SWOT report

Volume VI

The State of the World's Sea Turtles

the green turtle

THE MOST VALUABLE REPTILE IN THE WORLD

INSIDE

STORIES FROM THE GULF OIL SPILL | WHAT'S A TURTLE WORTH?
THE FALL AND RISE OF HAWAII'S HONU | AND MORE ...

An olive ridley hatchling heads to the sea on Costa Rica's Ostional Beach. Hatchlings face a gauntlet of predators from dogs to vultures, crabs, caracaras, and even chickens! © SOLVIN ZANKL

Editor's Note

SWOT Goes Green

Sure, we use Forest Stewardship Council–certified paper in the production of *SWOT Report* and encourage people to download it from the Internet to save a tree, but when I say that "SWOT goes green," the "green" I am talking about is the green turtle! *SWOT Report, Vol. VI*, which you hold in your hands (or are reading at www.SeaTurtleStatus.org), presents the first up-to-date global map of the biogeography of the last sea turtle in our species-focused series—the green turtle. The green turtle is arguably the most studied, the most iconic, and, as suggested on our cover, the most valuable of all sea turtles, for reasons that you will soon discover as you read Peter Pritchard's Special Feature article on page 24.

With the addition of the green turtle to the SWOT database, data on all seven species are now flowing in annually from more than 500 sources that represent more than 2,000 nesting beaches around the world. The SWOT database, housed within Duke University's Ocean Biogeographic Information System–Spatial Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP), has become the most comprehensive resource of its kind.

We have learned a great deal since starting SWOT back in 2004. Our first global mapping effort (of leatherbacks, in *SWOT Report, Vol. I*, 2006), and subsequent visits to nesting beach projects around the world, made us aware of some major challenges in presenting complete, accurate, and comparable information. As data sheets were submitted, and as we walked the beaches with SWOT partners in South America, the Caribbean, Africa, and Asia, we soon realized that nearly every project uses somewhat different techniques and protocols to monitor sea turtle nesting activity. It became clear that SWOT would have to achieve a greater level of comparability among beaches, to improve data quality overall, and to help projects meet a minimum standard that would enable the projects, and SWOT, to one day monitor local and global trends. Thus was born the SWOT Minimum Data Standards project (see the article on page 47) that has now brought together some of the world's top sea turtle biologists and statisticians to design practical standards for sea turtle nesting beach monitoring.

We also saw that people in the field needed help to achieve their conservation goals and that *SWOT Report* was a useful tool to that end. However, using the tool required some financial assistance. So we developed a small grants program to support projects pursuing conservation in the field. To date, we have made grants to 31 SWOT Team partners in 18 different countries and have seen marvelous and innovative programs take shape as a result. In 2010, we expanded the scope of this program to include not just education and outreach programs, but also research, capacity building, and networking programs (see the article on page 48). Our dream is to secure funding to vastly grow this highly effective small grants program.

Like the tiny hatchling green turtle in the incredible photo by Jérôme Bourjea (at left), SWOT started small, but we aspire to be something much bigger. We pledged to support the sea turtle and ocean conservation movement by adopting a planetwide perspective and helping to develop a network of people, a global database on sea turtle biogeography, and a strategy to improve and guide conservation. Each year, we have taken on these tasks one small step at a time, and today, we are beginning to realize our goals.

Whether you are a data contributor, photographer, writer, or donor, or merely a fan, thanks for being a part of our SWOT Team and for helping to support sea turtles and the health of their ocean homes.

Roderic B. Mast

AT LEFT: Near the island of La Réunion in the southwest Indian Ocean, SWOT Team member Jérôme Bourjea was witnessing a rare open-water hatchling encounter, when a humpback whale and her calf appeared on the scene. © JÉRÔME BOURJEA

SWOT report
The State of the World's Sea Turtles

State of the World's Sea Turtles
2011 Crystal Drive, Suite 500
Arlington, VA 22202
U.S.A.
+1-703-341-2400
www.SeaTurtleStatus.org

For changes of address, or to request a copy of the latest issue of *SWOT Report,* please call us toll-free at 800-406-2306 from within the United States or at +1-703-341-2400 from outside the United States. If you have comments or questions, please e-mail us at editor@seaturtlestatus.org.

meet the turtles

The seven sea turtle species that grace our oceans belong to a unique evolutionary lineage that dates back at least 110 million years. Sea turtles fall into two main subgroups: the unique family *Dermochelyidae,* which consists of a single species, the leatherback; and the family *Cheloniidae,* which comprises the six species of hard-shelled sea turtles.

Flatback *(Natator depressus)*
IUCN Red List status: Data Deficient

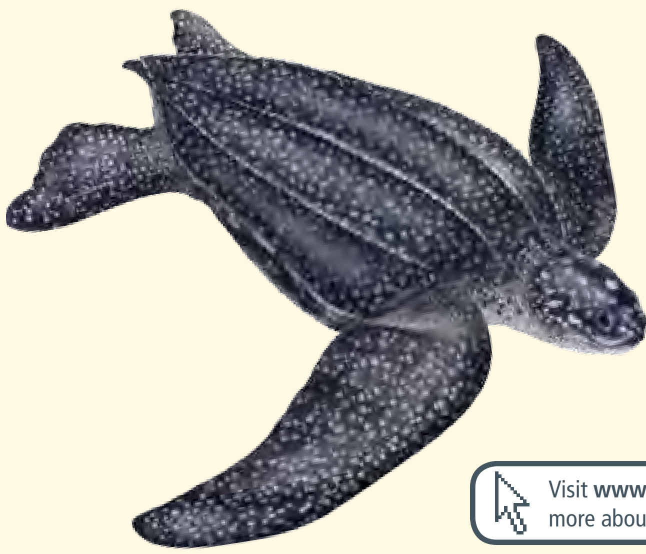
Kemp's ridley *(Lepidochelys kempii)*
IUCN Red List status: Critically Endangered

Green *(Chelonia mydas)*
IUCN Red List status: Endangered

Loggerhead *(Caretta caretta)*
IUCN Red List status: Endangered

Hawksbill *(Eretmochelys imbricata)*
IUCN Red List status: Critically Endangered

Olive ridley *(Lepidochelys olivacea)*
IUCN Red List status: Vulnerable



Leatherback
(Dermochelys coriacea)
IUCN Red List status:
Critically Endangered

Visit **www.SeaTurtleStatus.org** to learn more about all seven sea turtle species!

table of contents

2 Editor's Note: SWOT Goes Green

4 Meet the Turtles

research and status

7 One Size Does *Not* Fit All for South African Turtles

10 Hawaii's Unique Turtles

12 How Will Sea Turtles Cope with Climate Change?

outreach and action

15 Sea Turtle Murals Inspire Conservation

16 When Disaster Strikes

22 Community Conservation Programs Built to Last

special feature

24 The Most Valuable Reptile in the World—
The Green Turtle

29 SWOT Feature Maps: Global Biogeography
of Green Turtles

30 SWOT Feature Map: Worldwide Green Turtle
Nesting Sites 2011

32 SWOT Feature Map: Green Turtle Satellite Telemetry
and Genetic Stocks

34 Many Shades of Green

policy and economics

37 Egg Collection for Conservation

40 What's a Turtle Worth?

42 Sea Turtles and CITES

44 The Case of Shell Beach

the SWOT team

47 New Standards for SWOT Data

48 Acting Globally: SWOT Small Grants 2010

50 SWOT Team Member Spotlight

51 SWOT Data Contributors

Inside Back Cover Acknowledgments

THIS PAGE, FROM TOP TO BOTTOM: © CAROLYN COLE / LOS ANGELES TIMES, © NEIL EVER OSBORNE / WWW.NEILEVEROSBORNE.COM, © MICHELLE KALAMANDEEN FRONT COVER: A distinctively yellow-colored green turtle takes a closer look at Michele Westmorland's lens in the clear waters of Bora Bora, Tahiti. © MICHELE WESTMORLAND AT LEFT: © DAWN WITHERINGTON

Find Mr. Leatherback! How many times can you spot Mr. Leatherback's distinctive silhouette in this issue of *SWOT Report?* Check the SWOT Web site at www.SeaTurtleStatus.org for the correct answer!

research & status

One Size Does *Not* Fit All for South African Turtles

By RONEL NEL, GEORGE HUGHES, and JENNY TUCEK

In the summer of 1963, the first conservation officers set foot on the beaches of Maputaland, northern KwaZulu-Natal, South Africa, where they discovered two species of nesting sea turtles, as well as an active turtle harvest under way in local communities. It was quickly determined that direct intervention was necessary to ensure that these species would be around in the future, and that while researchers actively pursued protection on the ground, it would be possible to simultaneously accomplish important research and monitoring goals. Today, after nearly five decades of patrolling the South African coastline, we researchers have now learned a good deal more about these turtles and how to conserve them.

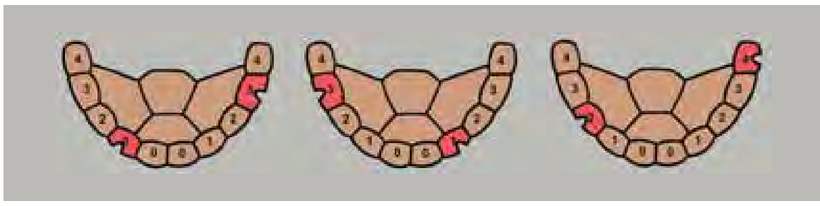
During those first few years, conservation patrols were initiated to protect and document all nesting loggerhead and leatherback females that came ashore. Conservation officers still walk and drive along the beaches to count, measure, and tag all turtles encountered. Indeed, one of the keys to South Africa's sea turtle conservation success has been the long-term commitment to continuous monitoring. Moreover, efforts are run from within a committed and stable government body—the Natal Parks Board, now Ezemvelo KZN Wildlife—and through long-standing partnerships with WWF–South Africa and others.

THIS PAGE: A leatherback turtle nests in KwaZulu-Natal, South Africa. Conservation officers first discovered leatherbacks nesting here in 1963 and, ever since, have undertaken efforts to study them and to restore their populations. © HEINRICH VAN DEN BERG AT LEFT: A small juvenile loggerhead turtle carries a solar-powered satellite transmitter. In a ground-breaking research study, scientists have applied tiny tags like this to little loggerheads to shed light on the movements of this elusive life stage. © JIM ABERNETHY

Visit **www.SeaTurtleStatus.org** to learn more about the solar-powered satellite transmitters and what they've helped reveal to scientists.

In the early seasons, much of the activities were based on trial and error. Turtles were turned on their backs so as not to escape as officers continued their patrols, returning later to tag them with cattle or sheep tags. Attempts were even made to use shark tags! Over time, it became clear that such tags were inappropriate for turtles, as was turning them over on their backs, but where we researchers did get it right was to be clear in our objectives from early on. For instance, we collectively maintained that harvesting needed to stop while populations were in recovery, but it could be considered again in the future should the turtle populations reach a threshold size.

If we were to measure population growth over the years, monitoring needed to be consistent and quantitative. It is with some pleasure that we can now say that nesting loggerhead numbers have increased three-fold since conservation efforts began more than 40 years ago. On the one hand, although the threshold of 500 nesting females per annum has been reached, the issue of resuming the harvest of loggerheads has not surfaced again because the interest of the community has since shifted to sustainable tourism.



THIS PAGE: Government researchers in KwaZulu-Natal, South Africa, have been using a unique tagging system to mark hatchling loggerhead turtles since 1970. Hatchlings are marked by removing marginal scutes in a specific pattern that corresponds to their year of hatching. If the turtles return to nest as adults, scientists are able to determine their age—an otherwise impossible task. The images above (clockwise from left) show a hatchling's carapace being notched, the tell-tale notchings on an adult turtle's shell decades after she received them, and a schematic of notching patterns for different years. LEFT: © ROGER DE LA HARPE / GALLO IMAGES / CORBIS; RIGHT: © MARIUNS DE JAGER; DIAGRAM: © STEPHEN NASH / CI ADAPTED FROM GEORGE HUGHES AT LEFT: Loggerhead turtle hatchlings scramble to the ocean after emerging from their nest along the South African coast. Researchers tag hatchlings like these using unique notching patterns to identify them when they return decades later as nesting adults. © ROGER DE LA HARPE / AFRICA IMAGERY

On the other hand, leatherbacks started—and remain—at low numbers (fewer than 100 females nesting per annum). The question is why two species that have received absolutely equal protection have not recovered at the same rate. Because there is no indication that offshore threats are specifically targeting leatherbacks, we suspect that conditions on the beach, such as the influence of nest temperatures on leatherback sex ratios, are hampering recovery. With leatherback numbers in South Africa still low and with other global leatherback populations in a perilous state, our local population merits continued care. We are investigating this disparity between species in hopes of replicating our loggerhead success with leatherbacks.

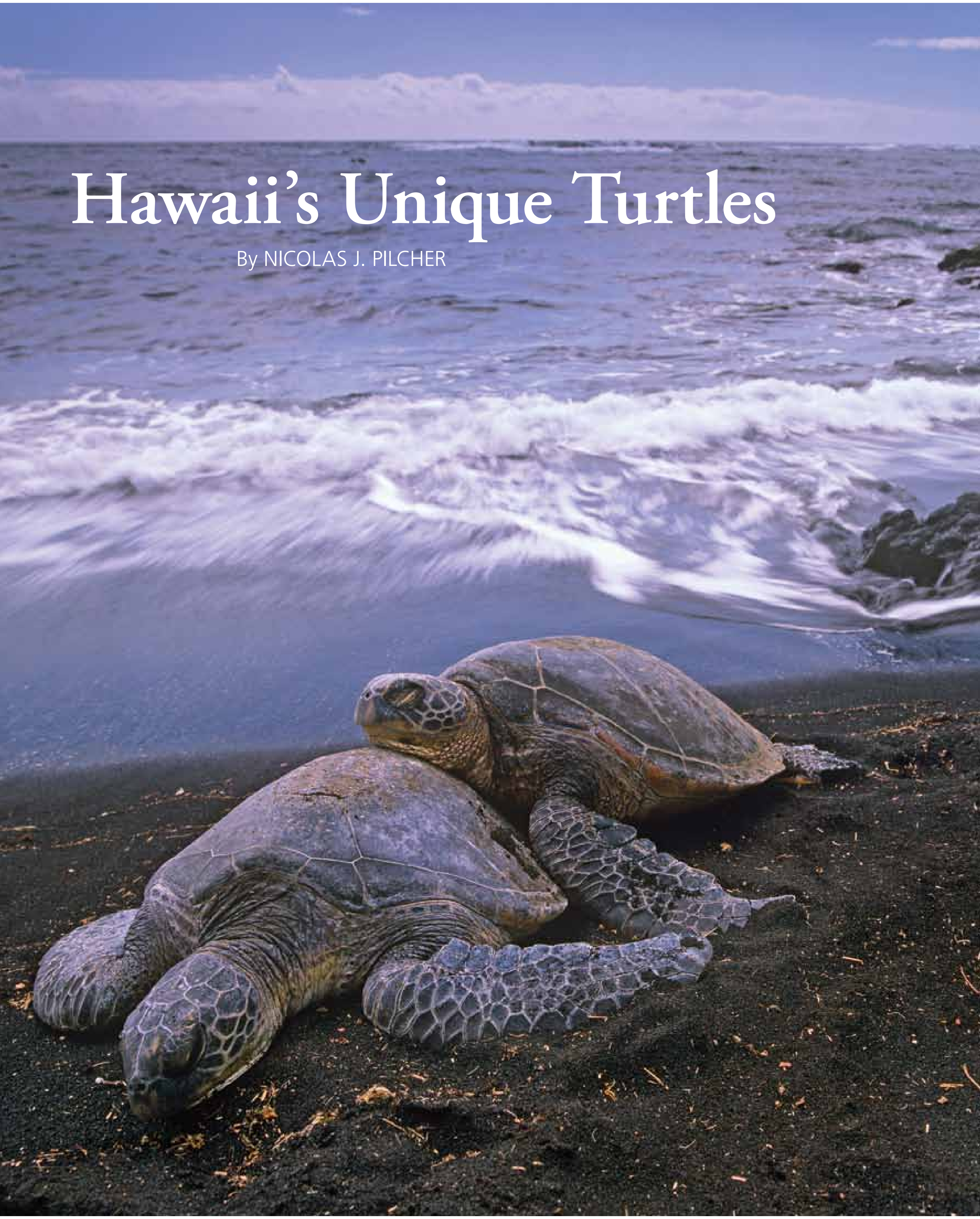
The Natal Parks Board staff displayed particularly good foresight by initiating mutilation tagging of hatchlings in 1970 to eventually be able to estimate age to maturity, one of the most important yet elusive biological traits of sea turtles. Over 30 years' time, about 350,000 loggerhead hatchlings were "tagged" by having marginal scutes removed in a particular pattern that corresponded to the year in which they entered the ocean. The only similar program for loggerheads exists in Mon Repos, Australia, under Colin Limpus's leadership. Today, 15 to 30 years after these programs were begun, some peoples' heads have greyed and other people have retired, yet adult loggerheads bearing telltale notches in their carapaces are returning to their natal shores in substantial numbers to nest for the first time. Using these tagging codes and a bit of tricky statistics, researchers are able to estimate the ages of first-time nesters. It seems that females reach maturity at about 20 years (or a shell length of 84 centimeters [33 inches]), but age at reproductive maturity does vary broadly (10 to 35 years). We expect to refine these results in the near future as more data become available.

Over 30 years' time, about 350,000 loggerhead hatchlings were "tagged" by having marginal scutes removed in a particular pattern that corresponded to the year in which they entered the ocean.

Combining these two experiences—monitoring efforts and notching experiments—we can offer some lessons learned. To begin, one must have clear objectives for a monitoring program from the start! Flipper tagging in isolation is not research, conservation, or monitoring; although counting nesting females is fundamental, additional information is necessary to evaluate the success of conservation and monitoring. Next, if monitoring, research, or conservation protocols work, don't change them! And just because a protocol works for one population does not mean that it will work for all populations. Each country, each population, and each rookery is unique in its challenges. One should use the local strengths, which are often found in individual champions, to make conservation work. Most important, we have learned from the slow and steady turtles that slow and steady really is a good strategy for long-term success in conservation as well. ■

Hawaii's Unique Turtles

By NICOLAS J. PILCHER



Although green turtles swim in nearly all the world's oceans, nest on sandy beaches around the globe, and migrate vast distances between feeding and breeding areas, a curious population of green turtles calls only the Hawaiian Islands home.

One of the longest-running monitoring and conservation projects in the world for sea turtles has tracked the fall and rise of this distinctive population amid an array of human threats. In recent decades, scientists have discovered that these abundant green turtles—favorites of divers, surfers, snorkelers, tourists, and locals—belong to a relatively small, endemic, and growing population whose members are born, grow up, and reproduce solely within the Hawaiian Islands. Like other residents in this tropical paradise, the native greens exhibit the distinctly human behavior of hauling out on beaches to soak up the warm Hawaiian sun.

All the green turtles that nest and feed throughout the Hawaiian archipelago belong to the same lineage: they do not share any substantial genetic links with other green turtle populations in the Pacific Ocean, although occasionally some turtles from the East Pacific stock that nest in the American Pacific are recorded in Hawaiian waters. This fact makes Hawaiian greens a unique subset of the greater global population or, as scientists like to call them, a Distinct Population Segment or Regional Management Unit. The geographic isolation of the Hawaiian greens means that they are at greater conservation risk because they do not intermix with other stocks in the Pacific; thus, any population declines are unlikely to be compensated for by immigration from other populations.

Although there is no reliable way to know what the population might have looked like hundreds of years ago (mostly because no one thought of counting them back then), Hawaiian turtles, or *Honu* as they are known to native Hawaiians, have been an important part of Hawaiian culture. They feature prominently in mythology and petroglyphs and are revered as personal totems and guardians, or *aumakua*. Ancient Hawaiian people hunted turtles, and turtle meat was an important food resource managed through *ali'I*, or royalty-controlled hunting programs. Turtle shells and bones were used as tools, fishing hooks, and personal ornaments. The multiple uses and important roles that *Honu* have played in Hawaiian culture suggest that there were substantial numbers in the past.

Green sea turtles exhibit basking behavior at only a few sites worldwide, the most well-known of which is in Hawaii, U.S.A. Although it is possible that turtles haul out of the ocean to avoid predators, it's more likely that this behavior allows them to rest and get some sun. © TIM FITZHARRIS / MINDEN PICTURES / NATIONAL GEOGRAPHIC STOCK

The arrival of western culture in the 1600s brought increased exploitation of sea turtles. Particularly during the past two centuries, large numbers of green turtles were harvested throughout the island chain, often destined for the soup pot. Laws now prohibit hunting, injuring, or harassing sea turtles or holding them in captivity (at least without a special permit). Violations can bring hefty fines and prison time, and as a result, the population has been on the rise in recent decades. Presently, more than 90 percent of nesting activity in the archipelago occurs within French Frigate Shoals, a National Wildlife Refuge administered by the U.S. Fish and Wildlife Service, while foraging turtles can be found in coral reef and coastal habitats throughout the islands.

