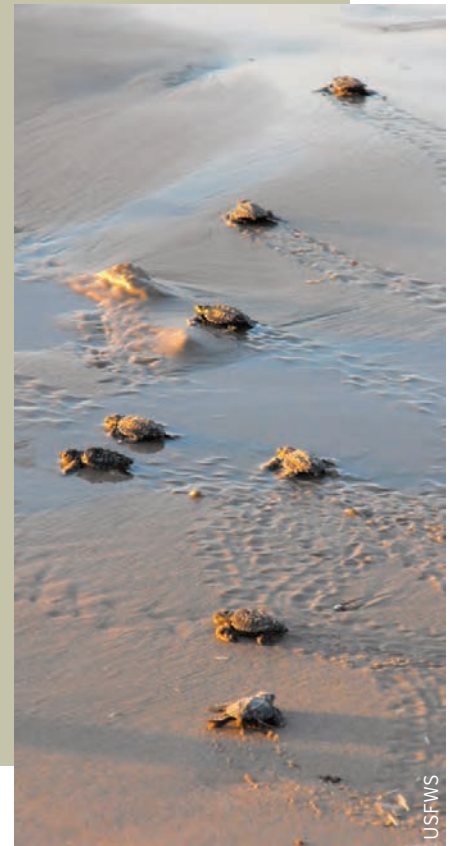
- **A number of other policy changes are warranted.** Establishing construction setbacks or dune conservation zones to better protect dunes on critically eroding beaches and changes to the overly permissive armoring laws are needed in order to better protect beaches and restore the natural functioning of dune systems. There should also be limits on the current CCCL policy that allows building up to the seaward-most line of construction and rebuilding on the same location adjacent to an eroding beach after structures are destroyed by hurricanes and storms.

ELIMINATE COSTLY INCENTIVES FOR INAPPROPRIATE AND HARMFUL NEW CONSTRUCTION AND REBUILDING IN ECOLOGICALLY IMPORTANT AND HIGH HAZARD COASTAL AREAS BY PLACING COMMON-SENSE LIMITS ON FLORIDA’S CITIZENS PROPERTY INSURANCE CORPORATION AND NATIONAL FLOOD INSURANCE PROGRAM COVERAGE AND EXPANDING THE COASTAL BARRIER RESOURCES SYSTEM.

A major program that promotes ill-advised construction in coastal high hazard areas fronting vulnerable and eroding beaches is the state-financed Citizens Property Insurance Corporation (CPIC). While the primary focus of the CPIC is to provide state-subsidized coverage for wind damage from storms, insurance coverage is provided regardless of whether development is thousands of feet from shore or adjacent to the most seaward line of dunes on eroding beaches. In addition, CPIC coverage is provided to builders, investors, and homeowners along the coast regardless of the historical erosion rates, storm history, or frequency of repeat claims. It is even provided to people that build seaward of the 30 year erosion line. Currently there is no linkage between this subsidized insurance in high hazard coastal areas and the CCCL Program that permits building in these areas. For example, there could be incentives for reduced premiums

through prudent development such as building as far landward as possible on a coastal lot.

In specific situations, CPIC coverage may actually be working to undermine federal and state efforts to protect coastal resources, such as those offered by the Coastal Barrier Resources Act (CBRA). CBRA, which was originally authored by U.S. Representative Thomas Evans, Jr., and Senator John Chafee and enacted in 1982, set aside millions of storm-prone acres on vulnerable barrier islands in the John H. Chafee Coastal Barrier Resources System (CBRS).⁶¹ The CBRS incorporates more than 677,000 acres of barrier islands and wetlands in Florida and more than 3 million acres nation-wide. Many of these barrier islands and related coastal lands provide important nesting beaches for sea turtles; they are habitat for numerous other fish and wildlife species; and they are the first line of defense for coastal communities



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against erosion and storm surges. In order to minimize loss of life, stop wasteful expenditures of federal funds, and protect coastal resources, CBRA denies federal subsidies such as flood insurance to development projects on CBRS lands. According to the FWS, the CBRS already has saved American taxpayers more than \$1 billion dollars since 1983. However, Florida's CPIC coverage is provided for development in CBRA zones irrespective of consistency with the federal prohibition. This is a practice that should be repealed. Further, the protective CBRS should be expanded in light of the growing threats from climate change and the need to reduce



associated risks to coastal communities.