In addition to harvest, the Hawaiian greens came under the negative effect of a mysterious disease that first appeared in the 1930s, that peaked in the 1980s and 1990s, and that severely debilitated and often killed turtles. Infected turtles developed lobe-shaped tumors caused by the fibropapilloma virus, or FP, which afflicts most soft portions of the body—primarily on the skin. Moreover, it can also appear between scales and scutes, in the mouth, on the eyes, and even on internal organs. However, continuous research and monitoring efforts have provided an encouraging outlook: Turtles, particularly larger ones, can recover from FP infections, and the frequency of FP infections in Hawaii is declining. Therefore, although turtles today still exhibit FP symptoms, the severity of the threat to the overall population has substantially diminished.

Although abundance is probably lower than before western-origin impacts, the Hawaiian green turtle population is growing consistently—thanks to a combination of legal protection for turtles and their habitats, the virtual cessation of traditional hunting, and the remission of FP. The Hawaiian green is one of those rare examples of recovery where societal concern and legal governance came together and reversed the declining trend. Today, Hawaiian green turtles face a promising future, and serve as an example of the might of human effects on nature—both negative and positive. ■

How Will Sea Turtles Cope with Climate Change?

By MARIANA FUENTES and LUCY HAWKES

It is now widely accepted that climate change is a significant threat to biodiversity, especially to species like sea turtles whose life histories are sensitive to fluctuating environmental conditions. A growing number of studies have begun to investigate and predict how different climatic processes will affect sea turtles. Most of the studies have focused on the possible effects on turtle nesting beaches, which reflects the general terrestrial bias present in sea turtle research. Nevertheless, climate change is expected to affect turtles in multiple ways and at all life stages, from the loss of nesting beaches resulting from sea level rise and increased erosion, to feminization of turtle populations because of elevated nest temperatures, changes in reproductive periodicity, shifts in latitudinal ranges, and decreased reproductive success. Although some of these factors have received a fair amount of attention from researchers, much still remains unanswered about how climate change will affect things like hatchling dispersal and migration, foraging ecology, and the ways in which turtles will find new beaches if current beaches become unsuitable for nesting.

THIS PAGE: Small, low-lying islands, such as the one pictured above in Belize, are often used by sea turtles for nesting. Unfortunately, sea-level rise caused by climate change is already causing some low-lying islands to become inundated and, thus, unreliable and unfit nesting habitats for sea turtles. This trend is likely to continue. © KJELL SANDVED AT LEFT: Climate change is expected to cause increased erosion and nesting beach loss in some areas, which can directly affect sea turtle nesting habitats, as shown by this washed-out nest in Florida, U.S.A. Although the exact effects of climate change on sea turtles are uncertain, precautionary human actions can give sea turtles a better chance of adapting to such changes. © CHRIS JOHNSON / WWW.TURTLEIMAGES.ORG

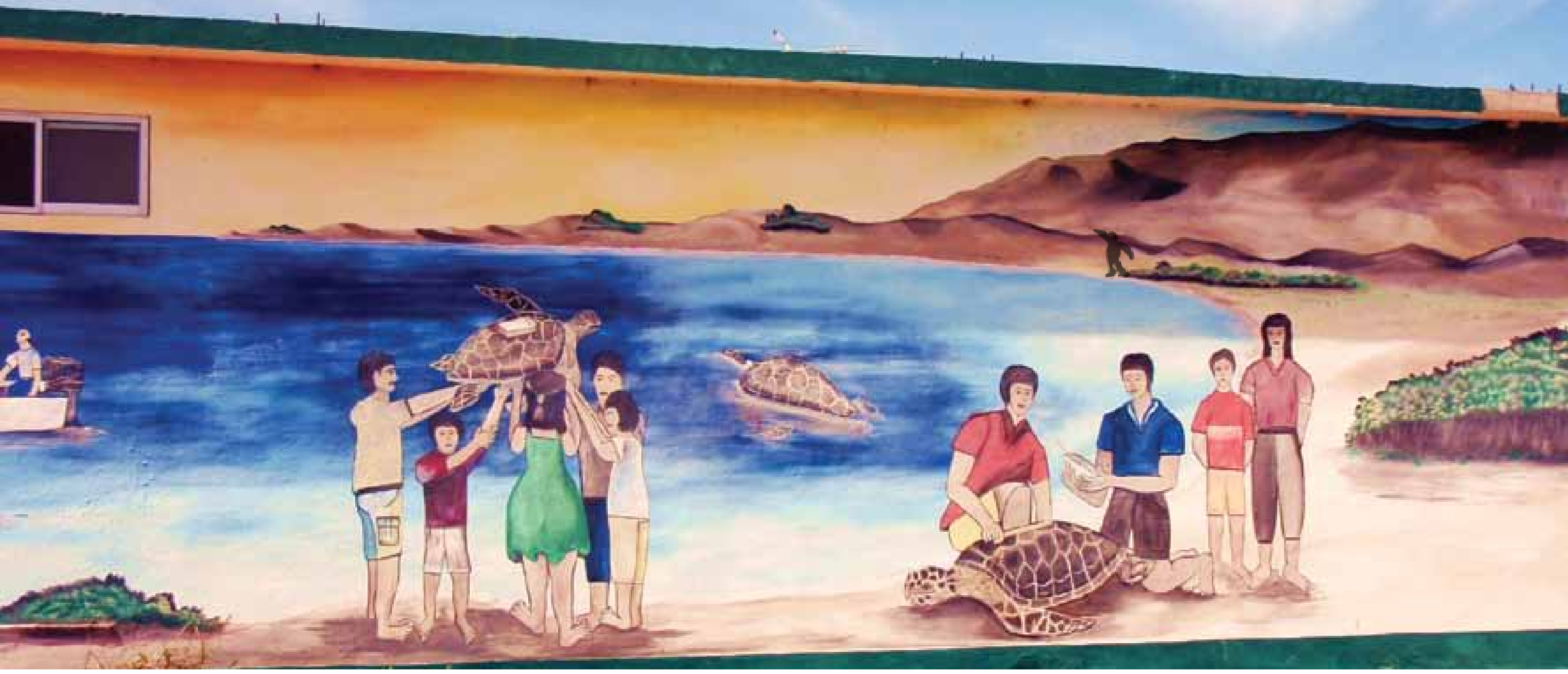
The risk to sea turtle populations from climate change will depend on the turtles' ability to adapt to changing conditions. Sea turtles have survived climate fluctuations during their evolutionary history, but their ability to do so again is uncertain because current rates of climate change are much faster than historic rates. Today, there are many additional anthropogenic pressures to cope with as well. Nevertheless, sea turtles have evolved flexible life history traits and may adapt to climate change through shifts in the distribution of their nesting areas or through changes in nest site selection, nesting season, and nest depths. Other possible adaptation responses include changes in their pivotal temperatures (that is, the temperature at which a nest produces a 50:50 hatchling sex ratio) and alteration of migration routes.

Because of uncertainty about whether sea turtles will adapt on their own, precautionary human actions may be necessary to increase the turtles' chances of adjusting. A mix of different short-term and long-term approaches has been suggested to enhance sea turtle nesting success and reproduction, including reduction of egg harvesting, nest shading, revegetation, and sand renourishing, as well as preemptive protection of areas that are predicted to be optimal nesting sites under future climate scenarios.

Uncertainties about the feasibility and effectiveness of adaptation strategies make the selection of preemptive interventions challenging, as do unanswered questions such as "How many males are necessary to maintain a fertile population of females?" and "What beach characteristics are favored by nesting females?" These factors, as well as how current nesting areas may respond to predicted climate changes, need to be better understood if one is to accurately identify and protect areas that will provide suitable nesting conditions for turtles in the future.

We must continue gathering crucial scientific information to guide our efforts to enhance sea turtles' adaptive capacity. Until such comprehensive data exist, the most appropriate actions might include lobbying for reduction in greenhouse gas emissions and addressing the acute threats to sea turtles. As the negative effects of climate change become more extreme and apparent in the years ahead, more directed interventions may become necessary; the best options will likely be site-specific and will depend on environmental, social, economic, and cultural conditions at a particular location, yet also will be integrated at the appropriate regional scale. Concerted efforts like these will be required across the globe to reduce the direct negative impacts and to increase the resilience of turtle populations to a rapidly changing climate. ■

& outreach action



Sea Turtle Murals Inspire Conservation

By ANDREW J. SCHNELLER, ALYSSA IRIZARRY, and S. HOYT PECKHAM

Public murals in Mexico have long served as platforms for social commentary and transformation. In the 1920s, influential artists such as Diego Rivera, José Clemente Orozco, and David Alfaro Siqueiros began wielding the power of their paintbrushes to bring the complex ideals of the Mexican Revolution into daily life, thereby helping to form a new public consciousness. Building on this tradition, the sea turtle conservation community of the Baja California peninsula has turned to public murals to help shape pro-environmental attitudes and behaviors. In towns throughout Baja California, sea turtles now glide across the once blank walls of schools, restaurants, and gas stations. In these murals, they swim through marine worlds teeming with life, delight groups of ecotourists, and even collect plastic rubbish for recycling.

A recent study conducted by Dr. Andrew J. Schneller and Alyssa Irizarry from the School for Field Studies suggests that these sea turtle murals have important and positive effects. Over the course of 333 interviews with adults and students in nine cities, researchers found a positive correlation between mural exposure, heightened pro-environmental attitudes, and increased sea turtle–friendly behavior. Many students interviewed explained that the murals helped them to forge an emotional connection with sea turtles, a connection that served as the foundation for changes made in their attitudes and actions. Adults described similar experiences: "When I see a mural, I think about the sea and the protection of marine animals," noted one participant.

> "When I see a mural, I think about the sea and the protection of marine animals."

Schneller and Irizarry's research also highlighted the important role that local nongovernmental organizations such as Grupo Tortuguero play in creating lasting change. In 2002, Grupo Tortuguero's Proyecto Caguama was confronted with the difficult task of mitigating fisheries bycatch of loggerhead turtles. In response, Grupo Tortuguero developed a suite of outreach initiatives to convey a core message of responsibility and empowerment to the community: that ultimately, the fate of the Pacific loggerhead lay in the hands of Baja fishermen and their families. Informative workshops for fishermen and curriculum enrichment for schoolchildren were complemented by a range of locally resonant media, including comic books, brochures, radio programming, and—of course—sea turtle murals. In addition, regional festivals, holiday parades, sports competitions, and puppet shows were produced to celebrate sea turtles as natural treasures. This integrated approach to conservation communications has resulted in substantial decreases in sea turtle bycatch and poaching.

Schneller and Irizarry's research demonstrates that environmentally themed public murals have the potential to profoundly and positively affect sea turtle conservation. They can help to weave new concepts, values, and attitudes into the collective consciousness of a community. The true potential of murals, however, is realized when they are incorporated into a holistic outreach campaign—one that educates, engages, and inspires in thoughtful and locally resonant ways. ■

THIS PAGE: Painted by Marcos Aragon, this mural at the entrance to Puerto Adolfo López Mateos was designed by ProCaguama and Grupo Tortuguero to celebrate the area's local loggerhead population and the potential for sea turtle–based ecotourism. © ANDREW J. SCHNELLER AT LEFT: A researcher observes a nesting leatherback with beachgoers during a nighttime patrol in Florida, U.S.A. © CHRIS JOHNSON / WWW.TURTLEIMAGES.ORG

Visit **www.SeaTurtleStatus.org** to see additional murals painted throughout Baja California Sur.

When Disaster STRIKES

On April 20, 2010, BP's Deepwater Horizon mobile drilling rig exploded in the Gulf of Mexico. Two days later, the rig sank and oil began to gush—35,000 to 60,000 barrels of crude flowed up from about a mile deep each day, seeping into waters south of the Mississippi River delta. For weeks, the saga topped headlines and captivated audiences around the world. It served as a wake-up call regarding the dangers of deep-water oil extraction, not only to marine and coastal species and ecosystems, but also to the lives and livelihoods of the people who depend on a healthy sea and coastline for fishing, tourism, and recreation.

Yet, when disaster strikes, we often see glimmers of optimism in our humanity. The intense need that the BP oil spill presented for wildlife response brought together scientists, conservation workers, and rehabilitation specialists from around North America and even the Pacific. Here are two accounts of these response efforts from the inside, as given by Blair Witherington and T. Todd Jones.

GULF DIARIES 1:
Of Falling Trees, Oil at Sea, and Floating Little Turtles

By BLAIR WITHERINGTON

A tree falls in the forest, and no one is there to hear it. Does it make a sound?

Like trees falling in obscurity, some events are difficult to draw into our personal experience. Many aspects of this event, I thought, would be like that. The "event" was the largest marine oil spill in history—the blowout following the sinking of BP's Deepwater Horizon in the Gulf of Mexico. For nearly three months, oil rose to the surface and spread over a vast, remote area … remote to us, that is.

The effects from all this oil are only beginning to be measured and may never be fully understood. But it seems likely that among the natural resources of the open Gulf, juvenile sea turtles could be among the most profoundly affected. Why? A beginning glimpse of those young turtles comes from a research program I've undertaken with colleague Tomo Hirama through the Florida Fish and Wildlife Conservation Commission (FWC), work funded by the National Marine Fisheries Service (NMFS). In our work, we've found young turtles to be patchily distributed within the most productive surface habitat of the open Gulf. The patches, as discrete as desert oases, are the Gulf's convergence zones—surface water that brings organisms together along downwelling fronts. These focal points for life include the surface community anchored by the floating, golden-brown alga, *Sargassum*.

In the open Gulf, masses of cobalt-blue water carry golden clumps of *Sargassum*. As water masses collide with one another and with greener coastal waters, they push *Sargassum* and other drifters into distinct frontal lines, just as weather fronts assemble clouds at their leading edges. Clinging to the algal rafts are many animals that are found no place else, including crabs, shrimps, hydroids, moss animals, gastropods, and tube worms. Other animals are just passing through but have important ties to convergence zones. Among these are the sailors—bubble-rafting purple sea snails, blue buttons, and by-the-wind sailors. And pressed into these oases by the same oceanography are little sea turtles—juveniles in their oceanic (deep-sea) life stage.

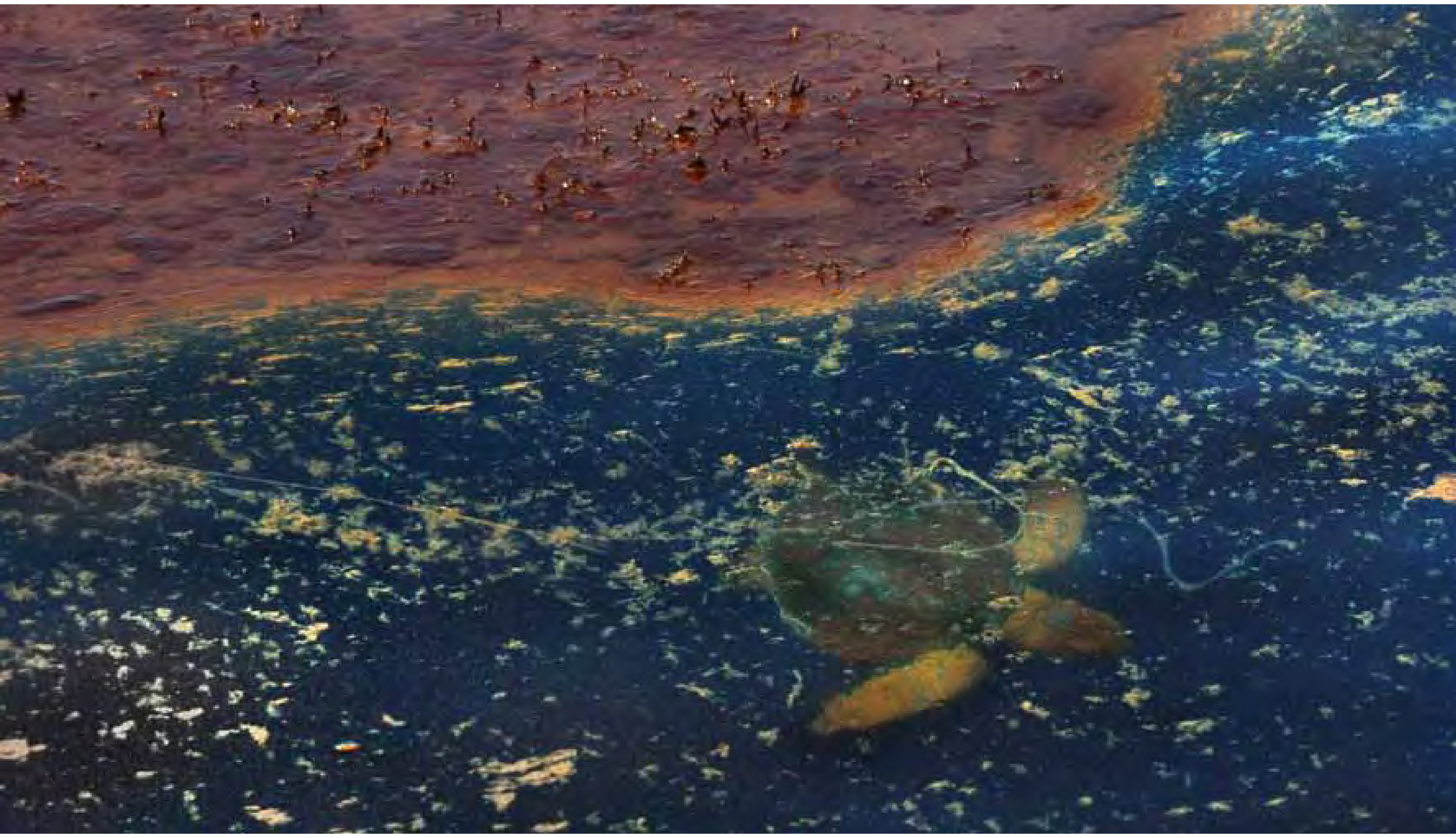
In the *Sargassum*-lined convergence zones of the eastern Gulf, we've dip-netted pelagic juveniles of four species—Kemp's ridleys, green turtles, hawksbills, and loggerheads, each turtle remarkably similar in size to a mature coconut. The vast majority of those turtles are found floating no more than a meter from the nearest *Sargassum* clump. And from samples of material the turtles have ingested, we've learned that their diet is drawn from the rich *Sargassum* community, including the jellies and whimsically named sailing animals that blow through it.

In mid-April 2010, this was the world into which oil began to flow. Although original reports were lower, current estimates are that, during the first month of the event, the Gulf received the volume of three Exxon Valdez accidents. Yet, as the first month of the spill passed, little oil had reached land. It was a relief to many. The source was 70 kilometers (43 miles) from land, and although the oil's extent could have covered an area the size of Ireland, the oil's effects were seemingly invisible to those of us not at sea.

Although original reports were lower, current estimates are that during the first month of the event the Gulf received the volume of three Exxon Valdez accidents.

In mid-May, when Tomo and I threw our bags onto bunks at a camp near the southern end of the Louisiana Delta, there had been almost no oiled wildlife brought in. Yet, we felt certain that oiled turtles were out there, as did Barbara Schroeder (National Sea Turtle Coordinator, NMFS), who began working tirelessly to manage the logistics of a search-and-rescue effort. Working within the spill's Unified Command and using vessels operated by the Louisiana Department of Wildlife and Fisheries (LDWF), Tomo and I left shore May 17 on the first search by vessels for turtles at sea. It was a dual effort—to bring oiled turtles back for rehabilitation and to search for them in a measured way that would allow estimates of how many were missed.

It was a sobering scene. Beyond coastal waters into the deeper Gulf, the oceanography was familiar but the biology was not. Recognizable lines of floating material assembled, but there was little life. The convergence zones we were accustomed to had become the crevasses into which oil had settled. Although broad areas were covered by a glassy, rainbow sheen, the densest liquid and semisolid oil had concentrated within the *Sargassum* drift community. Along those linear fronts, the floating *Sargassum* had browned and was visible mostly as a roughened texture to the swirls of black, brown, and orange oil in



THIS PAGE: A Kemp's ridley turtle swims out from under an oil slick as rescue workers attempt to capture the animal for rehabilitation. Unfortunately, this turtle could not be successfully captured. © CAROLYN COLE / LOS ANGELES TIMES AT LEFT: One of 10 heavily oiled Kemp's ridley sea turtles recovered near the site of the Deepwater Horizon explosion. © CAROLYN COLE / LOS ANGELES TIMES PREVIOUS SPREAD: On April 20, 2010, an explosion occurred on the Deepwater Horizon oil rig off the coast of Lousiana, U.S.A., that caused oil to spill into the Gulf of Mexico at an alarming rate—35,000 to 60,000 barrels per day. The oil continued to flow for months before the well could be successfully capped, causing untold damage to the marine and coastal environment. © CAROLYN COLE / LOS ANGELES TIMES

various stages of weathering and emulsification. Most convergence lines smelled like the drain pit at a Jiffy Lube; others had the noxious, throat-burning smell of fresh gasoline. Many lines were almost all petroleum, ranging from thin liquid to viscous grease.

With the first oily, nut-sized turtle head that slowly poked above the surface, we knew that they hadn't all perished. The oiled convergence lines had lost most of their familiar life, but little turtles were indeed there, although difficult to detect. With their surroundings adhering to them in greasy camouflage, they were often no more than oily lumps in a sea of lumpy oil.

Help for the search grew; over the next three months, teams recovered oiled turtles by dip-net hours from land, transported them to shore, and drove them to rehab facilities for de-oiling. The rescue effort began out of the delta port of Venice, Louisiana, and expanded with additional vessels from Alabama and Florida. Teams searched as far out as one can in a 14-hour day, typically staying within 130 kilometers (81 miles) of land. Dozens of eminently qualified biologists served within this rescue fleet, representing FWC, NMFS, LDWF, the Georgia Department of Natural Resources, Inwater Research Group, Riverhead Foundation, and the University of Florida. Behind the scenes, an army of others arranged for vessels run by local captains, for aerial operations to locate oiled *Sargassum*, and for solutions to thorny logistical and bureaucratic obstacles. To leave these heroic folks unmentioned is an unfortunate consequence of editorial brevity.

The search teams brought aboard more than 350 oiled turtles of four species and transported them to rehabilitation facilities. Nearly all turtles found at sea were alive, although some were coated so as to be barely recognizable as turtles. For those, rescue changed their fate. Thick, tenacious oil covered their eyes, clogged their nostrils, coated their mouths, and lined their throats. Even after the mid-July capping of the well that had gushed for so long, oiled turtles continued to be found. But by mid-August, individual cases of oiling had clearly grown less severe, with many turtles having only smudges and smears or no sign at all of external oil. By the end of August, with the total effort reaching more than 500 turtles collected and examined, no turtles gave signs that they were in need of rehabilitation.

With rescue urgency diminished, the difficult assessment of damage began. How might one assign a measure of harm to the turtles? The oiled turtles observed must represent many more that were unobserved, but how many? And what does it mean to be an oiled little turtle, or an oiling survivor, to live in previously oiled habitat, or to depend upon oil-exposed food items?

Over the millennia, remoteness has protected young sea turtles during their most vulnerable years. From a scientific perspective, this obscurity has also maintained a veil of mystery. Despite our advancing technology and our increased efforts to study the open-sea realm, scientists have made only meager progress in understanding these animals at sea. Yet, although our grasp may be meager, our reach is not. Some unintended consequences of human actions span the planet and seep deeply into formerly isolated wilderness. Perhaps little turtles may show us how grand our presence on the planet has become, as well as how inextricably connected to everything else we truly are.

GULF DIARIES 2:

On the Events, People, and Turtles of the Mississippi Shoreline

By T. TODD JONES

Stationed in far-off Hawaii last spring, I felt disconnected from what was happening in the Gulf of Mexico. For weeks, e-mail updates and National Public Radio reports had been as close as I'd come to the events unraveling in the wake of the Deepwater Horizon explosion. All of that changed on June 13, when my supervisor called to tell me that I would soon be traveling to Mississippi to aid the local sea turtle stranding network.

Three days later, I rendezvoused with my colleagues, Dr. Yonat Swimmer and Shawn Murakawa, in Gulfport-Biloxi, Mississippi. The scene was surprising. The oil hadn't yet reached Mississippi's shores, so instead of finding empty, sludge-covered beaches like those on the news back home, I found beaches that were buzzing with summer activity: sunbathers soaking in rays, jet skiers racing the waves, and recreational fishermen casting their lines. It looked as though it were business as usual on this stretch of the Gulf Coast. But it wasn't. Alongside the beachgoers and vacationers were not only hundreds of emergency response workers, but also a great number of wildlife strandings, including sea turtles.

The stranding network that my colleagues and I stepped into was exhaustive, complex, and highly organized. Set up by the National Marine Fisheries Service, the Southeast Fisheries Science Center, and the Institute of Marine Mammal Studies (IMMS), this system united the government, not-for-profit organizations, private industry, local community members, and tourists to monitor Mississippi's 30 miles of coastline. Any wildlife spotted within this stretch of coast was reported to the wildlife hotline and subsequently sent to the appropriate entity for the location and type of animal found.

At the peak of spill activity in Mississippi, the sea turtle stranding team fielded 20–30 calls per day. These days were long, often starting before sunrise and ending well past sunset, and were filled with the foul smell of decay. Fewer than 10 of the nearly 160 turtles called in during my "tour of duty" were found alive. My team's job was to aid the few animals we could and to collect the highest-quality data possible from the rest.

Stranded turtles were identified, swabbed for oil exposure, and photographed before being tagged, bagged, and delivered to IMMS for deep freeze and necropsy. Although none of the Kemp's ridley and loggerhead turtles we responded to appeared oiled to the naked eye, IMMS necropsy results might ultimately help us to better understand the causes of their demise.

Our stranding work brought us into contact with a wide variety of people. In the beginning, when our focus was on turtles that had washed ashore, we frequently encountered the very volunteers and vacationers who had called us in. Later, when our efforts shifted away from land to the scattering of dead and injured turtles floating near shore, we worked with the fishermen, shrimpers, and charters who, no longer able to fish or conduct tourism activities, had been hired to captain their boats to new ends. This fleet set and checked oil booms, analyzed water and air quality, transported people and supplies, and even collected stranded turtles. Everywhere we went, on land and by sea, we met people eager to help.

By the end of my three weeks in Mississippi, the turtle-holding facilities had reached capacity. A tractor-trailer was sent to take the backlog of frozen turtles for necropsies while a twin-propeller aircraft was flown in to transport some of the survivors. I was charged with escorting 11 juvenile ridleys to SeaWorld and Disney's Animal Kingdom, where they were to take up residence. Flying over the Gulf and gazing down at the vast, rainbow-colored oil sheen, I couldn't help but wonder what lay ahead—for the turtles next to me; for the intricate ecosystem of which they'd been a part; and for the fishermen, hotel owners, and beachgoers who called the Gulf Coast home.

It was comforting, at least, to know firsthand how much care had gone into ensuring that quality data had been—and would continue to be—collected. It can be difficult during times of crisis to keep hard facts from being overshadowed by conjecture and hype. Yet although the hard facts may not always make for the most captivating headlines, they are what pave the way for the most promising future. Moving forward, I knew we'd have the data we'd need to learn all we could and to make the best choices possible for the future of the Gulf. ■

THIS PAGE: Drs. T. Todd Jones and Yonat Swimmer of NOAA's Pacific Islands Fisheries Science Center collect data on a dead Kemp's ridley that was reported through the Mississippi wildlife hotline. The data they collect will help establish the oil spill's full impact on sea turtles. © NOAA AT RIGHT: Sea turtles that were rescued from the oil were sent to rehabilitation centers throughout the region, including the Audubon Nature Institute in New Orleans pictured here. © JOEL SARTORE / WWW.JOELSARTORE.COM

Community Conservation Programs Built to Last

By MAGGIE MUURMANS

Four years ago, a friend approached me for help—not for himself, but for an unprotected population of nesting sea turtles on the Indonesian archipelago of Pulau Banyak. The turtles' problem? An unsustainable take of eggs by local poachers. The poachers' problem? A chronic lack of basic income. It was a delicate situation that required attention, and I decided to see if I could help. Like many sea turtle conservationists taking on a new challenge, I was passionate, committed, and full of fresh ideas, but I was also faced with the daunting task of starting a project from the ground up.

Over the next two years, I worked tirelessly to engage the right allies and gather enough resources to establish a nonprofit organization, navigating twists, scaling hurdles, and learning along the way. Today, a successful sea turtle conservation organization is up and running in Pulau Banyak. Of all the lessons I've learned over the course of this journey, the most important has been to make my sea turtle work as relevant as possible to as many people as possible—finding the common ground among a wide variety of stakeholders.

Community Connections

Gaining community support is vital to the long-term success and survival of any local conservation project, and it takes time. Projects need to address problems in an organic way, weaving solutions into the fabric of the local culture rather than layering them on top of it. Luckily for me, in Pulau Banyak this process had started long before my arrival.

In 1994, Mahmud Bangkaru founded Yayasan Pulau Banyak, a locally driven sea turtle conservation program that focused on protecting the area's primary nesting beach. For seven years, the well-received program had helped to curb local poaching by combining beach patrols and environmental awareness campaigns with turtle-friendly income opportunities for locals. Unfortunately, despite the program's progress and popularity, a regional civil war in 2001 forced the organization to bring its activities to a halt. Thankfully, the years Mahmud had spent establishing a positive relationship with the local community were not lost. By the time I came to Pulau Banyak, the civil war had ended, and Mahmud and I joined forces to build a new program under the same trusted name of Yayasan Pulau Banyak.

As in most places, the driving force behind egg poaching in Pulau Banyak is economic; the egg trade offers a livelihood in a place where livelihoods are scarce. For us to ask the community to stop taking turtle eggs, we had to work with them to find alternatives. For example, it wasn't enough for us to say that ecotourism could be a suitable economic substitute for poaching. We needed to provide the education and tools necessary to *make* it a viable possibility, including workshops on how to guide jungle treks; English lessons to communicate with tourists; and backpacks, stoves, and tents for the treks themselves.

Over the past several years, we have found that true community support for our work has stemmed from direct, hands-on engagement. No matter what the timeline is for realizing our conservation goals, community members need to see a tangible return for their contributions quickly—they need to see that the work they do brings real and immediate benefits for themselves and their families.

Fundraising beyond Conservation

Within the not-for-profit world, fundraising is an essential and ongoing endeavor that takes on many different forms. The high demand for limited funds means that turtle conservation groups must cast a large net and package and promote their work not just for its conservation effects, but also for its human and economic benefits. Yayasan Pulau Banyak, for example, is without a doubt a sea turtle conservation program, and we apply for grants from all of the usual conservation foundations. However, from another angle, it is also a community and economic development program; we offer educational programming and resources that build community capacity and economic opportunity. Hence, our single project can at once be seen as a sea turtle conservation program by one donor and as a program for poverty alleviation or economic development by another. By stepping back and viewing our work in this holistic way, we have been able to approach a wide variety of funding agencies, from those focused on conservation and scientific research to those focused on human well-being. This breadth of influence has allowed us to diversify our revenue stream and develop the strong track record of success needed to attract larger, longer-term donors. In addition, we have also been able to develop a volunteer and membership program that supports our work not only in a financial manner, but also through the in-kind contribution of manpower.

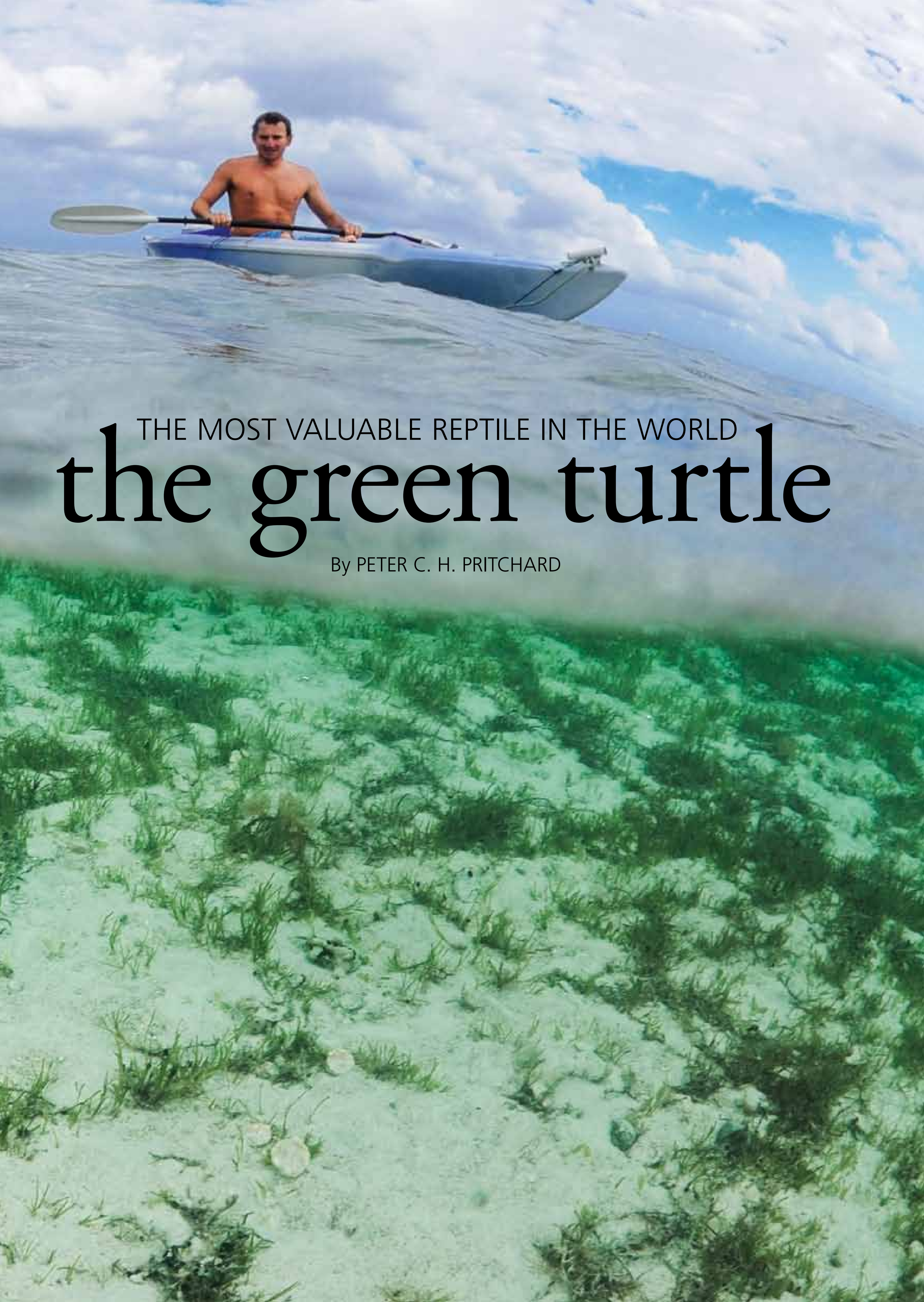
The path toward creating an enduring conservation program is never straight or clearly marked. Beyond your passion and dedication to sea turtle conservation, it is important for you to maintain the ability to see your work with fresh eyes and to recognize the way your goals and methods interact with those of other stakeholders. The more you focus on building relationships based on a sense of common purpose, the better the chances of long-term success. ■

THIS PAGE: Author Maggie Muurmans releases a satellite tag–equipped turtle with local staff members. © DAVID ROBINSON AT LEFT: A boy takes notes during an English lesson in Pulau Banyak, Indonesia. Local organization Yayasan Pulau Banyak conducts English lessons like this to prepare community members to work with tourists. Supporting the development of a local tourism industry is part of Yayasan Pulau Banyak's successful strategy, which fuses community development with conservation efforts. © DÖRTHE GAU

THE MOST VALUABLE REPTILE IN THE WORLD

the green turtle

By PETER C. H. PRITCHARD



As the best recognized of the sea turtle species, the green turtle is an icon of popular culture today. Their image is seen on car window decals and T-shirts; they appear on the covers of tourism brochures, books, and magazines; and they even star in children's movies. Once viewed primarily as a resource to be exploited, green turtles are now the centerpiece of a global conservation movement. The more we have learned about the green turtle, the more our opinion of them and their value has changed, and continues to change today.

The green turtle, *Chelonia mydas*, carries the name "Chelonia," which the Greeks used to encompass the entire creation of turtles, terrapins, and tortoises, and which is still used today by scientists to include all of the shelled reptiles. "Green turtle" is the common English name for the species, although hatchlings are black above and white below, and adults are varying shades of brown-yellow to black, often with decorative spots and streaks. Their name refers to the color of the fat, or "calipee." The species is famous as gourmet food for the privileged population on both sides of the Atlantic Ocean, and it is subsistence fare for indigenous or underprivileged coastal dwellers in many parts of the tropics.

The green is the largest of the hard-shelled marine turtles, weighing up to 395 kilograms (870 pounds), and manages to be both elegant in the water and muscular on land. It is sufficiently heavy that it cannot—or does not—walk on land with an alternating gait, but rather heaves itself forward with a series of pushes involving all of its limbs. It is the only herbivorous marine turtle species and, appropriately, has both the complex jaw surfaces for biting off and chewing marine foliage and the short, rounded snout typical of vegetarian reptiles.

A History of Consumption

For much longer than humans have been studying green turtles, they have been eating them. Some societies have concentrated on egg collection, others on catching turtles themselves on land or at sea for direct consumption. This use for consumption, above all else, has been the main factor in the green turtle's global decline. As a result, most nations now prohibit the practice, though some societies still tolerate a level of take; both need to be carefully supervised.

Several efforts have been undertaken to raise green turtles in captivity. During the 1960s and 1970s, there was much discussion among turtle conservationists about the rights and wrongs of green turtle farming. The discussions about the world's biggest sea turtle farm, located on Grand Cayman Island and incorporated in 1968, brought to bear significant academic and entrepreneurial brainpower. Initially, the farm imported eggs from Costa Rica, Guyana, and Suriname, and it brought in adult turtles to provide breeding stock. Techniques for raising green turtles in captivity were developed, and the farm made itself available to scientists studying various aspects of green turtle biology. The setbacks were many, including loss of turtles during hurricanes. However, each setback was overcome, and eventually, turtles were produced in industrial quantities.

Turtle farms were a divisive subject for many years, even to the extent that longstanding friendships were broken. The proponents offered to saturate the market for the shells, meat, and calipee to take the pressure off wild turtles, while opponents argued that expanding the market for farm-raised turtles would exacerbate demand and put added pressure on wild stocks, which, they insisted, tasted better anyway.

A solution, of sorts, to the divisiveness arose when the U.S. Endangered Species Act was passed in 1973 and green turtles were listed as an endangered species in 1978. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) also prohibited international trade in sea turtles at about the same time (see the article on page 42 for more information). The Cayman Turtle Farm continued to exist, but the products could not be legally brought into the United States. Eventually, the farm was purchased by the Cayman government, mainly for preservation as a tourist attraction with, by Cayman standards, a substantial payroll that should not be jeopardized. Today, the farm still exists, under the name Bo'sun's Bay, and still has thousands of green turtles, as well as tropical fish, gift shops, aviaries, restaurants, and even Kemp's ridleys and loggerhead-hawksbill hybrids. The green turtles breed regularly, and every week, a few turtles are sacrificed for sale to Cayman Island restaurants and hotels, out of reach of both the U.S. and the CITES authorities.

Today, many nations with responsibility for management of green turtle stocks have undergone similar transformations away from consumption. They have undertaken a range of conservation activities, primarily focused on both identifying the stakeholders who depend to varying degrees on green turtles as a resource and working out cooperative management programs.

A History of Research

Unlike ridleys or loggerheads, the green has been studied for centuries, beginning with early observations on their physical appearance and behavior and evolving into much more elaborate studies that include the use of techniques such as DNA analysis, population modeling, and satellite tracking.

Ships' records and logs dating back to Christopher Columbus and his contemporaries in the 15th century reference the enormous numbers of sea turtles they saw upon their arrival to the "New World." Perhaps these precolonization statistics are an indication of how modern Americans have decimated turtle stocks since Columbus's time. Or perhaps the observations of vast flotillas of turtles were a result of the understandable exaggeration that can creep into such accounts.

Some of the first scientific observations of green turtles were made more than two centuries ago by the French naturalist and aristocrat Comte de Lacépède. He reported in his famous *Histoire naturelle du poissons* that, in Cuba, he had found some green turtles that indeed had green flesh, whereas others were black inside and still others were yellow. Lacépède also noted that green turtles nested more than once and might produce as many as 300 eggs in a season. Other early sources of surprisingly accurate information about green turtles may be found in the writings of the Dutch governor of Curaçao about a century ago. And visitors to Palau (Micronesia) may see some carved, colorful "storyboards" in the villages, a favorite of which offers the story of how humans first realized that female marine turtles return to nest a second time after an interval of about two weeks:

> A young couple once went down to a small beach to spend the night together. The girl took off her grass skirt before they fell asleep. The following morning, there was no sign of the skirt, but there were tracks of an enormous turtle in the sand nearby. The couple returned home in shame and embarrassment. But they happened to return to the same rendezvous two weeks later, and just before they fell asleep, a huge turtle emerged from the sea with the remains of a grass skirt still entangled on its flipper.

It was the same turtle! This single experiment demonstrated both that sea turtles show philopatry (literally "love of place," describing the tendency of an individual to return to his or her home or place of birth) *and* that their nesting is influenced by semilunar cycles. These behaviors have since been studied extensively and are foundational concepts of modern sea turtle biology.