Similarly, the National Flood Insurance Program (NFIP), implemented by the Federal Emergency Management Agency (FEMA), enables property owners to acquire insurance for properties in high hazard, flood-prone areas. Established in 1968 with passage of the National Flood Insurance Act, the NFIP is designed to ameliorate heavy expenditures of federal disaster relief by authorizing flood insurance that would otherwise be prohibitively costly or unavailable. Though participation in the NFIP is technically voluntary, virtually every flood-prone locale in the United States applies for eligibility and participates in the program. The reason is straightforward: failure to enroll in NFIP can seriously diminish financial opportunities and property values for community residents. For example, the National Flood Insurance Act states that other federal agencies such as the Federal Housing Administration and Small Business Administration may not provide loans to property owners in non-NFIP communities. Additionally, without NFIP participation, mortgages from federally insured or regulated banks as well as Veterans Administration loans are unavailable where applicants secure assistance based on property or structures located within floodplain areas. FEMA also sets eligibility rules for communities that want to participate in the flood insurance program — rules that currently fail to limit development in high risk floodplains and fail to consider the impacts of development on environmentally sensitive lands, including key habitat for ESA-listed sea turtles. Instead, the NFIP continues to promote new construction and rebuilding in coastal areas at great expense to the taxpaying public. On a national level, flood damages currently cost an alarming \$6 billion per year — triple what they were in the early 20th

century (in adjusted dollars). A significant portion of these losses are from properties with repetitive flooding histories. In 1995, Florida ranked sixth among states in NFIP repetitive-loss properties (those with at least two flood insurance claims paid within a 10-year period since 1978). At the time, Florida had 3,087 such properties, having cost the NFIP \$95.5 million in claims payments.⁶³ As of September 30, 2009, Florida had 16,253 repetitive loss properties totaling \$1.33 billion, the vast majority of which were in coastal counties.⁶⁴ Sensible limits on repeat claims along the coast could be implemented for both the federal and state subsidized insurance programs.

In July 2010, NWF and FWF filed a lawsuit against FEMA for failing to protect endangered sea turtles from the impacts of its NFIP on sea turtle habitat. The lawsuit, which builds on the successes of three previous suits to protect coastal and floodplain species listed under ESA in the Florida Keys, the Puget Sound watershed, and along Oregon's streams and rivers, seeks to ensure that coastal development receiving federally subsidized flood insurance occurs in a manner that is protective of Florida's sea turtles. Under the ESA, FEMA has an obligation to consult with FWS and NMFS over impacts of its actions on threatened and endangered species and to ensure that such actions do not jeopardize listed species. NWF, FWF, and FEMA recently agreed to a settlement whereby ESA consultation will occur between FEMA and FWS and NMFS. This process, once complete, will likely result in a "biological opinion" from FWS (which has primary responsibility for conservation and recovery of sea turtles on nesting beaches) that will require that FEMA implement "reasonable and prudent alternatives" that protect sea turtles from the impacts of development or otherwise demonstrate that the NFIP is protecting sea turtles.

Action 3.

ENHANCE PROTECTION OF LESS-DEVELOPED COASTAL LANDS BY SUPPORTING TARGETED LAND ACQUISITIONS AND INCREASED INCENTIVES THROUGH A COMBINATION OF PUBLIC AND PRIVATE RESOURCES AND PROGRAMS, INCLUDING FLORIDA FOREVER, THE FEDERAL LAND AND WATER CONSERVATION FUND, AND ENSURING THAT DEEPWATER HORIZON OIL SPILL FUNDS ARE DEDICATED TO COASTAL RESTORATION.



While the majority of Florida's coastline has been developed, it is not too late to restore and protect natural, dynamic beaches, dunes, wetlands, and other coastal habitats across the state. In reality, many of the ecological processes that these systems support will make for much safer, healthier, and more resilient coastal communities than continuing to spend increasing amounts of scarce resources on man-made alternatives such as seawalls and perpetual repetitive beach nourishment projects, particularly given the growing threats from climate change. They also will help ensure that the sea turtles and other fish and wildlife species that call our coastal and marine ecosystems home will thrive for generations to come. There are numerous planning tools and climate change adaptation strategies available to maximize opportunities to protect the beach/dune system, coastal wetlands, and other important coastal resources in an era of rising seas and stronger storms.