A volunteer observes a nesting green turtle at Tortuguero National Park in Caribbean Costa Rica. Dr. Archie Carr began his studies on green turtles here in the 1950s, which revolutionized our understanding of sea turtles and inspired generations of sea turtle biologists. Research continues at Tortuguero today, and the park and its turtles have become a major draw for ecotourism. © NEIL EVER OSBORNE / WWW.NEILEVEROSBORNE.COM

AT LEFT: A newly captured green turtle awaits its fate inside the cabin of a Moken houseboat (called a kabang) off the coast of Myanmar. The Moken are a nomadic, sea-based people who rely on marine wildlife, including sea turtles, for food. Sea turtles have been consumed by people for thousands of years and continue to be a food source for some coastal communities. © NICOLAS REYNARD / NATIONAL GEOGRAPHIC STOCK PREVIOUS SPREAD: A kayaker observes a green turtle in New South Wales, Australia. Once valued almost exclusively for their meat and eggs, green turtles are now widely appreciated for their beauty and ecological importance. © JUSTIN GILLIGAN / OCEANWIDEIMAGES.COM

A green turtle glides towards the surface for a breath of air. © DAVID FLEETHAM / OCEANWIDEIMAGES.COM

Other similarly accidental observations of green turtles uncovered behaviors that were later studied and proven with greater rigor. For example, the ability of green turtles to perform remarkable feats of navigation was first made clear many years ago when a Cayman Island turtle fisherman caught a load of green turtles at a particular spot in the Mosquito Cays of Nicaragua. He took them back to Grand Cayman. But before they could be sent on to Key West, Florida, a buyer from Jamaica arrived and took the whole shipment back to Kingston, where the turtles were all washed out of their corral in a storm. One of those turtles, identified by its unique brand, was recaught months later at the exact spot in Nicaragua where it had been first caught. The journey back to its old sleeping rock was at least 684 kilometers (425 miles), perhaps much more.

Beyond these early observations, relatively little was known about the green turtle until the mid-20th century. At that time, Dr. Archie Carr (1909–1987) began his studies on green turtles at Tortuguero, Costa Rica. In his younger days, Carr had been a keen consumer of the green turtle, but an adulthood dedicated to studying and working with sea turtles shifted his value system. He subsequently advocated for the complete protection of sea turtles, and he believed that it is morally wrong to kill nesting females. He became the green turtle's most celebrated enthusiast, declaring it "the most valuable reptile in the world," not in reference to its meat, fat, and other consumables, but rather to its aesthetic value and value for nonconsumptive uses such as ecotourism and scientific study.

Most of Carr's research took place at Tortuguero, where the extraordinary migrations of the adult green turtles have been thoroughly documented for half a century in a strictly low-tech fashion—cattle ear tags on the turtles, small rewards for capture, and a large wall map of recoveries delineated with colored pins. Though relatively simple, this research revolutionized our understanding of the green turtle's natural history and laid the foundation for modern sea turtle biology.

The rationale for the turtles' migrations appears mainly to be that a good nesting beach needs high-energy wave action, whereas the best feeding occurs a great distance away on calm waters with good seagrass flats. The favored feeding grounds of Tortuguero turtles turned out to be the Caribbean waters of Nicaragua, and the volume of turtles captured for food in those waters—supplemented by hunting in Colombia, Honduras, Panama, and Venezuela—continues to give rise to great concern. Yet somehow this massive-scale take has not resulted in the disappearance of the nesting colony at Tortuguero. Perhaps the key feature is that the subsistence harvest in those countries includes all size classes, not just adult females, which have greater value to the population. In addition, Costa Rica has a national park at Tortuguero, with reasonably good enforcement of turtle and egg protection.

Marine turtles have great dispersal power in the oceans of the world, and therefore, the isolation that causes speciation is not present. Indeed, only seven or eight species of sea turtle are considered valid today, compared with more than 40 tortoise species and more than 250 freshwater turtle species. But within that handful of sea turtle species, significant diversity exists. Green turtles in different parts of the world may be drastically different in size. For example, in the Atlantic system, the Tortuguero adult females may be considered to be of medium size—about 113 kilograms (250 pounds). However, in the western Caribbean, once in a while a huge green turtle is spotted that the locals call a "wind turtle." They have no idea where it comes from. But outside the Caribbean proper, in Guyana and Suriname, and also in Ascension Island and Trindade (Brazil), the turtles are twice as big as those in Tortuguero, and they eat seaweeds rather than seagrasses. Gourmets report that they taste different as well.

In the Pacific Ocean, specifically the Galapagos Islands and western Mexico, the locals find two rather drastically different turtles that broadly fall within the green turtle type. In the Galápagos, they recognize the black turtle and the yellow turtle, and in Mexico, they have the *caguama prieta* (black turtle) and the *tortuga blanca* (white turtle). The black phenotype is truly black, and even the adults are quite small and have certain key features—a narrowing of the posterior part of the carapace, a gray plastron, and an extremely long tail in adult males. They feed on algae, and they don't taste good. The *tortuga blanca* is similar to mainstream *Chelonia mydas* in the western Pacific Ocean (where they nest) or in the Atlantic Ocean.

Turtle scientists are divided as to whether the two types are different species. Geneticists argue against it. Field biologists may not have an opinion until they see the two types together. The Japanese now list *Chelonia agassizii*—the black turtle—as part of their fauna because they have seen the turtles in their own waters, and both forms appear together in Papua New Guinea as well. A couple of years ago, an Australian research team diving for green turtles happened to catch a black turtle, with an immediate response from all aboard: "That's not one of ours!" Seeing is believing. We are probably watching speciation in action; it takes time (see the photo montage on page 34 for more information on the diversity of green turtle phenotypes).

To make sense of the great diversity within each sea turtle species, the Marine Turtle Specialist Group has recently begun defining Regional Management Units for each species by integrating nesting sites, genetics, and tag return and migration data. The effort identified 17 Regional Management Units for green turtles—the most among all sea turtle species—which further highlights their wide variation. At a finer scale, studies of maternally inherited mitochondrial DNA (mtDNA) have identified more than 34 different stocks worldwide, as shown in the map on pages 32–33.

Shifting Values and Recovering Stocks

Today, we are witnessing a substantial resurgence of these "valuable reptiles" in many areas. The green turtle was once so rare on Florida beaches that even a single nesting was worthy of being described in a scientific note. Nowadays, there are thousands of green turtle nests in Florida during the good seasons, and healthy populations of greens can be found in other places where once they were heavily exploited, such as Ascension Island in the Atlantic Ocean and Hawaii in the Pacific Ocean. Just as Archie Carr changed from consumer to conservationist, and as the Cayman Island turtle farm changed from generating revenue through consumption to generating revenue through tourism, global policies and public opinion over the past half century have gradually made a value shift in relation to the green turtle: toward protection and away from consumptive use.

Over time, human perspectives of green turtles have broadened from seeing them mainly as a resource to be exploited to seeing them as an ecosystem engineer, an indicator of ocean processes, and, ultimately, as fellow creatures worth conserving. As this development has happened, we have recognized the negative impacts of our actions on green turtle numbers, and we have responded in ways that have resulted in incredible bounce-back in several green turtle populations around the world. Like an acquaintance becoming a good friend, we have come to know the green turtle better over the years and now appreciate it for its many benefits, not solely for its yummy taste. Perhaps one day the shift will be complete, and people everywhere will consider sea turtle protection a moral imperative. ■

SWOT Feature Maps

GLOBAL BIOGEOGRAPHY OF GREEN TURTLES

The maps on pages 30–33 display the global biogeography of green turtles (*Chelonia mydas*). With these, SWOT has now completed global maps for all seven sea turtle species. SWOT has grown significantly since we began our mapping efforts; the leatherback map in *SWOT Report, Vol. I* (2006) displayed 203 nesting sites, whereas the green turtle nesting map on the following pages shows more than 1,100 sites, and the combined SWOT database now has data from more than 2,000 nesting sites for all the world's sea turtles.

Although green turtles have an extremely broad geographic range, as shown in the nesting map (pages 30–31) and global distribution inset (page 32), they also exhibit high levels of population structuring (many genetically distinct populations) and regional-scale movement patterns, as shown in the genetic stock and telemetry map (pages 32–33).

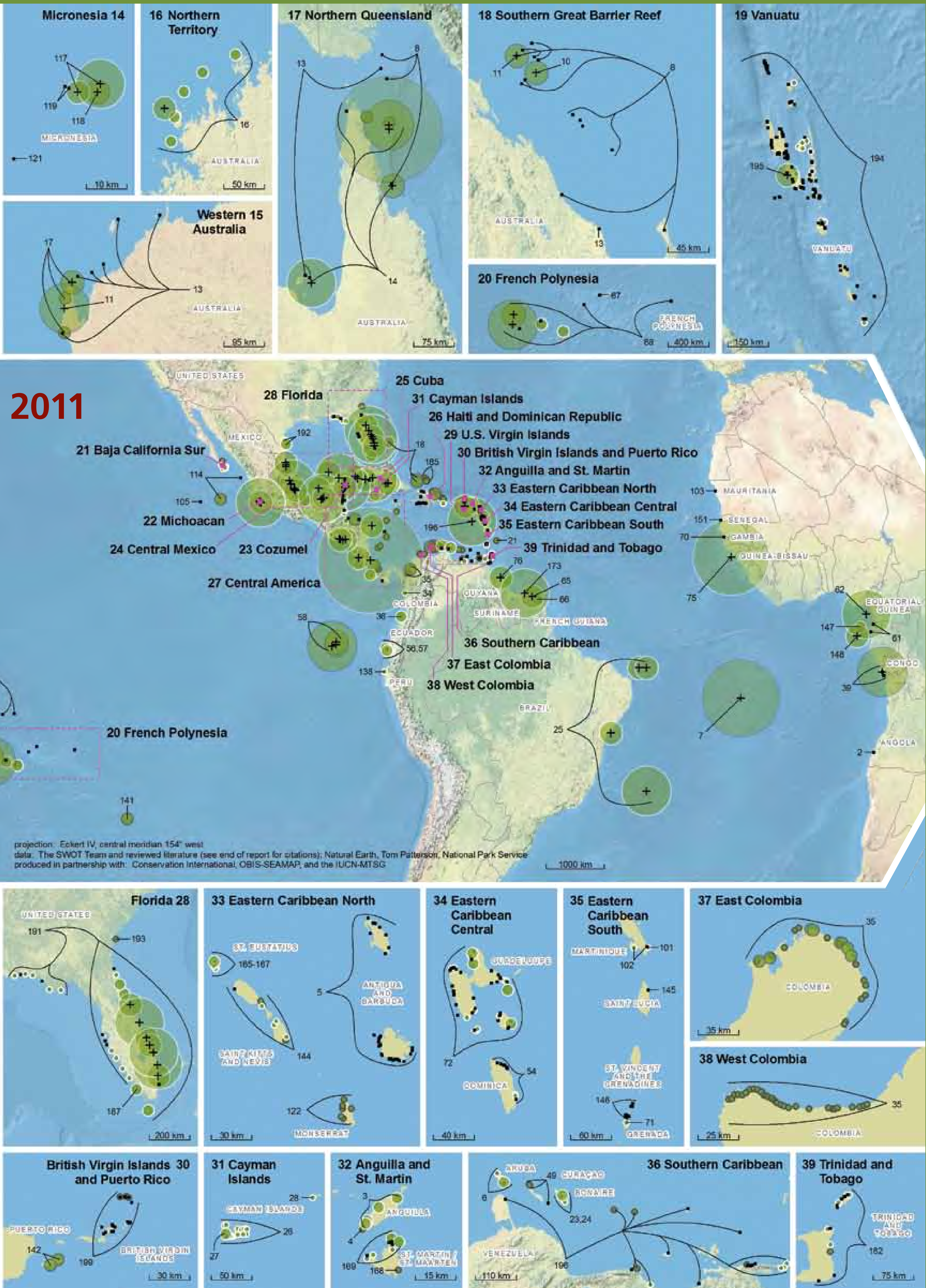
In the nesting map, relative annual nesting abundances are displayed by site for the most recent available year(s) or season(s) of data. Raw count data are reported in the data citations on pages 51–60, but are displayed on the maps in generalized bins (e.g., 1–10 clutches, 11–100 clutches, and so on) to facilitate interpretation. We have also distinguished between data that were reported before or after 2006 (i.e., more or less than five years ago) to aid interpretation of data accuracy (older data may be less accurate). Nesting abundances are reported in number of clutches. We converted data that were reported in units other than clutches using regionally appropriate values, or, if regional conversion factors were unavailable, we used global average conversion values (see page 60 for more information and references). Altogether, the nesting map displays 1,167 nesting sites from more than 200 different data providers and published sources. Please see the SWOT Data Contributors section (pages 51–60) for details.

In the map on pages 32–33, we have included the green turtle's global distribution based on multiple data types, including telemetry, tag-returns, strandings, and sightings, as well as satellite telemetry data (displayed as number of turtle locations in a given area) and known genetic stocks (based on mitochondrial DNA). Altogether, this map shows 34 distinct genetic stocks and data from more than 200 satellite-tracked turtles. Original data sources are cited in the SWOT Data Contributors section (pages 51–60).

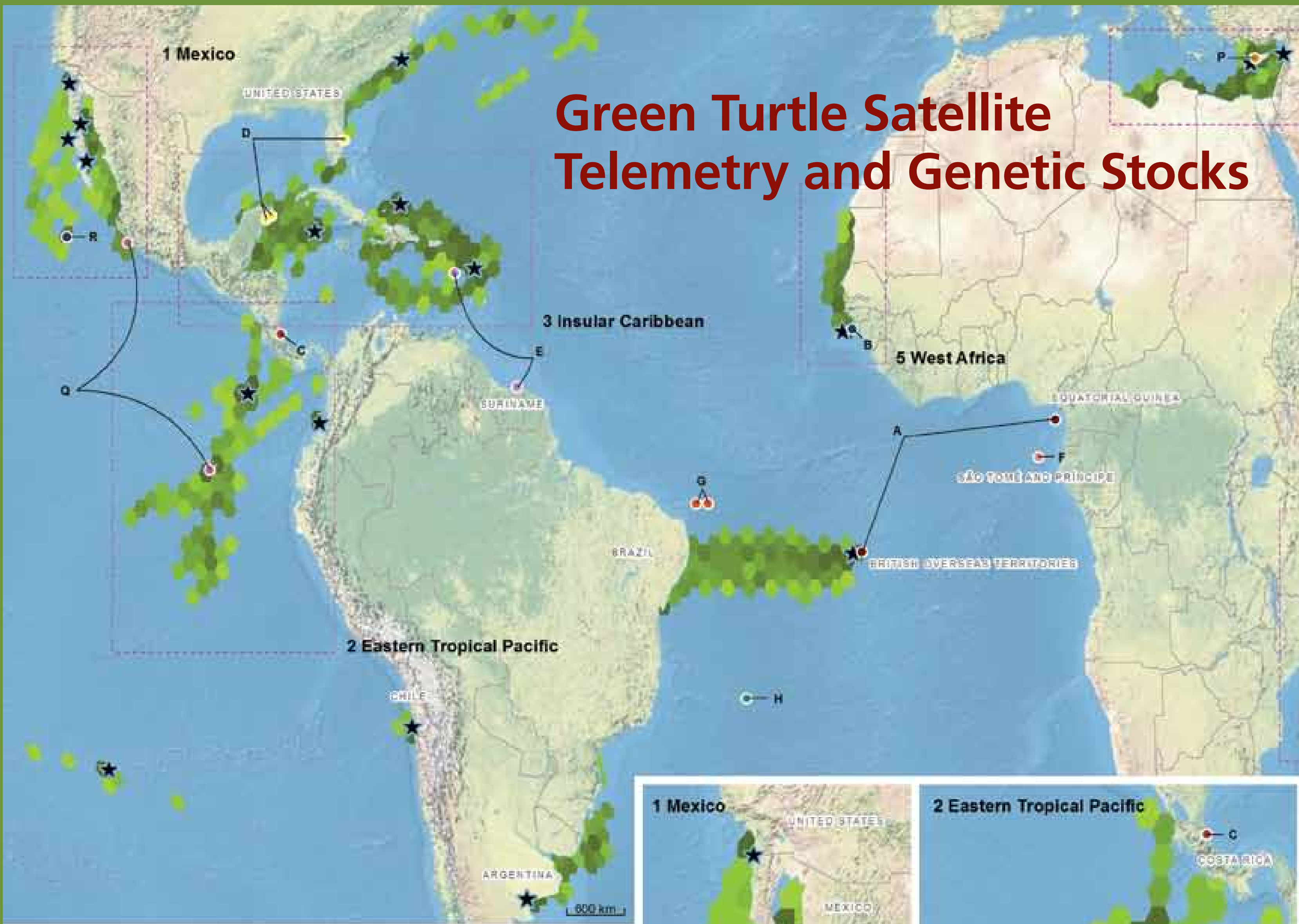
Small numbers on the nesting map (pages 31–32) are data record numbers (which correspond to the citations on pages 51–60), while numbers in larger, bold font indicate map insets. In the map on pages 32–33, satellite telemetry data include adult females and males, as well as juvenile turtles, and each genetic stock is represented by a different letter code. In some cases, multiple sites refer to the same letter code, meaning that the sites belong to the same stock.

By spatially synthesizing several types of biological information, these SWOT maps are the most comprehensive presentation of biogeographical information collected on green turtles to date.


Worldwide Green Turtle Nesting Sites
Mediterranean 1
5 Seychelles
8 Bangladesh
9 Indonesia
13 Northern Mariana Islands (B)
Egypt 2
3 Kenya
4 Comoros
6 Northwest India
7 Lakshadweep Islands
10 Palau
11 Guam
12 Northern Mariana Islands (A)
1 Mediterranean
2 Egypt
14 Micronesia
15 Western Australia
16 Northern Territory
17 Northern Queensland
18 Southern Great Barrier Reef
19 Vanuatu
Baja California Sur 21
22 Michoacan
25 Cuba
26 Haiti and Dominican Republic
27 Central America
23 Cozumel
24 Central Mexico
29 U.S. Virgin Islands
TURKEY
SYRIA
CYPRUS
KENYA
COMOROS
SEYCHELLES
BANGLADESH
INDONESIA
NORTHERN MARIANA ISLANDS
PALAU
GUAM
EGYPT
INDIA
LEBANON
IRAN
PAKISTAN
SAUDI ARABIA
OMAN
ERITREA
YEMEN
CHINA
JAPAN
TAIWAN, ROC
MYANMAR
THAILAND
VIETNAM
PHILIPPINES
SRI LANKA
MALAYSIA
PAPUA NEW GUINEA
AUSTRALIA
TANZANIA
MOZAMBIQUE
MADAGASCAR
MEXICO
CUBA
HAITI
DOMINICAN REPUBLIC
BELIZE
JAMAICA
GUATEMALA
HONDURAS
EL SALVADOR
NICARAGUA
COSTA RICA
PANAMA
U.S. VIRGIN ISLANDS
green turtle clutches
(most recently available year)
greater than 50,000
10,001-50,000
1,001-10,000
101-1,000
11-100
1-10
unquantified
data older than five years
(recent data have a white halo)
inset map extent
inset location only


2011
Micronesia 14
MICRONESIA
10 km
16 Northern Territory
AUSTRALIA
50 km
17 Northern Queensland
AUSTRALIA
75 km
18 Southern Great Barrier Reef
AUSTRALIA
45 km
19 Vanuatu
VANUATU
150 km
Western 15 Australia
AUSTRALIA
95 km
20 French Polynesia
FRENCH POLYNESIA
400 km
UNITED STATES
MEXICO
25 Cuba
28 Florida
31 Cayman Islands
26 Haiti and Dominican Republic
29 U.S. Virgin Islands
30 British Virgin Islands and Puerto Rico
32 Anguilla and St. Martin
33 Eastern Caribbean North
34 Eastern Caribbean Central
35 Eastern Caribbean South
39 Trinidad and Tobago
21 Baja California Sur
22 Michoacan
24 Central Mexico
23 Cozumel
27 Central America
MAURITANIA
SENEGAL
GAMBIA
GUINEA-BISSAU
EQUATORIAL GUINEA
CONGO
ANGOLA
GUYANA
SURINAME
FRENCH GUIANA
COLOMBIA
ECUADOR
PERU
BRAZIL
36 Southern Caribbean
37 East Colombia
38 West Colombia
20 French Polynesia
projection: Eckert IV, central meridian 154° west
data: The SWOT Team and reviewed literature (see end of report for citations); Natural Earth, Tom Patterson, National Park Service
produced in partnership with: Conservation International, OBIS-SEAMAP, and the IUCN-MTSG
1000 km
Florida 28
UNITED STATES
200 km
33 Eastern Caribbean North
ST. EUSTATIUS
ANTIGUA AND BARBUDA
SAINT KITTS AND NEVIS
MONSERRAT
30 km
34 Eastern Caribbean Central
GUADELOUPE
DOMINICA
40 km
35 Eastern Caribbean South
MARTINIQUE
SAINT LUCIA
ST. VINCENT AND THE GRENADINES
GRENADA
60 km
37 East Colombia
COLOMBIA
35 km
38 West Colombia
COLOMBIA
25 km
British Virgin Islands 30 and Puerto Rico
PUERTO RICO
BRITISH VIRGIN ISLANDS
30 km
31 Cayman Islands
CAYMAN ISLANDS
50 km
32 Anguilla and St. Martin
ANGUILLA
ST. MARTIN / ST. MAARTEN
15 km
36 Southern Caribbean
ARUBA
CURAÇAO
BONAIRE
VENEZUELA
110 km
39 Trinidad and Tobago
TRINIDAD AND TOBAGO
75 km

Green Turtle Satellite Telemetry and Genetic Stocks



density of turtle locations based on satellite telemetry

high

low

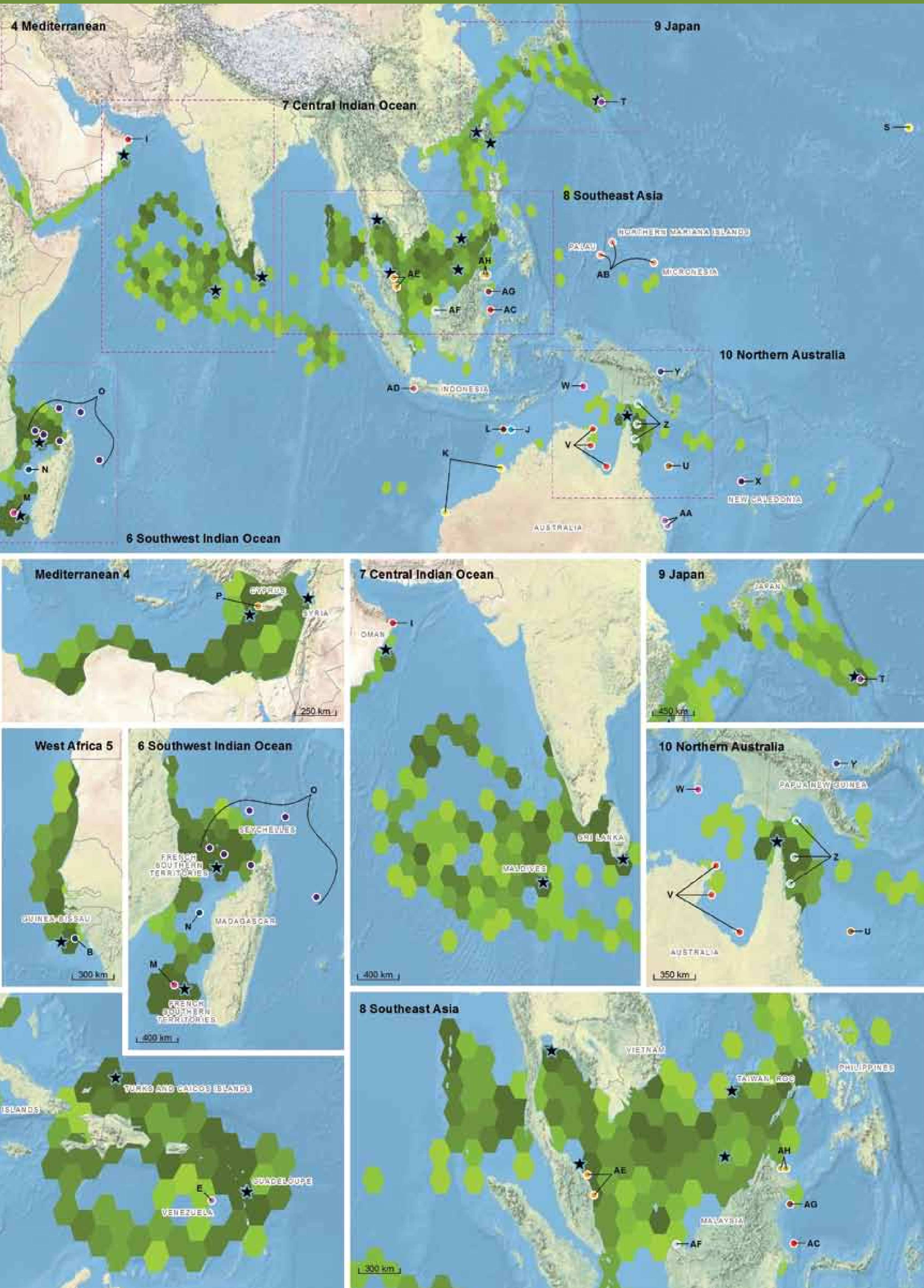
projection: Eckert IV, central meridian 30° east
data: The SWOT Team and reviewed literature (see end of report for citations); Natural Earth, Tom Patterson, National Park Service
produced in partnership with: Conservation International, OBIS-SEAMAP, and the IUCN-MTSG

inset map extent

★ *telemetry dataset start location*

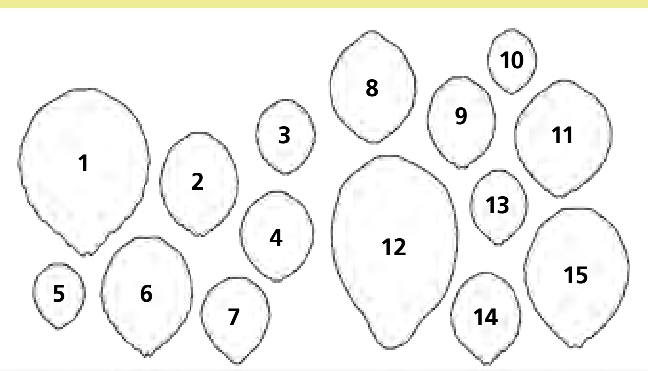
genetic stocks

- *A - Atlantic, East Central (Ascension Island and Bioko)*
- *B - Atlantic, East Central (Guinea Bissau)*
- *C - Atlantic, Northwest (Costa Rica)*
- *D - Atlantic, Northwest (Florida and the Yucatan)*
- *E - Atlantic, Northwest (South Caribbean)*
- *F - Atlantic, Southeast (São Tomé and Principe)*
- *G - Atlantic, Southwest (Atol las Rocas and Fernando de Noronha)*
- *H - Atlantic, Southwest (Trinidade)*
- *I - Indian, Northwest (Oman)*
- *J - Indian, Southeast (Ashmore Reef)*
- *K - Indian, Southeast (Lacepede Islands and Northwest Cape)*
- *L - Indian, Southeast (Scott Reef)*
- *M - Indian, Southwest (Europa)*
- *N - Indian, Southwest (Juan de Nova)*
- *O - Indian, Southwest (North Mozambique Current)*
- *P - Mediterranean (Cyprus)*
- *Q - Pacific, East (Galapagos and Colola)*
- *R - Pacific, East (Revillagigedos)*
- *S - Pacific, North Central (Hawaii)*
- *T - Pacific, Northwest (Japan)*
- *U - Pacific, Southwest (Coral Sea)*
- *V - Pacific, Southwest (Gulf of Carpenteria)*
- *W - Pacific, Southwest (Inu Island)*
- *X - Pacific, Southwest (New Caledonia)*
- *Y - Pacific, Southwest (Papua New Guinea)*
- *Z - Pacific, Southwest (Northern Great Barrier Reef)*
- *AA - Pacific, Southwest (Southern Great Barrier Reef)*
- *AB - Pacific, West Central (Micronesia, N. Mariana Islands, and Palau)*
- *AC - Pacific, West/South East Asia (Berau)*
- *AD - Pacifc, West/Southeast Asia (Pangumbahan)*
- *AE - Pacific, West/South East Asia (Peninsular Malaysia)*
- *AF - Pacific, West/South East Asia (Sarawak)*
- *AG - Pacific, West/South East Asia (Sipidan)*
- *AH - Pacific, West/South East Asia (Sulu Sea)*


4 Mediterranean
9 Japan
7 Central Indian Ocean
8 Southeast Asia
NORTHERN MARIANA ISLANDS
PALAU
MICRONESIA
10 Northern Australia
INDONESIA
NEW CALEDONIA
AUSTRALIA
6 Southwest Indian Ocean
Mediterranean 4
CYPRUS
SYRIA
250 km
OMAN
JAPAN
450 km
West Africa 5
GUINEA-BISSAU
300 km
SEYCHELLES
FRENCH SOUTHERN TERRITORIES
MADAGASCAR
400 km
SRI LANKA
MALDIVES
400 km
PAPUA NEW GUINEA
AUSTRALIA
350 km
TURKS AND CAICOS ISLANDS
ISLANDS
GUADELOUPE
VENEZUELA
VIETNAM
TAIWAN, ROC
PHILIPPINES
MALAYSIA
300 km

Many Shades *of* Green

The green turtle's physical appearance is so variable that for as long humans have been observing this species, they have been redefining it. On the scientific side, this has principally consisted of divisions into subspecies, of which there have been four—*Chelonia mydas agassizii*, *C. m. carrinegra*, *C. m. japonica*, and *C. m. mydas*. Informally, those who study green turtles often refer to different types, such as the standard green turtle, the black turtle (East Pacific form), or the yellow turtle (or Galapagos yellow). While some continue to disagree about the green turtle's classification, the general consensus is that there is just one species, *Chelonia mydas*. Yet, the fact remains that no two green turtles are exactly the same. Within the species, there are several unique forms that appear regularly, as well as brilliant variations observed in just a few individuals. To capture the magnificent variation in green turtles for this issue, we turned to the global SWOT Team and our friends at www.seaturtle.org, and were rewarded with images from all corners of the world. The images on this page are just a fraction of the more than 250 that were submitted, all of which can be seen at www.SeaTurtleStatus.org. The carapaces (shells) shown here are from images of live turtles that were edited to exclude all else. They are not shown to scale.



(1) Fisheries bycatch; Ilha do Cardoso, São Paulo, Brazil, Atlantic Ocean. © SHANY M. NAGAOKA; **(2)** Research capture; Juan de Nova Island, Indian Ocean. © KÉLONIA; **(3)** Research capture; Europa Island, Indian Ocean. © KÉLONIA; **(4)** Research capture; Europa Island, Indian Ocean. © KÉLONIA; **(5)** Fisheries bycatch; Japan, Sea of Japan. © KEI OKAMOTO; **(6)** Research capture; Turks and Caicos Islands, Caribbean Sea. © THOMAS STRINGELL; **(7)** Research capture; Punta Abreojos, Baja California Sur, Mexico, Pacific Ocean. © JOHN WANG (UH-JIMAR) / OCEAN DISCOVERY INSTITUTE (ODI); **(8)** Research capture; Europa Island, Indian Ocean. © KÉLONIA; **(9)** Cold stunned; Lower Laguna Madre, Texas, USA, Gulf of Mexico. PHOTO COURTESY DONNA SHAVER; **(10)** Fisheries bycatch; Ryukyu Islands, Japan, East China Sea. © KEI OKAMOTO; **(11)** Research capture; Juan de Nova Island, Indian Ocean. © KÉLONIA; **(12)** Research capture; Isla Pardito, Baja California Sur, Mexico, Sea of Cortez. © JEFFREY SEMINOFF; **(13)** Underwater; St. John, U.S. Virgin Islands, Caribbean Sea. © C. S. ROGERS; **(14)** Research capture; Turks and Caicos Islands, Caribbean Sea. © THOMAS STRINGELL; **(15)** Fisheries bycatch; Cananéia, São Paulo, Brazil, Atlantic Ocean. © SHANY M. NAGAOKA

policy & economics

Egg Collection for Conservation

By JOSÉ URTEAGA, PERLA TORRES, and ALEXANDER GAOS

Don Juan Amaya moves swiftly in the total darkness of a cloudy night, navigating by memory through the patches of sand and mangroves scattered around the Padre Ramos Estuary on Nicaragua's northern Pacific coast. The mosquitoes are especially bad tonight, but Don Juan's thick, leathery skin is accustomed to them. He's been doing this for 30 years now—collecting sea turtle eggs and selling them to earn a little extra money to help around the house, or to have a few drinks later with his friends. In spite of all the eggs he's seen, it's been years since Don Juan has seen a baby turtle. He can sense that something isn't right and that—if things continue this way—the turtles will likely disappear completely. But in the impoverished coastal communities of Nicaragua, it is *today* that matters most.

Don Juan detects a slight movement on the beach—a nesting hawksbill turtle—and automatically this *huevero* (egg collector) makes a mark across the turtle's track in the sand to let other hueveros know that he now "owns" this one according to the unwritten "code." He then runs down the beach to tell Luis about his find. Luis is from the same community as Don Juan and works for a conservation project that began less than a year earlier, run by a local fishing cooperative called COJIZOPA. Luis grabs his backpack and follows Don Juan back to the turtle, which is now dropping about 200 eggs into the sand. He quickly pulls out a plastic bag and latex gloves and hands them to Don Juan, who begins to carefully collect the eggs while Luis measures, tags, and takes tissue samples from the turtle. Finished, they walk together back to the hatchery where the eggs will be relocated for their protection.

Over the coming months, Don Juan will regularly visit the hatchery to check whether the eggs have hatched and to ensure that the hatchlings are successfully released to the sea. Like other hueveros in the area, Don Juan is proud and happy to support this project. More important, he isn't losing income by doing so. He is paid, at market price, for each egg that he helps protect, as well as for each turtle that hatches from "his" nests. In this way, the project and the local hueveros will together protect 95 percent of the hawksbill nests laid in the Padre Ramos Estuary.

It wasn't always this way. Until last year, hueveros sold their eggs to a black market that delivered them to restaurants and bars throughout Nicaragua and into neighboring countries. Experts estimate that prior to the start of the project, almost 100 percent of the eggs laid on this beach were lost in this fashion. This transformation is remarkable, but even more remarkable is that it is not unique to Padre Ramos. A similar change is unfolding just 200 kilometers (124 miles) to the south, in the community of El Astillero.

The beach at El Astillero is covered in fishermen's *pangas* (skiffs), and amid them sits a turtle hatchery where Don Justo proudly works. As he watches a nest hatch, he explains, "Our community used to be famous for looting sea turtle eggs, to the point that they portrayed us on television like the 'bad guys' from a movie." For many years, there was a growing conflict between members of the community and the

THIS PAGE: Hatcheries, like this one in Panama, are often operated by conservationists to protect turtle nests and hatchlings from predation. © NEIL EVER OSBORNE / WWW.NEILEVEROSBORNE.COM
AT LEFT: Legally harvested sea turtle eggs are fed to livestock near Ostional Beach in Costa Rica. Turtle eggs are collected by coastal communities around the world—both legally and illegally—for consumption or sale, often providing an important source of protein or income. Such situations present both challenges and opportunities for conservation. © PAUL ZAHL / NATIONAL GEOGRAPHIC STOCK

"Our community used to be famous for looting sea turtle eggs, to the point that they portrayed us on television like the 'bad guys' from a movie."

MARENA (Ministry of Environment and Natural Resources) authorities of the nearby Rio Escalante Chacocente Wildlife Refuge over access to the turtle eggs that are laid there. The conflict became so intense that ultimately lives were lost on both sides. But the relationship has changed. The solution, in part, was to construct a turtle hatchery right in the middle of the community from which the conflict had originated.

The idea was simple; the community would agree to reduce their pressure on the refuge; in exchange, Fauna and Flora International would finance a project that would generate 20 seasonal jobs. The community members would work jointly with the authorities from the park to protect the beach at Chacocente and would also build and operate the sea turtle hatchery. A deal was made, and the hatchery was built. After construction was completed, some 200 olive ridley nests were relocated there for protection, and more than 10,000 hatchling turtles emerged 45 days later. The entire community came out to witness the spectacle and even organized a festival that made its way into local newspapers and television. Unlike the previous time the community was featured in the media, they were now the "good guys" of the movie. Currently, the relationship between MARENA and the community is much improved, and there is an ongoing dialogue between the two groups.

In yet another community, near the La Flor Wildlife Refuge to the south, the organization Paso Pacifico is leading a conservation project using similar financial incentives, but with a unique twist. In addition to compensating individual community members for protecting turtle eggs and hatchlings, they also contribute to a community fund for each nest that is protected. The community members then jointly oversee the fund and decide how the money will be spent. This process not only engages the individual poachers in the project, but also expands the spectrum of actors and addresses important social issues for the development of the community.

These successful projects are part of a new conservation trend in Nicaragua. The incentives programs described previously have proven to be an effective tool for advancing conservation in Nicaragua in a way that directly engages and benefits local communities. Once the door is open with communities, people begin to see conservation in a different light, and they become willing to consider new possibilities, such as community-based tourism, sustainable agriculture and fisheries, environmental education in schools, and more. Though still far from the goal, such communities are taking solid steps in the right direction that can be used to inform conservation efforts in similar communities throughout the world. ■

Don Justo holds a basket of newly hatched olive ridley turtles inside the hatchery at El Astillero on Nicaragua's Pacific coast. The hatchery was constructed by the community in collaboration with Fauna and Flora International and MARENA as part of a project that employs community members to collect turtle eggs for conservation. © BRIAN J. HUTCHINSON

WHAT'S A

Turtle Worth?

By HEIDI GJERTSEN

As governments and environmental agencies seek to quantify nature's economic value, conservationists are increasingly asked the seemingly simple question, "What is a sea turtle worth?" Economists measure value in terms of something's worth to humankind. This measurement includes not only "use values," which are benefits from physical use or access to an environmental good, but also "nonuse values," which are values placed on something that exists or can be left for future generations. Humans derive many values from sea turtles, which vary geographically, culturally, and individually. The table characterizes the different types of values and provides examples for sea turtles.

Some values, particularly direct consumptive use, may be incompatible with others. For example, if I consume a turtle for its meat, then it will not be available for other uses such as (a) tourism, (b) ecosystem services that it could have provided, or (c) its breeding contribution to the future population or for nonuses (its mere existence). In the extreme case, if enough individuals are taken from a population (for example, through very high consumptive use), then the ability of the population to sustain itself may be compromised to the point that extinction occurs and all values disappear. This change threatens to be the case for certain sea turtle populations, such as Pacific leatherbacks and eastern Pacific hawksbills.

In various studies, economists have measured some of those values for sea turtles and have generally found that the value of direct consumptive use is less than other values that can be enjoyed from nonconsumptive use, indirect consumption, or nonuse. For example, a contingent valuation study found that U.S. residents in North Carolina were willing to pay on average of $33.22 per person per year (in 1991 USD) to prevent loggerhead sea turtles from going extinct (Whitehead 1992). If one believes that such households are representative of the country, then the United States alone would value the existence of loggerhead turtles at nearly $3.8 billion annually. This estimate may include other values that could be derived through the turtles' existence, such as tourism.

It is important to understand not only the amounts of the values, but also to whom the benefits accrue, because the benefits from conservation versus consumption often accrue to different parties. For example, an individual living in a village where turtles come to nest can benefit from the consumption or sale of turtles, their eggs, and their carapaces. This benefit may be greater than the value they place on the turtle for other "uses" such as spiritual or ecosystem benefits. However, other individuals in the same village or in another village may be able to derive greater benefits from conserving the turtle, such as by participating as a guide in a turtle-watching program. In this scenario, a person from another country might also receive benefits by enjoying a turtle-watching trip.

In the absence of laws that prohibit consumption (or without enforcement of such laws), a person will choose to consume a turtle as long as the benefit to him or her is greater than the cost. Even if the value to society (the total of all values to all people around the world) of conservation is greater than an individual's benefit from consumption, the individual has no reason to factor this into his or her decision. This scenario is what economists call a *negative externality*; people acting in their own self-interest create a situation that imposes an unintended cost on society.

Negative externalities occur when the incentives of individuals or groups pursuing their own interests do not coincide with the interests of society (whether defined as a village, a nation, or the world). The question, then, is how to align the desires of those who are harvesting turtles with what is socially optimal on a global scale. Although enacting and enforcing conservation laws can achieve this goal, laws are not necessarily the most effective or fairest solution. Another option is to create a mechanism to transfer the nonconsumptive value that exists throughout the world to the local users, thus giving people an incentive to do what is best for society. One such promising approach is for stakeholders to negotiate a contract that transfers a portion of the global value of conservation to the local users in exchange for giving up consumptive use and for participating in conservation. This approach is already being done successfully in some places, such as Nicaragua (see page 37).

As conservationists begin to answer the question "What is a turtle worth?" or look to develop economic alternatives to direct consumption, it is essential to take a broader view of values (use and nonuse) and to understand to whom those values accrue. This information can make a powerful addition to the conservationist's toolkit. ■

AT RIGHT: Visitors to the Marinelife Center of Juno Beach, Florida, U.S.A., watch a male loggerhead turtle that is recuperating in a tank after being bitten by a large shark.

VALUES THAT HUMANS DERIVE FROM SEA TURTLES

Value	Use Values: *Benefits from physical use or access to an environmental good*			Nonuse Values: *Benefits from the good existing*
	Direct use: *Goods or services that can be consumed directly*		Indirect use: *Functional benefits that can be enjoyed indirectly*	Nonuse: *Existence value or value of leaving for future generations*
	Consumptive (extractive)	Nonconsumptive (nonextractive)		
Examples	• Meat • Eggs • Carapace • Oil • Leather	• Tourism	• Ecosystem services (ecosystem support, physical protection, global life support)	• Existence (value from knowledge of continued existence) • Bequest (value of use and nonuse values to future generations) • Option (potential for future direct or indirect use)
Sample Estimates of Value	$337,788 (2006 USD) annual egg harvest revenue at Ostional, Costa Rica (Campbell et al. 2007 and R. Valverde, pers. comm.)	$187,880 (1999 AUD) annual consumer surplus for turtle-watching at Mon Repos, Australia (Wilson and Tisdell 2004)		$225,373,781 (1991 USD) annual willingness to pay of North Carolina, U.S.A., residents to prevent loggerhead sea turtles from going extinct (Whitehead 1992 and U.S. Census Bureau)

Note: The values presented represent a particular species at a particular location in a particular time and cannot be generalized. Data references are available from the author.