One of the primary ways in which Florida can protect its remaining natural coastal lands is through acquisition programs. For example, Florida's landmark land conservation program, Florida Forever, has helped to protect 2.5 million acres of environmentally sensitive lands, including 70,000 acres within coastal watersheds and 6,600 acres of fragile coastal resources.⁶⁵ Originally designed to run through 2010, Florida Forever was renewed at \$300 million per year through 2020; however, the Legislature defunded the program in 2009 and provided only meager funds in 2010. We must work to renew legislative support for the program. At the federal level, the Land and Water Conservation Fund (LWCF) designates a portion of receipts from offshore oil and gas leases for acquisition and conservation of state and federal lands. Since its establishment more than 40 years ago, LWCF has added millions of acres to public lands — including Canaveral National Seashore, one of Florida's premier sea turtle nesting

habitats. While LWCF is authorized at \$900 million annually, only once has it reached that level through the annual appropriations process. Recently, funding for LWCF has dramatically declined — despite record levels of offshore oil revenues. Opportunities for additional protections through these and other state or local programs abound, but it will require a firm commitment from the Florida Legislature, Floridians and Congress to continue to provide dedicated funding for such efforts.

Another significant source of funding for coastal protection and restoration in Florida and throughout the Gulf Coast region will come from proceeds associated with the Deepwater Horizon oil spill in the Gulf of Mexico. This should include dedicated funds from any civil penalties under the Clean Water Act, in addition to those required under the Oil Pollution Act.⁶⁶ This unprecedented disaster underscored for all Americans just how important a healthy Gulf of Mexico is for our society. It is critical



that we focus not only on recovery from oil spill damages but that we redouble our efforts to restore and protect the ecological integrity of the Gulf in light of the innumerable challenges facing the region. In addition, local, state, and federal agencies should expand incentives for private acquisitions by land trusts, establishment of conservation easements, and transferable development rights, which will be increasingly important tools for coastal conservation as human population growth in the region continues.⁶⁷

Even in lean economic times, with

budgets stretched thin by competing needs, it is important to recognize that the ultimate cost of acquiring coastal lands and maintaining them for the public good is likely to be far more cost effective in the long-term than having to pay more and more funds to maintain coastal armoring structures, subsidize beach nourishment, and provide taxpayer-financed insurance coverage to rebuild repetitive-loss properties in areas that are likely to be increasingly threatened by flooding and erosion. A number of factors can play a role in identifying priority areas for strategic acquisition and conservation.

A recent study conducted for the U.S. Environmental Protection Agency (EPA) identified low-lying coastal lands across the Atlantic Coast that are least-likely, most-likely, or certain to be protected from erosion and inundation in the coming decades, based on factors such

as current and foreseeable development trends, conservation status, and property values relative to the cost of shoreline protection (e.g., armoring and beach nourishment).⁶⁸ The challenge is identifying the best candidates for additional conservation investments. Priority areas likely lie somewhere in-between those areas certain to be protected from coastal erosion and sea level rise (e.g., densely developed urban areas and/or designated growth areas) and those that face little or no pressures for shoreline hardening (e.g., private lands owned by conservation groups, lands with conservation easements that preclude coastal armoring, and state parks, National Parks and Wildlife Refuges). This might include areas with relatively light density development and limited public infrastructure, or those adjacent to environmentally sensitive lands.

Action 4.

COMMIT TO MEANINGFUL STRATEGIES TO COMBAT CLIMATE CHANGE BY IMPLEMENTING RECOMMENDATIONS ESTABLISHED UNDER FLORIDA'S 2008 ENERGY AND CLIMATE CHANGE ACTION PLAN AND ENACTING STRONG FEDERAL ENERGY AND CLIMATE POLICY. THIS WILL SIGNIFICANTLY REDUCE THE STATE'S AND NATION'S GLOBAL WARMING POLLUTION, PROMOTE CLEANER, SAFER ENERGY RESOURCES, AND PROVIDE DEDICATED FUNDING FOR SAFEGUARDING OUR NATURAL SYSTEMS AND HUMAN COMMUNITIES IN AN ERA OF CLIMATE CHANGE.



To prevent the worst impacts of climate change and sea level rise and limit the impacts on coastal communities and wildlife, we must reduce global warming pollution. As individuals, we can urge our state and federal law makers to support and enact federal climate and energy legislation that puts a price on carbon pollution and sets out a plan to transition America to a clean energy future. We also must prepare for and cope with the effects of climate change that are already occurring, or are inevitable despite our best efforts to reduce greenhouse gas emissions — an endeavor referred to as climate change adaptation.