USD = U.S. dollars; AUD = Australian dollars

Sea Turtles and CITES

By MARYDELE DONNELLY

When a ship laden with hundreds of sea turtles is intercepted in the South China Sea, the bust generates international attention. This clandestine activity undercuts conservation, but trade today is only a fraction of what it was when sea turtles were first included in CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) in 1975. At that time, hundreds of thousands of sea turtles were killed every year for international trade, a situation noted in the Sea Turtle Conservation Strategy (1979):

> Few groups of animals are more valuable and magnificent and at the same time more misused than sea turtles. Able to serve as a source of protein for coastal peoples in the tropics, they have been overexploited most frequently to feed, clothe, and adorn the wealthy in Europe, North America, and eastern Asia.

Widespread concern about sea turtles and the trade in skin (of olive ridleys and green turtles), shell (of hawksbills and green turtles), and meat and calipee (of green turtles) led to early CITES prohibitions on trade that placed most species on either Appendix I (meaning no trade is allowed, or trade is allowed only with permits under exceptional circumstances) or Appendix II (meaning trade is allowed with permits). By 1981, all sea turtles were included in Appendix I. Yet, despite this international protection, trade intensified for several years as countries stockpiled turtle products or traded under reservations (exceptions) to the CITES ban (for example, France, Italy, and Japan).

Just a few years later in 1985, sea turtles faced a new challenge as Suriname, France, the United Kingdom, the Seychelles, and Indonesia sought to reopen hawksbill and green turtle trade at the Fifth Conference of the Parties to CITES. Fortunately, the CITES Parties had little interest in allowing Indonesia and the Seychelles to export wild-turtle products. The debates over four proposals to permit international trade in ranched green turtle meat, skin, and shell were contentious, though the proposals were ultimately defeated. Those proposals became a major focus of that 1985 meeting, as did Cuban efforts to reopen the trade in wild hawksbills with Japan in 1997 and again in 2000, with both sides arguing passionately about the adequacy or inadequacy of biological data, conservation benefits, and trade controls. Although the votes for Suriname's and Cuba's proposals were close, the CITES Parties have, over the years, consistently rejected all proposals to reopen international sea turtle trade, most of which were focused on farms and ranches.

Sea turtle farms (closed-cycle systems) and ranches (stock collected from the wild) have been the subject of extensive discussion at CITES. Successful crocodile ranching generated interest in the possibility of commercial sea turtle mariculture, despite significant differences in the biology and conservation of sea turtles and crocodiles. After years of debate, the Parties adopted Conference Resolution 9.20, *Guidelines for Evaluating Marine Turtle Ranching Proposals*, in 1994; sea turtle farms are regulated by CITES farming requirements for Appendix I species.

Decades ago, famed turtle biologist Archie Carr labeled the green turtle "the world's most valuable reptile." Although CITES has significantly reduced the international green turtle trade, illegal commerce continues today in places such as the U.S.–Mexico border region, where meat is smuggled from Baja into southern California for Holy Week celebrations. And green turtles continue to be hunted legally in large numbers in many countries because CITES does not restrict domestic use. As more countries pass national legislation to implement CITES restrictions, use is expected to decline.

In recognition of their global plight, sea turtles were among the first species listed on the CITES Appendices when the treaty came into force, and CITES protection over the past 35 years has been critical to ensuring their survival. Formidable opposition from some CITES Parties to all attempts to weaken sea turtle protection and a unified effort from the conservation community have been key to maintaining the international ban on trade. ■

AT LEFT: Green turtles are raised in captivity at Cayman Island Turtle Farm on Grand Cayman Island in the Caribbean. Sea turtle farms and ranches have been the subject of heated debate over the years in meetings of the Convention on International Trade in Endangered Species. © STEPHEN FRINK

PROPOSED CHANGES TO TURTLE PROTECTION UNDER CITES AND THE RESULTS

YEAR	PROPONENT	PROPOSAL	OUTCOME
1983	France	Ranched greens in Réunion	Rejected
	Suriname	Ranched greens	Rejected
	U.K.	Special Resolution to exempt Cayman Turtle Farm products as pre-Convention	Rejected
1985	Suriname	Ranched greens	Rejected
	France	Ranched greens in Réunion	Rejected
	U.K.	Ranched greens in Cayman Islands	Rejected
		Special Resolution to exempt Cayman Turtle Farm products as pre-Convention	Rejected
	Seychelles	Annual export quota for 100 wild male hawksbills	Rejected
	Indonesia	Downlist resident wild greens	Rejected
		Downlist resident wild hawksbills	Rejected
1987	France	Ranched greens in Réunion	Rejected
	Indonesia	Downlist resident wild greens	Withdrawn
		Downlist resident wild hawksbills	Withdrawn
1989	Indonesia	Annual export quota of 3,000 wild greens	Withdrawn before meeting
		Annual export quota of 3,000 wild hawksbills	Withdrawn before meeting
1997	Cuba	To Japan, export the <6 tonne stockpile of hawksbill shell, and annually export the shells of up to 500 harvested or ranched hawksbills	Rejected
2000	Cuba	Export the 6.9 tonne stockpile of hawksbill shells to Japan, and annually export to Japan or to a party with equivalent controls, the shells of up to 500 turtles	Rejected
		Export the 6.9 tonne stockpile of hawksbill shells to Japan	Rejected
2002	Cuba	Export the 7.8 tonne stockpile of hawksbill shells to Japan	Withdrawn before meeting
	U.K.	Register Cayman Turtle Farm as a captive breeding facility to allow export of turtle carapaces	Rejected

Note: There have been many proposals to lift CITES international prohibitions on sea turtle trade from ranched and wild populations, and all have failed. Data source: CITES.

The Case of Shell Beach

By MICHELLE KALAMANDEEN

"What about our traditional user rights?" asked Alonso Cornelius, the Vice-Captain of Waramuri Village. Hearing this question can be a protected area manager's worst nightmare, but for us, it was an opportunity to reaffirm our commitment to a fully consultative and participatory process, one that recognizes the rights and roles that indigenous people can play in delineating the proposed Shell Beach Protected Area (SBPA).

Shell Beach is a 120 kilometers (74 miles) stretch of beach and mudflats along the northwestern coast of Guyana in South America. The area is renowned as the annual nesting ground for four marine turtle species: leatherbacks, hawksbills, olive ridleys, and green turtles. The wider Shell Beach area encompasses mostly intact mangrove and lowland swamp forests and seasonally flooded ita palm (*Mauritia sp.*) savannahs. The area's bird diversity is also one of the richest in Guyana. For those reasons, Shell Beach was identified by the government of Guyana—through a consultative process—as a priority site for protected area status.

The Guyana Marine Turtle Conservation Society (GMTCS), for which I work, was appointed to lead the process toward the establishment of the proposed SBPA, which we began in June 2009. Over the following year, we were faced with the important, yet challenging, task of fully engaging local communities and resource users in the park's development.

At the initial stakeholders' workshop in August 2009, Alonso Cornelius posed that very important question, which raised an issue at the heart of the process: Who owns and controls natural resources? Addressing such questions was instrumental to the process, as was shattering myths about protected areas, resource use, and traditional rights. It was also important for us to be familiar with the relevant laws and to be able to cite key pieces of legislation that govern traditional activities on state lands. Integrating traditional knowledge into the planning process further strengthened the conviction that sustainable traditional activities would be allowed to continue within the proposed protected area.

We began the delineation process at the initial stakeholders' workshop by developing goals for the protected area, discussing stakeholders' expectations, defining criteria for selection of land and ocean areas, and refining the methodology to be used throughout the process. It was imperative that stakeholders understood that we were starting with a blank slate, with no preconceived ideas of where the proposed protected area boundaries should be. This approach laid the foundation for trust and a strong sense of local ownership; it was the ideas, the decisions, and the process of the

Local stakeholders discuss the prospective boundaries of Shell Beach Protected Area on Guyana's coast. The park's boundaries were defined through a consultative process that engaged all local stakeholder groups and ensured that traditional user rights were maintained within the park. © MICHELLE KALAMANDEEN

locals that drove the park's delineation. During this process, we recounted traditional stories and folklore to remind communities of how they have historically protected sea turtles and other biodiversity at Shell Beach.

Beyond ensuring stakeholders' comfort and engagement with the proposed protected area, it was also essential to provide them with information on the benefits that would result from its establishment. We were careful to avoid exaggeration, because continued support at the community level is often based on keeping promises and meeting expectations.

At the outset of the process, we also formed a Community Representative Group (CRG) consisting of representatives from the stakeholder communities to act as liaison among the communities, GMTCS, and other stakeholders and to represent the communities' interests throughout the process. The CRG played an important role in communicating between and among stakeholders; as a result, communities clearly saw how their decisions and knowledge were used in park planning.

Stakeholders initially created six proposed boundary options and then selected two of the six for community consultations. Following those consultations, one last workshop was held to finalize the proposed boundary.

Throughout the process, my staff members and I were always available to address issues raised and to give advice on any other community-related matter. This presence ensured that we were focused on both the present and the future welfare of the communities, and it promoted trust and understanding that we cared not only about the process, but also about the communities themselves. In the end, Alonso's question was answered to his satisfaction. He became a strong advocate for the Shell Beach Protected Area, and he was elected by his peers to be the chair of the Community Representative Group. ■

the SWOT team

New Standards for SWOT Data

As of 2011, the SWOT database has expanded to include more than 5,700 individual data records contributed by more than 550 data providers (and literature sources) from more than 2,800 distinct nesting beaches. As such, it is currently the most comprehensive global sea turtle nesting database in existence, and it is well positioned to serve as the world's premier data clearinghouse and monitoring system for sea turtles. With this in mind, the SWOT Scientific Advisory Board (SAB, see list on page 4) recognized the need to establish minimum standards for data provided to the database (a) to identify datasets that could be included in future analyses of abundance and long-term trends; and (b) to provide SWOT Team members (that is, data providers) with guidelines for improving their existing monitoring schemes to enhance the effectiveness of documenting local, temporal patterns of sea turtle nesting abundance.

First, the SAB emphasized that the "gold standard" for sea turtle population monitoring programs are long-term, capture-mark-recapture (CMR) studies on nesting beaches, as well as foraging areas for populations. Comprehensive CMR studies facilitate robust abundance assessments and diagnoses of population trends, which, in turn, inform effective conservation management efforts.

Second, because nesting beach abundance data are an essential component to population assessments and are the data type contributed to the SWOT database, the SAB defined minimum data standards for nesting beach monitoring programs, which included the following: (a) the units for reporting sea turtle nesting beach count data and conversions among units; (b) the allowable level of error in seasonal nest abundance estimates; (c) the minimum standards for monitoring efforts to generate abundance estimates with acceptable levels of variation (that is, to meet item b); (d) a modeling software program that generates total seasonal abundance estimates from partial counts, which will both assist data providers and populate the SWOT database; and (e) a classification system to label individual data records according to whether the monitoring schemes associated with those records meet the minimum standards. To ensure a smooth transition to the next generation of the SWOT database, relevant resources—including reports, papers, species identification guides, and modeling software—will be available for SWOT Team members on the SWOT Web site at www.SeaTurtleStatus.org/data/standards.

> The SWOT database … is currently the most comprehensive global sea turtle nesting database in existence, and is well positioned to serve as the world's premier data clearinghouse and monitoring system for sea turtles.

Taken together, the initiatives for SWOT minimum data standards provide SWOT Team members with guidelines and resources for improving the existing sea turtle nesting beach monitoring schemes, make the SWOT database more sophisticated with respect to dealing with the wide variation in quality of provided data, and lay the groundwork for future analyses of sea turtle abundance and population trends. Achieving those goals will allow SWOT to play a critical role in network building and conservation status assessments for years to come. ■

THIS PAGE: A researcher with Projeto TAMAR-ICMBio in Brazil monitors a nesting green turtle that was encountered during a nighttime beach survey. © PROJETO TAMAR – MARTA GRANVILLE
AT LEFT: © NEIL EVER OSBORNE / WWW.NEILEVEROSBORNE.COM

Acting Globally

SWOT Small Grants 2010

Since 2006, SWOT small grants have helped SWOT Team partners around the world realize their education and outreach goals. To date, we have given 31 grants to partners in 18 countries through this program. In 2010, we expanded the scope of the SWOT grants program to include work being done in each of SWOT's three areas of focus: networking and capacity building, science, and education and outreach. The following are project updates from each of our six grantees in 2010.

Rénatura—Republic of the Congo

Five of the world's seven species of sea turtles either nest or feed along the shores of the Republic of the Congo. In 2005, local nongovernmental organization Rénatura developed a dynamic environmental education program geared toward teaching the nation's next generation about sea turtles, the problems they face, and the importance of protecting sea turtles and other wildlife. A 2010 SWOT grant helped to fund another year of the program in schools in the economic center of Pointe-Noire (the country's second-largest city) and surrounding coastal villages.

Students work on a sea turtle life cycle diagram during an environmental education class developed by Rénatura. © RÉNATURA

After participating in awareness and capacity-building meetings run by COBEC, Kenyan fishermen release turtles that they would have previously slaughtered. © COBEC

Community Based Environmental Conservation (COBEC)—Kenya

Unsustainable fishing practices are a leading threat to local sea turtle populations in Kenya. With the help of a SWOT grant, COBEC led an awareness-building campaign for fishermen that combined environmental education with capacity building. COBEC organized a series of local meetings at which fishermen were taught about local marine ecology and sea turtle conservation and research techniques such as turtle tagging, nest mapping, and nest protection. In addition, five outdated fishing nets were replaced with new, more turtle-friendly nets. In the months following the campaign, the number of turtles released by fishermen increased.

African Chelonian Institute—Guinea-Bissau

Five species of sea turtles nest on the shores of Guinea-Bissau, where fisheries bycatch and direct harvesting for meat and eggs are some of the most pressing threats. Over the past two decades, the African Chelonian Institute has worked hard to learn more about the sea turtles in this region and to develop a long-term conservation plan that integrates research, outreach, and local capacity building. A 2010 SWOT grant helped to fund community-supported beach patrols on two key nesting beaches in the Bijagos Archipelago.

A team member takes a closer look at a hatchling found emerging from its nest during a field survey on the island of Poilao. © AFRICAN CHELONIAN INSTITUTE

Universidad Central del Ecuador—Ecuador

Machalilla National Park is the single most important feeding and reproductive area for hawksbill and green (black) turtles in continental Ecuador. Yet despite long-standing protection for both the park and its sea turtles, populations have continued to decline over the past several decades. In an effort to reverse this troubling trend, a 2010 SWOT grant to Micaela Peña, of the Universidad Central del Ecuador, was used to develop a Sea Turtle Recovery and Conservation Action Plan for Machalilla in collaboration with all of the park's local stakeholders. Over the course of several workshops, participants discussed and prioritized existing threats, evaluated their underlying causes, and identified measures to mitigate them. Important next steps for the project include controlling and zoning key sites within the park, developing an education and outreach campaign, and pursuing more active local participation in conservation efforts.

Micaela Peña works with local stakeholders to develop a Sea Turtle Recovery and Conservation Action Plan for Machalilla National Park. © MNP SEA TURTLE ACTION PLAN

Sculpted from canoe wood and flip flops found on Kenyan beaches, this turtle pair was made by artist Andrew McNaughton in collaboration with local craftsmen and Watamu Marine Association staff members. The turtles will be exhibited at the 5th International Marine Debris Conference in Hawaii. © 2011 WATAMU MARINE ASSOCIATION

Oceanic Society—Belize, Costa Rica, Hawaii (United States), Kenya, Micronesia, Palau, and Suriname

The ever-increasing quantity of debris being introduced into our world's oceans threatens all marine life, including sea turtles. Over the past two decades, the African Chelonian Institute and Castro Barbosa of the Institute of Biodiversity and Protected Areas have worked hard to learn more about the sea turtles in this region and to develop a long-term conservation plan that integrates research, outreach, and local capacity building. The Oceanic Society used SWOT funding to support teams of students from seven coastal locations to collect plastic debris from local sea turtle nesting beaches, create sea turtle sculptures from that debris, and ship the sculptures to the exhibit in Hawaii.

Cook Islands Turtle Project—Cook Islands

The Cook Islands form a vast archipelago of 15 islands in the South Pacific Ocean, and the Cook Islands Turtle Project is responsible for studying marine turtles throughout this expansive region. Little research has been done in recent years on the sea turtle populations that nest and feed here, and the resulting lack of information hinders efforts to protect not only sea turtles, but also the atoll ecosystems on which the local marine life depends. It took three weeks by sea for the researchers to reach the study zone. But with the help of a SWOT grant, the Cook Islands Turtle Project was able to conduct the first sea turtle survey in decades, enabling scientists to support and advance conservation practices throughout the islands.

This crawl, evidence of sea turtle nesting activity, was documented during a survey of Tongareva, the largest and most remote atoll of the Cook Islands. © COOK ISLANDS TURTLE PROJECT

Visit **www.SeaTurtleStatus.org** to apply for a 2011 SWOT Small Grant!

SWOT Team Member Spotlight

Annette Broderick (United Kingdom)

Except for my first assignment researching leatherback turtles in Trinidad and Tobago in 1991, I have remained principally in the Mediterranean studying green and loggerhead populations. After completing my Ph.D. on sea turtles in Cyprus, I was appointed Lecturer at the University of Exeter Centre for Ecology and Conservation, where I work today. Although my research and outreach work began with sea turtle conservation, it has since grown to include research on the effects of human activities on marine biodiversity. *SWOT Report* provides an invaluable reservoir of data that help scientists like me better understand how to reconcile the needs of priority sea turtle populations with those of humans.

Alfredo Mate (Mozambique)

Five sea turtle species are found in Mozambique, where I live and work. As a data analyst for the World Wildlife Fund, I study the pressures on Mozambique's sea turtle populations, and I work with conservationists like those on the SWOT Team to develop sound conservation practices. Although I collect data and do research on many marine species, I focus mostly on sea turtles because of their iconic status as flagships for the protection and health of the oceans. I hope that the data I collect and submit to *SWOT Report* will help move forward the global effort for sea turtle and ocean conservation.

Kei Okamoto (Japan)

I have been studying sea turtles in Japan since 2005, when I was an undergraduate student at Mie University and a member of its sea turtle research and conservation club. For the past two years, I have been completing my graduate degree at Tokyo University and working for the Sea Turtle Association of Japan, and I will soon begin working toward a Ph.D. I am currently studying the taxonomy of green and black turtles in Japan and was excited to learn about the "green turtle photo project" (page 34) in this issue of *SWOT Report*, because it gives a global perspective to green turtle taxonomy that is not available elsewhere. I like *SWOT Report* because it contains information about unique turtle populations and projects all over the world that helps me gain a better understanding of sea turtle status globally.

Doug Perrine (United States)

I have always been fascinated by the ocean. Since I first used a Nikonos camera while working for the Marine Resources Division in Pohnpei, Micronesia, I have been photographically documenting life below the water's surface. My work has been published in thousands of publications, including *National Geographic* Magazine, and in 2004, I was awarded the title of Wildlife Photographer of the Year by BBC *Wildlife* magazine and London's Natural History Museum. I have written several books on marine wildlife and continue to work regularly on photographic and writing assignments. I contribute my photos to *SWOT Report* because I am inspired by its mission to tell meaningful and widely accessible stories of ocean conservation through the perspective of sea turtles.

Jeffrey Seminoff (United States)

I am the program leader of the Marine Turtle Ecology and Assessment Program at National Oceanic and Atmospheric Administration's Southwest Fisheries Science Center and the current president of the International Sea Turtle Society. I am also an active member of the Marine Turtle Specialist Group of the International Union for Conservation of Nature (IUCN) and was the assessor for the most recent green turtle *IUCN Red List Assessment*. I am primarily a researcher, and my studies focus on understanding the movements and foraging ecology of sea turtles using an array of tools, particularly satellite telemetry and stable isotope analyses. My work has taken me around the world, especially throughout Latin America, where much of my research has taken place. I am continually impressed with the SWOT Team's ability to assemble sea turtle research from around the world, creating one global effort for sea turtle conservation and truly using sea turtles as a flagship species for the ocean.

SWOT Data Contributors

Guidelines of Data Use and Citation

The green turtle nesting data below correspond directly to the map on pages 30–31, and are organized alphabetically by country, then by data record number as listed on the map. Every data record with a point on the map is numbered to correspond with that point. To use data for research or publication, you must obtain permission from the data provider and must cite the original source indicated in the "Data Source" field of each record.

In the records that follow, nesting data are reported from the most recent available year or nesting season or are reported as an annual average number of clutches based on the reported years of study. Beaches for which count data were not available are listed as "unquantified." Additional metadata are available for many of these data records, including information on beach length, monitoring effort, and other comments, and may be found online at www.SeaTurtleStatus.org. Following nesting data records we have also included citations for satellite telemetry, genetic stocks, and information used to create the global distributions.

GREEN TURTLE NESTING DATA CITATIONS

AMERICAN SAMOA

DATA RECORD 1

Data Sources: (1) Balazs, G. H. 2009. *Historical Summary of Sea Turtle Observations at Rose Atoll, American Samoa, 1839–1993*. Honolulu, Hawaii: NOAA National Marine Fisheries Service, Pacific Islands Fisheries Science Center. Unpublished report. **(2)** Tagarino, A., K. S. Saili, and R. Utzurrum. 2008. *Investigations into the Status of Marine Turtles in American Samoa, with Remediation of Identified Threats and Impediments to Conservation and Recovery of Species: NOAA Grant No. NA04NMF4540126, October 1, 2004, to September 30, 2008*. Unpublished report. **(3)** Tagarino, A., and R. Utzurrum. 2010. *Investigations into the Status of Marine Turtles in American Samoa: Assessment of Threat to Nesting Activities and Habitat in Swains Island: NOAA Grant No. NA08NMF4540506, October 1, 2008, to September 30, 2009*. Final report. **(4)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey. 2010. *Green Turtle Nesting Sites and Sea Turtle Legislation throughout Oceania*. NOAA Technical Memorandum NMFS-F/SPO-110. Honolulu, Hawaii: U.S. Department of Commerce.
Nesting Beaches: Rose Atoll, Swains Atoll, and Tutuila
Years: 1993, 2009, and 2008, respectively **Counts:** 10–100 crawls, 56 crawls, and 1–10 nesting females, respectively
SWOT Contacts: Irene Kinan-Kelly and Kim Maison

ANGOLA

DATA RECORD 2

Data Source: Weir, C. R., R. Tamar, M. Morais, and A. D. C. Duarte. 2007. Nesting and at-sea distribution of marine turtles in Angola, West Africa, 2000–2006: Occurrence, threats and conservation implications. *Oryx* 41(2): 224–231.
Nesting Beach: Namibe Province **Year:** 2003
Count: Unquantified

ANGUILLA

DATA RECORD 3

Data Source: Anguilla Department of Fisheries and Marine Resources. 2011. Green turtle nesting in Anguilla: Results from ongoing nesting beach surveys. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Captains Bay, Limestone Bay, Long Bay, and Meads Bay **Year:** 2011 **Counts:** 1–25 clutches at each beach
SWOT Contacts: James Gumbs and Stuart Wynne

DATA RECORD 4

Data Sources: (1) Godley, B. J., A. C. Broderick, L. M. Campbell, S. Ranger, and P. B. Richardson. 2004. *An Assessment of the Status and Exploitation of Marine Turtles in Anguilla: An Assessment for the Status and Exploitation of Marine Turtles in the UK Overseas Territories in the Wider Caribbean*. Anguilla: Department of Environment, Food and Rural Affairs and the Commonwealth Office. Unpublished report. **(2)** Dow, W. E., and K. L. Eckert. 2007. *Sea Turtle Nesting Habitat—A Spatial Database for the Wider Caribbean Region*. Beaufort, North Carolina: Wider Caribbean Sea Turtle Conservation Network and The Nature Conservancy.
Nesting Beach: Shoal Bay West **Year:** 2003 **Count:** 1–25 crawls
SWOT Contacts: James Gumbs and Stuart Wynne

ANTIGUA AND BARBUDA

DATA RECORD 5

Data Sources: (1) Fuller, J. E., K. L. Eckert, and J. I. Richardson. 1992. *Sea Turtle Recovery Action Plan for Antigua and Barbuda*. Kingston, Jamaica: Caribbean Environment Programme. Technical report. **(2)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: 29 beaches throughout Antigua and Barbuda
Year: 1992 **Count:** Unquantified
SWOT Contacts: Cheryl Appleton, James Richardson, Peri Mason, Tricia Lovell, and Vagi Rei

ARUBA

DATA RECORD 6

Data Source: Van der Wal, E., and R. Van der Wal, Turtugaruba (Aruban Foundation for Sea Turtle Protection and Conservation). 2011 Green turtle nesting in Aruba: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: East coast: Bachelors Beach, Boca Grandi, Dos Playa, Pet's Cemetery, and Rincon; West coast: California
Year: 2010 **Counts:** 3, 30, 5, 1, 3, and 7 clutches, respectively
SWOT Contacts: Richard and Edith Van der Wal

ASCENSION ISLAND

DATA RECORD 7

Data Source: Broderick, A. C., R. Frauenstein, F. Glen, G. C. Hays, A. L. Jackson, et al. 2006. Are green turtles globally endangered? *Global Ecology and Biogeography* 15: 21–26.
Nesting Beach: Ascension Island **Year:** 2004
Count: Approximately 39,000 clutches

AUSTRALIA

DATA RECORD 8

Data Sources: (1) Harvey, T., S. Townsend, N. Kenyon, and G. Redfern. 2005. *Monitoring of Nesting Sea Turtles in the Coringa Herald National Nature Reserve: 1991/92–2003/04 Nesting Seasons*. Australia: Indo-Pacific Sea Turtle Conservation Group. Final report. **(2)** Limpus, C. J. 2009. *A Biological Review of Australian Marine Turtle Species, Chapter 2: Chelonia Mydas*. New Zealand: The State of Queensland, Environmental Protection Agency. **(3)** Limpus, C. J., J. D. Miller, C. J. Parmenter, and D. J. Limpus. 2003. The green turtle, *Chelonia mydas*, population of Raine Island and the Northern Great Barrier Reef: 1843–2001. *Memoirs of the Queensland Museum* 49(1): 349–440. **(4)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: Beaches on 12 islands and the mainland coast from Bustard to Bundaberg in the Northern Great Barrier Reef **Year:** 2004 **Counts:** 63, 240, 922, and 290 nesting females, respectively
Nesting Beaches: Coral Sea Platform: Bell Cay, Bramble Cay, Busy Island **Year:** 2004 **Count:** Unquantified
Nesting Beaches: Northern Great Barrier Reef: Erskine Island, Fairfax Island, Fraser Island, Hoskyn Island, Lady Elliot Island, Lady Musgrave Island, Mainland coast (Bustard to Bundaberg), Masthead Island, North Reef, Northwest Island, Percy Islands, Tryon Island, Wilson Island, and Wreck Island **Year:** 2009
Count: Unquantified
Nesting Beaches: Murray Islands and No. 8 Sandbank in the Southern Great Barrier Reef **Year:** 2001 **Count:** Unquantified
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

DATA RECORD 9

Data Source: Barker, L., and Australian Seabird Rescue. 2011. Green turtle nesting in Australia: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Angourie Surf Reserve, Cabarita Beach, Lennox Head 1, Mara Creek Angourie, Paches Beach, and Pippies Beach **Year:** 2009 **Counts:** 1 clutch each at Angourie Surf Reserve, Mara Creek Angourie and Pippies Beach. 1 crawl each at other beaches.
Nesting Beach: Lennox Head 2 **Year:** 2008 **Count:** 1 clutch
SWOT Contact: Lachlan Barker

DATA RECORD 10

Data Source: Broderick, D., K. E. M. Dethmers, N. N. Fitzsimmons, M. Guinea, R. Kennet, et al. 2006. The genetic structure of Australasian green turtles (*Chelonia mydas*): Exploring the geographical scale of genetic exchange. *Molecular Ecology* 15: 3931–3946.
Nesting Beach: Heron Island **Year:** 2003 **Count:** 1,000 clutches

DATA RECORD 11

Data Source: Broderick, D., K. E. M. Dethmers, N. N. Fitzsimmons, M. Guinea, R. Kennet, S. Lavery, C. J. Limpus, C. Moritz, R. I. T. Prince, and S. Whiting. 2006. The genetic structure of Australasian green turtles (*Chelonia mydas*): Exploring the geographical scale of genetic exchange. *Molecular Ecology* 15: 3931–3946.
Nesting Beaches: Ashmore Reef, North West Cape, North West Island, and Port Bradshaw **Years:** 1996, 1989, 1990, and 1998, respectively **Counts:** 100s; 5,000–10,000; 562 clutches; and unquantified, respectively

DATA RECORD 12

Data Sources: (1) Gow, G. F. 1981. Herpetofauna of Groote Eylandt, Northern Territory. *Australian Journal of Herpetology* 1(2): 62–70. **(2)** Broderick, D., et al. 2006. See complete citation in Data Record 11.
Nesting Beach: Groote Eylandt **Year:** 1999 **Count:** Unquantified

DATA RECORD 13

Data Source: Australian Government Department of Sustainability, Environment, Water, Population and Communities Species Profile and Threats Database. Accessed 2009.
Nesting Beaches: Croker Island, Dampier Archipelago, Darnley Island, Goulburn Island, Lowendal Island, Mon Repos, Muiron Islands, Ningaloo MP, Ningaloo Coast, Rocky Island, Scott Reef, Serrurier Island, Thevenard Island, Wellesley Islands, Wessel Islands, and Pisonia Island **Year:** 2009 **Count:** Unquantified

DATA RECORD 14

Data Sources: (1) Baker, V., A. Fleay, C. J. Limpus, and C. J. Parmenter. 1983. The Crab Island sea turtle rookery in the north-eastern Gulf of Carpentaria. *Australian Wildlife Research* 10(1): 173–184. **(2)** Limpus, C. J., J. D. Miller, C. J. Parmenter, and D. J. Limpus. 2003. The green turtle, Chelonia mydas, population of Raine Island and the Northern Great Barrier Reef: 1843–2001. *Memoirs of the Queensland Museum* 49(1): 349–440.
Nesting Beaches: Crab Island, MacLennan Cay, Milman Island, Moulter Cay, No. 7 Sandbank, North Bountiful Island, and Raine Island **Years:** 1983, 1988, 1978, 2001, 1997, 2002, and 2001, respectively **Counts:** Unquantified; 8; 10; 2,164; 108; 400; and 70,122 nesting females, respectively.

DATA RECORD 15

Data Source: Prince, R. I. T., M. P. Jensen, D. Oades, and the Bardi Jawi Rangers. 2011. Green turtle nesting in Western Australia: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Tiwi Islands **Year:** 2009 **Count:** Unquantified
SWOT Contact: Bob Prince

DATA RECORD 16

Data Source: RPS. 2008. 2008 *Inpex Environmental Impact Assessment Studies*. Technical Appendix: Marine Turtle Studies. Perth, Australia: RPS Planning and Environment.
Nesting Beaches: Bigge Island, Cassini Island, Hat Point, and Lamarck Island **Year:** 2006 **Counts:** 25–100 crawls each
Nesting Beaches: Maret Islands and Lacepede Islands **Year:** 2007
Counts: 250–500 clutches and 500–1,000 crawls, respectively
Nesting Beach: Montalivet Islands **Year:** 2006
Count: 100–250 crawls
SWOT Contact: David Waayers

DATA RECORD 17

Data Source: Waayers, D. A. 2003. *Nesting Distribution of Green Turtles (*Chelonia mydas*) and Loggerhead Turtles (*Caretta caretta*) between Gnaraloo Homestead and Carnarvon, including Bernier and Dorre Islands, Western Australia*. Australia: Ecowaays Australia. Unpublished report.
Nesting Beach: Red Bluff **Year:** 2003 **Count:** 1–25 crawls
Nesting Beaches: Cape Range National Park, Jane's Bay, and Jurabi Coastal Park in Ningaloo Marine Park **Year:** 2002
Counts: 25–100 crawls, 25–100 crawls, and 500–1,000 clutches, respectively
SWOT Contact: David Waayers

BAHAMAS

DATA RECORD 18

Data Source: Phillips, E. 2006. Anecdotal evidence and survey data. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.

Nesting Beaches: Great Abaco, Great Inagua, and Little Inagua **Years:** 2006, 2005, and 1998, respectively **Counts:** 25–100 crawls at each beach
SWOT Contact: Eleanor Phillips

BANGLADESH

DATA RECORD 19

Data Source: Islam, M. Z. 2010. *Bangladesh Sea Turtle Project during 2008–09 Nesting Season*. Bangladesh: Marinelife Alliance. Unpublished report.
Nesting Beaches: Cox's Bazaar, Sonadia Island, and St. Martin's Island in Teknaf **Year:** 2008 **Counts:** 2, 3, and 3 nesting females, respectively
SWOT Contact: M. Zahirul Islam

DATA RECORD 20

Data Source: Rashid, S. M. A., and M. Z. Islam. Status and conservation of marine turtles in Bangladesh. In Shanker, K., and B. C. Choudhury, eds. 2006. *Marine Turtles of the Indian Subcontinent*. Hyderguda, India: Universities Press.
Nesting Beaches: Bordal, Kochopia, Monkhali, Sandweep Island, and Teknaf **Years:** 1989, 1985, 1984, 1985, and 1987, respectively **Counts:** 6, 6, 2, 4, and 2 clutches, respectively

BARBADOS

DATA RECORD 21

Data Source: Beggs, J. A., J. A. Horrocks, and B. H. Krueger. 2007. Increase in hawksbill *Eretmochelys imbricata* turtle nesting in Barbados, West Indies. *Endangered Species Research* 3: 159–168.
Nesting Beach: Foul Bay **Year:** 2005 **Count:** 1–25 crawls
SWOT Contacts: Jen Beggs and Julia Horrocks

BELIZE

DATA RECORD 22

Data Sources: **(1)** Majil, I. 2006. *Inter-American Convention for the Protection and Conservation of Sea Turtles, Belize Second Annual Report*. Belize: Fisheries Department. Unpublished report. **(2)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Glovers-Long, Lighthouse-Half, Robles Point Bacalar Chico Marine Reserve, and Rock Point Bacalar Chico Marine Reserve **Year:** 2006 **Counts:** 1–25 crawls at each beach
Nesting Beach: Lighthouse-Long **Year:** 2006
Count: Unquantified
SWOT Contacts: Isaias Majil and Bacalar Chico Marine Reserve

BONAIRE

DATA RECORD 23

Data Sources: **(1)** van Eijck, T. J. W., and K. L. Eckert. 1994. *Sea Turtles in Bonaire: 1993 Survey Results and Conservation Recommendations*. Amsterdam: Sea Turtle Club Bonaire. **(2)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beach: Boca Onima **Year:** 2006 **Count:** 1–25 crawls
SWOT Contacts: Imre Esser, Kalli De Meyer, and Mabel Nava

DATA RECORD 24

Data Source: Nava, M., Sea Turtle Conservation Bonaire. 2011. Green turtle nesting in Bonaire: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Atlantis, Fisherman's Hut, Playa Chikitu, and South Playa Frans **Years:** 2007, 2007, 2008, and 2006, respectively **Counts:** 3, 2, 16, and 4 clutches, respectively
SWOT Contact: Mabel Nava

BRAZIL

DATA RECORD 25

Data Source: Barata, P., A. Barsante, C. Bellini, J. Castilhos, C. Coelho, A. C. Coelho Dias da Silva, G. Lopez, N. Marcovaldi, A. de Padua Aleida, E. Paes e Lima, A. Santos, L. Soares, and J. C. Thome. 2011. Green turtle nesting data from Projeto TAMAR Database (SITIMAR): Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Bahia State: Arembepe, Costa do Sauipe, Praia do Forte, and Sitio do Cond **Year:** 2010 **Counts:** 15, 600, 190, 3,148 clutches, respectively
Nesting Beaches: Espirito Santo State–Trindade Island, Pernambuco State–Fernando de Noronha, and Rio Grande do Norte State–Atol das Rocas **Year:** 2010 **Counts:** Unquantified
SWOT Contacts: Antonio de Padua Almeida, Alexsandro Santos, Armando Barsante, Augusto Cesar Coelho Dias da Silva, Cesar Coelho, Claudio Bellini, Eron Paes e Lima, Gustave Lopez, Jaqueline Castilhos, Joao Carlos Thome, Luciano Soares, Neca Marcovaldi, and Paulo Barata

CAYMAN ISLANDS

DATA RECORD 26

Data Sources: **(1)** Austin, T. J., C. D. Bell, J. M. Blumenthal, A. C. Broderick, G. Ebanks-Petrie, et al. 2007. Monitoring and conservation of critically reduced marine turtle nesting populations: Lessons from the Cayman Islands. *Animal Conservation* 10(1): 39–47. **(2)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Barefoot Gardens, Barkers, Bat Cave Beach, Chrisholm Road, Cottage, East End, Half Moon Bay, Little Spotts, Miller's Beach, Morrits Tortuga, Pease Bay, Prospect Point, Sand Hole Road, Spots Beach, Spots Dock, Spotters Way, and SS808 **Year:** 2006 **Counts:** 1–25 crawls at each beach
SWOT Contact: Gina Ebanks-Petrie

DATA RECORD 27

Data Source: Blumenthal, J., Cayman Islands Department of Environment.2011. Green turtle nesting in the Cayman Islands: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Grand Cayman **Year:** 2009 **Count:** 35 clutches
SWOT Contact: Janice Blumenthal

DATA RECORD 28

Data Source: Solomon, J., and J. Blumenthal. 2007. *Cayman Islands Government, Department of Environment Annual Marine Turtle Beach Monitoring Program*. Cayman Islands. Unpublished report.
Nesting Beach: Little Cayman **Year:** 2007 **Count:** 5 clutches
SWOT Contact: Joni Solomon

CHINA

DATA RECORD 29

Data Sources: **(1)** Chan, S. K.-F., I. J. Cheng, H-X. Gu, X.-J. Song, H.-J. Wang, and T. Zhou. 2007. A comprehensive overview of the population and conservation status of sea turtles in China. *Chelonian Conservation and Biology* 6(2): 185–198. **(2)** Balazs, G. H., J. K. Chan, S. K.-F. Chan, and L. T. Lo. 2003. Satellite tracking of the post-nesting migration of a green turtle (*Chelonia mydas*) from Hong Kong. *Marine Turtle Newsletter* 102: 2–4.
Nesting Beaches: Dongsha Archipelago and Lamma Island **Years:** 1995 and 2002, respectively **Counts:** Unquantified and 4 clutches, respectively
SWOT Contact: I-Jiunn Cheng

DATA RECORD 30

Data Source: Cheng, I. J., C. L. Fong, C. T. Huang, P. Y. Hung, B. Z. Ke, et al. 2009. A ten year monitoring of the nesting ecology of the green turtle (Chelonia mydas) on Lanyu Island (Orchid Island), Taiwan. *Zoological Studies* 48(1): 83–97.
Nesting Beach: Huidong **Year:** 2009 **Count:** 1–25 nesting females
SWOT Contact: I-Jiunn Cheng

DATA RECORD 31

Data Source: Chan, S., H. Gu, H. Jiang, X. Song, H. Wang, et al. 2002. Satellite tracking of post-nesting movements of green turtles (*Chelonia mydas*) from the Gangkou Sea Turtle National Nature Reserve, China. *Marine Turtle Newsletter* 97: 8–9.
Nesting Beach: Guangdong Province–Gangkou **Year:** 2001
Count: Unquantified

COCOS (KEELING) ISLANDS

DATA RECORD 32

Data Source: United Nations Environment Programme—World Conservation Monitoring Centre. The Marine Turtle Interactive Mapping System (IMAPS): Green turtle nesting data. http://stort.unep-wcmc.org/imaps/IndTurtles/viewer.htm. Accessed 2010.
Nesting Beach: Cocos Island **Year:** 1999 **Count:** 100–500 nesting females

DATA RECORD 33

Data Source: Whiting, S. D. 2007. *The Sea Turtle Resources of the Cocos (Keeling) Islands, Indian Ocean: Year 7—2006*. Australia: Commonwealth of Australia.
Nesting Beach: North Keeling Island **Year:** 2006
Count: 29 nesting females
SWOT Contact: Andrea Whiting

COLOMBIA

DATA RECORD 34

Data Source: Amorocho, D. 2008. *Informe del Taller Estandarizacion de Metodologias en Investigacion y Monitoreo para la Conservación de Tortugas Marinas en Colombia*. Colombia: Convenio Ministerio de Ambiente, Vivienda y Desarrollo Territorial (MAVDT)-WWF. Unpublished report.
Nesting Beach: El Valle **Year:** 2008 **Count:** 1 nesting female
SWOT Contacts: Cristian Ramirez-Gallego, Diego Amorocho, and Karla G. Barrientos-Muñoz

DATA RECORD 35

Data Sources: **(1)** Ceballos-Fonseca, C. 2004. Distribucion de playas de anidacion y areas de almientacion de tortugas marinas y sus amenazas en el Caribe Colombiano. *Boletin de Investigaciones Marinas y Costeras* 33: 77–99. **(2)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Albuquerque, Bahia Hondita, Boca del Apure, Bonito Gordo, Buritaca, Cano Lagarto, Cayo Roncador, Cayo Serranilla, Chengue, Cinto, Concha, Courtown, Corelca, Cuchicampo, Damaquiel, Dibulla, Don Diego, El Cabo, El Medio, El Sequion, Gairaca, Guachaca, Guachaquita, Jarrajarraru, Los Achotes, Los Cocos, Mata de Platano, Mendiguaca, Monitos, Montanita, Naranjo, Neguanje, Neimao, Palamarito, Palomino, Parajimaru, Piscinita, Playa Brava, Playa Larga, Playa Rocosa, Puerto Ingles, Puerto Lopez, Punta Castilletes, Punta Espada, Punta Estrella, Punta Gallinas, Punta Huayapain, Pusheo, Quintana, Rinconcito, Rio Ancho, Rio Cedro, San Juan de Uraba, San Salvador, Santa Cruz, Uvero, and Valencia **Year:** 2002 **Counts:** 1–25 crawls at each beach
Nesting Beaches: Cabo Falso, Chichibacoa, Jarrajarraru, Media Luna, Monitos, Neimao, Puerto Lodo, Rio Cedro, Taroa, and Taroita **Year:** 2002 **Counts:** 25–100 crawls at each beach
Nesting Beach: Serrana **Year:** 2002 **Count:** Unquantified
SWOT Contacts: Claudia Ceballos, Elizabeth Taylor, and Zunilda Baldonado