Florida has already taken important steps on both of these fronts. In 2008, Florida finalized its Energy and Climate Change Action Plan, which consists of a series of policy recommendations developed over several years to reduce greenhouse gas emissions and promote climate change adaptation strategies, as well as provides guidance for the development of a state-wide “cap-and-trade” program for fossil-fired electric generation plants.^{69,70} The final 2008 Plan includes 50 policy recommendations to reduce state greenhouse gas emissions more than 30% below 1990 levels by 2025.⁷¹ A recent macroeconomic study of the Plan suggest that its implementation would expand State Gross Product by \$38 billion and create 148,000 new jobs on a net cumulative basis by 2025.⁷² Recommendations include, among others, promoting renewable electricity through a Renewable Portfolio Standard, improving energy efficiency of buildings, power plants, and vehicle fleets, reducing conversion of forested to non-forested land uses, and promoting farming practices with greenhouse gas benefits. In addition, the Plan offers 15 recommendations for climate change adaptation measures, including a number of the coastal protection



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strategies underscored in this report as important priorities: placing a priority on coastal land acquisition through the Florida Forever program; efforts to reduce and discourage future reliance on bulkheading/hardening to stabilize estuarine and beach shorelines; and amending state and local coastal management activities to address sea-level rise and enhanced coastal storms. Putting in place a state-wide adaptation agenda will help leverage some of the local adaptation efforts that have been underway in Florida over the past few years and provide the state with a comprehensive and coordinated strategy.

Implementation of the Plan is being guided by the Florida Energy and Climate Commission, consisting of nine members appointed by the Governor, the Commissioner of Agriculture and Consumer Services, and the Chief Financial Officer for three-year terms. While the Commission has overseen the administration of more than \$200 million in renewable and energy efficiency grants since its creation in 2008, many of the recommendations

requiring legislative action have remained elusive. Public and legislative support is critical to ensuring that important actions established under the Energy and Climate Change Action Plan move forward.

At the federal level, the United States absolutely must enact a comprehensive energy and climate change strategy that will ensure that the nation can achieve significant reductions in greenhouse gas emissions over the next few decades. Delaying such action is unacceptable. Science tells us that achieving significant reductions in global greenhouse gas emissions by mid-century is a critical determinant of whether or not we will be able to avoid the most dangerous impacts of climate change.^{73,74} International attention has been focused on reducing emissions to a level that will limit global warming to 3.6° F.⁷⁵ New research suggests that, with currently known technological options, the feasibility of reaching that threshold is significantly improved and the economic costs reduced with higher mid-century reduction targets.⁷⁶ For

the United States, this means reducing our emissions to 80% below 2000 levels by 2050. This goal is achievable, but it will take a concerted effort on a number of fronts. America must embrace meaningful steps to reduce our dependence on dirty fossil fuels, including supporting important restrictions on risky offshore oil drilling. We must promote increased energy efficiency and renewable energy resources through existing and new policies and programs that create incentives for advancing innovative technologies.

At the same time, the nation must support the continued development and implementation of a national climate change adaptation strategy, including a proactive and collaborative effort across federal agencies to

safeguard people, property, and wildlife from sea-level rise and intensified storms and floods. A number of agencies with jurisdiction over coastal issues have already begun to develop climate change adaptation strategies. For example, the FWS recently finalized its Strategic Plan for Responding to Accelerating Climate Change, which includes a 5-Year Action Plan to begin implementing the strategy, including efforts to safeguard its coastal National Wildlife Resources.⁷⁷ NOAA has developed guidance for state coastal managers to develop coastal adaptation strategies as part of their Coastal Zone Management Act responsibilities.⁷⁸ And the U.S. EPA is implementing the Climate Ready Estuaries (CRE) program, which is a



partnership between EPA and the National Estuary Programs to build capacity among coastal managers to address climate change.⁷⁹ These and other efforts are clear indication of the nation's growing attention to coastal climate change adaptation. To be most effective, however, such efforts must be well coordinated and supported by dedicated funding sources.

Concluding Thought



A NEW BEGINNING

While implementing the ambitious agenda laid out in this report may seem daunting, we should not shy away from making important choices. Certainly, Florida and the nation have the ability and the opportunity to confront the many human-caused threats to sea turtles and prevent them from extinction. More importantly, what we can do for sea turtles and their habitats will have enormous benefits for us as well, because healthy coastal and marine ecosystems support a strong economy and are the heart of Florida's culture and way of life. Imagining a perfect homecoming for sea turtles in 2040 should be the metaphor of our undying commitment to protect Florida's coasts for our own generations to come.

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