DATA RECORD 36

Data Sources: **(1)** Payan, L. F. 2009. Fortalecimiento del programa de monitoreo de tortugas marinas CIMAD–UAESPNN en el Parque Nacional Natural Gorgona, informe preliminar. Unpublished report. **(2)** Amorocho, D. 2009. *Monitoreo Temporada de Anidacion de Tortugas Marinas en Playa Palmeras–PNN Gorgona*. Final report. Gorgona, Colombia: Centro de Investigacion para el Manejo Ambiental y el Desarrollo (CIMAD).
Nesting Beach: Playa Palmeras in Parque Nacional Natural Gorgona **Year:** 2009 **Count:** 6 nesting females
SWOT Contacts: Diego Amorocho and Ana Eugenia Herrara

COMOROS

DATA RECORD 37

Data Source: Bourjea, J., D. Broderick, S. Ciccione, L. Gagnevin, H. Grizel, et al. 2007. Phylogeography of the green turtle, *Chelonia mydas*, in the Southwest Indian Ocean. *Molecular Ecology* 16(1): 175–186.
Nesting Beach: Moheli **Year:** 2005 **Count:** 632 clutches

DATA RECORD 38

Data Source: Beudard, F., J. Bourjea, S. Ciccione, J. Frazier, C. Marmoex, A. M'soali, and D. Roos. 2011. Green turtle nesting at Moheli Island, Comoros: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Fomboni-Hoani **Year:** 2010
Count: 64 nesting females
SWOT Contacts: Chris Poonian, Claire Jean, Jerome Bourjea, and Stephane Ciccione

CONGO, REPUBLIC OF

DATA RECORD 39

Data Sources: **(1)** Bal, G., N. Breheret, and A. Girard. 2008. *Renatura : Rapport d'activite du programme d'etude et de sauvegarde des tortues marines au Congo*. Republic of Congo: Renatura. Unpublished report. **(2)** Girard, A. 2011. Green turtle nesting in Congo: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Bellelo, Djeno, and Tchissaou **Year:** 2007 **Counts:** 0, 0, and 6 crawls, respectively
Nesting Beach: Kouilou **Year:** 2005 **Count:** 1,381 nesting females
SWOT Contact: Alexandre Girard

COOK ISLANDS

DATA RECORD 40

Data Sources: **(1)** Balazs, G. H. Status of sea turtles in the central Pacific Ocean. In Bjorndal, K., ed. 1995. B*iology and Conservation of Sea Turtles*. Washington, DC: Smithsonian Institution Press. **(2)** Center for Cetacean Research and Conservation. 2004. Cook Islands Turtle Survey. www.whaleresearch.org/turtles/home.htm. **(3)** Woodrum-Rudrud, R. 2010. Forbidden sea turtles: Traditional laws pertaining to sea turtle consumption in Polynesia (including the Polynesian outliers). *Conservation and Society* 8(1): 84–97. **(4)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: Manihiki, Penrhyn, Pukapuka, and Rakahanga **Year:** 1970 **Count:** Unquantified
Nesting Beach: Palmerston Island **Year:** 2000
Count: 1–10 nesting females
Nesting Beaches: Nassau Island and Suwarrow Atoll **Year:** 2010 **Count:** Unquantified
SWOT Contact: Kim Maison and Irene Kinan-Kelly

COSTA RICA

DATA RECORD 41

Data Sources: **(1)** Arauz, R., I. Naranjo, S. P. Sunyer, and M. S. Viejobueno. 2009. *Conservación e Investigación de Tortugas Marinas en el Pacifico de Costa Rica (Punta Banco, Refugio Nacional de Vida Silvestre Caeltas-Ario, San Miguel, Corozalito)*. Unpublished report. **(2)** Arauz, R. 2011. Green turtle nesting in Pacific Costa Rica: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Corozalito, Playa Caletas, and Punta Banco/ Punta Burica **Year:** 2008 **Counts:** 1, 2, and 2 nesting females, respectively

SWOT Contacts: Alex Gaos, Sandra Viejobueno, and Shaleyla Kelez

DATA RECORD 42

Data Source: Aviles, J. R., G. Chaves, and R. Morera. 2011. Green turtle nesting in Ostional National Wildlife Refuge, Costa Rica: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Ostional National Wildlife Refuge **Year:** 2008 **Count:** 23 clutches
SWOT Contact: Gerardo Chaves

DATA RECORD 43

Data Source: Chacon Chaverri, D., and Asociación ANAI. 2006. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beach: Cahuita **Year:** 2005 **Count:** 25–100 clutches
SWOT Contact: Didiher Chacon Chaverri

DATA RECORD 44

Data Source: Malavar Montenegro, M., and D. Chacon Chaverri. 2011. Green turtle nesting in Costa Rica: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Carate, Pejeperro, and Rio Oro **Year:** 2008 **Count:** 16 nesting females, combined
Nesting Beaches: Sirena and Corcovado **Year:** 2008 **Count:** 13 clutches
SWOT Contacts: Mariana Malavar Montenegro and Didiher Chacon Chaverri

DATA RECORD 45

Data Source: Seminoff, J. A., B. A. Schroeder, S. MacPherson, E. Possardt, and K. Bibb. 2007. *Green Sea Turtle (*Chelonia mydas*) 5-Year Review: Summary and Evaluation*. Silver Spring, Maryland: National Marine Fisheries Service and U.S. Fish and Wildlife Service.
Nesting Beaches: Playa Naranjo and Tortuguero **Year:** 2007 **Counts:** 200 and 82,038 clutches, respectively

CUBA

DATA RECORD 46

Data Source: Azanza Ricardo, J., D. Cobian, L. Garcia Lopez, C. Gomez Pereda, N. Hernandez, et al. 2010. *Results of the Thirteenth Season of the University Project for the Study and Conservation of Sea Turtles in Guanahacabibes*. Cuba. Technical report.
Nesting Beaches: Pinar del Rio: Beaches of the Guahanacabibes Peninsula **Year:** 2010 **Count:** 100 nesting females
SWOT Contact: Julia Azanza Ricardo

DATA RECORD 47

Data Source: Moncada, F., Centro de Investigaciones Pesqueras (CIP); and ENFF (Empresa Nacional de Flora y Fauna). 2007. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beach: Peninsula de Guanahacabibes **Year:** 2006 **Count:** 100–500 crawls
Nesting Beaches: Cayo Peredon Grande: Cayo Coco, Cayo Fragosa, Cayos de San Felipe and Guanal **Year:** 2006 **Counts:** 1–25, 1–25, and 25–100 crawls, respectively
Nesting Beaches: Isle of Pines: Cayeroa de Doce Leguas, Cayo Guillermo, and Cayo Santa Maria **Year:** 2006 **Counts:** 100–500, 1–25, and 1–25 crawls, respectively
SWOT Contacts: Julia Azanza and Felix Moncada

DATA RECORD 48

Data Source: Blanco, R., E. Escobar, Y. Forneiro, F. Moncada, Y. Medina, et al. 2009. *Annual Report of Research and Conservation of Marine Turtles*. Havana, Cuba: Fisheries Research Center for the Ministry of Fisheries. Final report.
Nesting Beaches: Cayo Campos, Cayo Largo, and Cayo Rosario (eastern keys of Isla de la Juventud) **Year:** 2009 **Counts:** 0, 817, and 2 nesting females, respectively
Nesting Beaches: Cayos de San Felipe (Cayo Siju, Cayo Real, and Juan Garcia), Playa El Guanal, and Playas del Laberinto de las Doce Leguas **Year:** 2009 **Counts:** 61 nesting females, 37 nesting females, and 25–100 clutches, respectively
SWOT Contact: Felix Moncada

CURAÇAO

DATA RECORD 49

Data Sources: (1) Debrot, A. O., and L. J. J. Pors. 1995. Sea Turtle nesting activity on northeast coast beaches in Curaçao, 1993. *Caribbean Journal of Science* 31(3–4): 333–338. **(2)** Leysner, B., and P. Hoetjes. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Boka Mansalina and Un Boka **Year:** 1993 **Count:** 1-25 crawls
Nesting Beach: North Beach–Klein Curaçao **Year:** 2005 **Count:** Unquantified
SWOT Contacts: Brian Leysner and Paul Hoetjes

CYPRUS

DATA RECORD 50

Data Source: Broderick, A. C., F. Glen, B. J. Godley, and G. C. Hays. 2002. Estimating the number of green and loggerhead turtles nesting annually in the Mediterranean. *Oryx* 36(03): 227–235.
Nesting Beach: Lara **Year:** 2005 **Count:** 50 clutches

DATA RECORD 51

Data Source: Casale, P., and D. Margaritoulis. 2010. *Sea Turtles in the Mediterranean: Distribution Threats and Conservation*. Gland, Switzerland: International Union for the Conservation of Nature (IUCN). Unpublished report.
Nesting Beach: Alagadi **Year:** 2010 **Count:** 100 clutches
Nesting Beaches: Morphou Bay and Toxeftra **Year:** 2010 **Counts:** 25–100 nesting females at each beach

DATA RECORD 52

Data Source: Broderick, A. C., B. J. Godley, and M. Kasparek, M. 2001. Nesting of the green turtle, *Chelonia mydas*, in the Mediterranean: A review of status and conservation needs. *Zoology in the Middle East* 24: 45–74.
Nesting Beach: North Karpaz **Year:** 2001 **Count:** 179 clutches

DATA RECORD 53

Data Source: Broderick, A. C., W. J. Fuller, B. J. Godley, and R. T. E. Snape. 2009. *Marine Turtle Conservation Project Northern Cyprus*. Unpublished report.
Nesting Beaches: North coast beaches surrounding Esentepe, and West coast beaches surrounding Akdeniz **Year:** 2009 **Counts:** 123 and 43 clutches, respectively
SWOT Contact: Annette Broderick

DOMINICA

DATA RECORD 54

Data Source: Byrne, R., S. Durand, and S. Stapleton. 2007. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Big Bottom, Hodges Bay, Jimmy's Bay, Londonderry Bay (Cabana), L'anse Noir, L'anse Tortue, Plaisance Bay, Swaier, Thibaud, and Walker's Rest Bay **Year:** 2006 **Count:** Unquantified
Nesting Beaches: Ravine Cyrique and Secret Beach **Year:** 2006 **Counts:** 1–25 crawls at each beach
SWOT Contacts: Rowan Byrne, Seth Stapleton, and Stephen Durand

DOMINICAN REPUBLIC

DATA RECORD 55

Data Sources: (1) Ottenwalder, J. A. 1982. *Preliminary Study on Status, Distribution and Reproductive Biology of Sea Turtles in the Dominican Republic*. Univeristy of Santo Domingo, Dominican Republic: Department of Biology. Unpublished report. **(2)** Ross, J. P., and J. A. Ottenwalder. The leatherback turtle, *Dermochelys coriacea*, nesting in the Dominican Republic. In A. G. J. Rhodin and K. Miyata, eds. 1983. *Advances in Herpetology and Evolutionary Biology*. Cambridge, Massachusetts: Museum of Comparative Zoology, Harvard University. **(3)** Leon, Y., and Universidad Dominicana Instituto Tecnologico de Santo Domingo (INTEC). Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Playa Las Terrenas–Cabo Samana, Playa Nisibon–Boca del Maimon, Playa Macao–Cabeza de Toro, and Sosa–Boca del Yasica **Year:** 1981 **Counts:** 1–25 crawls at each beach
Nesting Beaches: Isla Saona, and Nigua-Gran Estero **Year:** 2006 **Count:** 1–25 and 25–100 crawls, respectively
SWOT Contacts: Yolanda León and Instituto Tecnológico de Santo Domingo

ECUADOR

DATA RECORD 56

Data Sources: (1) Baquero, A., J. P. Munoz, and M. Pena. 2011. Green turtle nesting in Ecuador: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011). **(2)** Coello, D., C. Flores, and M. Herrera. 2011. Green turtle nesting in Cabos San Lorenzi, Ecuador: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: San Lorenzo (in Esmeraldas) **Year:** 2009 **Count:** 4 clutches
SWOT Contacts: Daniel Rios, Dialhy Coello, Marco Herrera, and Equilibrio Azul

DATA RECORD 57

Data Sources: (1) Equilibrio Azul. 2011. Green turtle nesting in Ecuador: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011). **(2)** Baquero, A., X. Chalen, J. Macias, F. Munoz, M. Pena, and J. Puebla. 2011. Green turtle nesting in Ecuador: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Bahia Drake–Isla de la Plata, La Playita, and Puerto Lopez **Year:** 2008 **Counts:** 15, 4, and 1 nesting female(s), respectively
Nesting Beaches: Salango and Tortuguita **Year:** 2008 **Counts:** 9 and 3 clutches, respectively
SWOT Contact: Equilibrio Azul

DATA RECORD 58

Data Source: Seminoff, J. A., B. A. Schroeder, S. MacPherson, E. Possardt, and K. Bibb. 2007. See complete citation in Data Record 45.
Nesting Beaches: Barahona–Isla Isabela, Las Bachas–Isla Santa Cruz, Las Salinas–Isla Baltras, and Quinta Playa–Isla Isabel **Year:** 2005 **Counts:** 5,397; greater than 100; greater than 100; and greater than 1,000 clutches, respectively

EGYPT

DATA RECORD 59

Data Source: Hanafy, M. H., A. Salam, M. Abd El-Ghani, T. Monier, T. Mahmoud, et al. 2003. *Marine Turtles on the Egyptian Coast of the Red Sea*. Egypt: Programme for the Environment of the Red Sea and Gulf of Aden. Unpublished report.
Nesting Beaches: Ras Banas (Hertawy), Ras Henkrab, Sernaka Island, Torfat Al Mashayeikh North, uum Al-Abas area, Wadi El-Gamal Island, and Zabargad Island **Year:** 2003 **Counts:** 8, 756; 27; 182; 158; 131; and 2,210 clutches, respectively

EL SALVADOR

DATA RECORD 60

Data Source: Liles, M., W. Lopez, G. Mariona, J. Segovia, and M. Vasquez. 2011. Green turtle nesting in El Salvador: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: La Paz, La Union, San Vincente, Sonsonate, and Usulutan **Year:** 2007 **Counts:** 391, 303, 138, 1, and 585 clutches, respectively
SWOT Contacts: Georgina Mariona, Johanna Segovia, Mauricio Vasquez, Michael Liles, and Wilfredo Lopez

EQUATORIAL GUINEA

DATA RECORD 61

Data Source: Fretey, J. 2001. *Biogeography and Conservation of Marine Turtles of the Atlantic Coast of Africa*. CMS Technical Series, Publication No. 6. Bonn, Germany: United Nations Environment Programme / Convention on Migratory Species (CMS).
Nesting Beaches: Beaches north of Bata, and Corisco Island **Year:** 2001 **Count:** Unquantified

DATA RECORD 62

Data Source: Rader, H., M. A. Ela Mba, W. Moora, and G. Hearn. 2006. Marine turtles on the southern coast of Bioko Island (Gulf of Guinea, Africa), 2001–2005. *Marine Turtle Newsletter* 111: 8–10.
Nesting Beach: Bioko Island **Year:** 2006 **Count:** 1,000–5,000 clutches

ERITREA

DATA RECORD 63

Data Source: United Nations Environment Programme—World Conservation Monitoring Centre. 2010. See complete citation in Data Record 32.
Nesting Beaches: Beaches of Eritrea **Year:** 2007 **Count:** 165 clutches

FIJI

DATA RECORD 64

Data Sources: (1) Batibasaga, A., A. Qauqau, and S. Waqaiabete. 2006. *Notes on Fijian Sea Turtles: Estimates on Population Status*. Fiji: Fiji Fisheries Department. Unpublished report. **(2)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: Nanuku Levu and Nukumbalati Island **Year:** 2006 **Counts:** Unquantified and 10–100 nesting females, respectively
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

FRENCH GUIANA

DATA RECORD 65

Data Source: Kelle, L.; Amana Nature Reserve; and Association Kulalasi. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Farez, Irakumpapi, Organabo, and Pointe Isere **Year:** 2006 **Count:** 100–500 crawls combined
SWOT Contacts: Laurent Kelle, Amana Nature Reserve, and Association Kulalasi

DATA RECORD 66

Data Source: de Thoisy, B.; Association Kwata; and Association Sépanguy. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beach: Kourou and Karouabo Beach **Year:** 2006 **Count:** 25–100 crawls, combined
SWOT Contacts: Benoit de Thoisy, Association Kwata, and Association Sépanguy

FRENCH POLYNESIA

DATA RECORD 67

Data Source: Abreu-Grobois, F. A., G. H. Balazs, B. W. Bowen, R. J. Ferl, N. Kamezaki, et al. 1995. Trans-Pacific migrations of the loggerhead turtle (*Caretta caretta*) demonstrated with

mitochondrial DNA markers. *Proceedings of the National Academy of Sciences* 92: 3371–3734.
Nesting Beach: Rangiroa **Year:** 1991 **Count:** Unquantified

DATA RECORD 68

Data Sources: (1) Balazs, G. H., J. P. Landret, and P. Siu. 1995. Ecological aspects of green turtles nesting at Scilly Atoll in French Polynesia. In *Proceedings of the Twelfth Annual Symposium on Sea Turtle Biology and Conservation*, compilers J. I. Richardson and T. H. Richardson, 7–10. Jekyll Island, Georgia, USA. NOAA Technical Memorandum NMFS-SEFSC-361, **(2)** Lebeau, A. 1985. Breeding evaluation trials in the green turtle *Chelonia mydas* (Linne) on Scilly Atoll (Leeward Islands, French Polynesia) during the breeding season 1982–1983 and 1983–1984. In *Proceedings of the Fifth International Coral Reef Congress* 5: 487–493. **(3)** Hirth, H. F. 1971. Synopsis of biological data on the green turtle *Chelonia mydas* (Linnaeus) 1758. FAO *Fisheries Synopsis* (85) 1.1–8.19. **(4)** Pritchard, P. C. H. 1995. Marine turtles of the South Pacific. In Bjorndal, K., ed. 1995. Biology and Conservation of Sea Turtles. Washington, DC: Smithsonian Institution Press. **(5)** Te Mana o Te Moana. 2009. *Marine Environment Protection and Public Awareness in French Polynesia: Te Mana o Te Moana Activity Report* 2004–2008. Moorea, French Polynesia: Te Mana o Te Moana. Unpublished report. **(6)** Trevor, A. P. 2009. *Annual Report: Secretariat of the Pacific Regional Environment Program Turtle Research and Monitoring Database System (TREDS)*. Apia, Samoa: Secretariat of the Pacific Regional Environment Program Unpublished report. **(7)** Chelonia Polynesia. 2010. Personal communication. In Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: Bellinghausen (Motu One) and Scilly Atoll **Years:** 1991 and 1990, respectively **Counts:** 33, and 300–400 nesting females, respectively
Nesting Beaches: Bora Bora and Tetiaroa Atoll **Years:** 2010 and 2009, respectively **Counts:** 4–18, and 33 clutches, respectively
Nesting Beaches: Mopelia and Tupai **Year:** 1995
Count: Unquantified
Nesting Beaches: Manihi Atoll and Puka Puka Island
Years: 1971 and 1938, respectively **Count:** Unquantified
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

FRENCH INDIAN OCEAN TERRITORIES

DATA RECORD 69

Data Source: Rene, F., and D. Roos. 1996. The status of sea turtle conservation in French Territories of the Indian Ocean: Isles Eparces. In *Proceedngs of the Western Indian Ocean Training Workshop and Strategic Planning Session on Sea Turtles*. UNEP Regional Seas Reports and Studies No. 165. Sodwana Bay, South Africa.
Nesting Beach: Isles Eparces **Year:** 1996 **Count:** Unquantified

DATA RECORD 143

Data Sources: (1) Lauret-Stepler, M., S. Ciccione, and J. Bourjea. 2010. Monitoring of marine turtles' reproductive activities in Juan de Nova, Eparses Islands, South Western Indian Ocean, based on tracks count and width. *Indian Ocean Turtle Newletter* 11: 18–25. **(2)** Bourjea, J., C. Jean, and S. Ciccione. 2011. Green turtle nesting in the French Indian Ocean Territories: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Reunion; Europa, Glorieuses, Juan de Nova, and Tromelin in Iles Eparses **Year:** 2009 **Counts:** 0 clutches; 8,282 crawls; 4,340 crawls; 1–25 crawls; and 595 nesting females, respectively
SWOT Contacts: Claire Jean, Jerome Bourjea, and Stephane Ciccione

GAMBIA

DATA RECORD 70

Data Source: Fretey, J. 2001. See complete citation in Data Record 61.
Nesting Beach: Niumi-Sine Saloum National Park **Year:** 2001
Count: Unquantified

GRENADA

DATA RECORD 71

Data Source: Fastigi, M., and YWF–Kido Foundation. 2011. Green turtle nesting on Carriacou Island, Grenada: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Anse La Roche in Carriacou Island **Year:** 2008
Count: 1 nesting female
SWOT Contact: Marina Fastigi

GUADELOUPE

DATA RECORD 72

Data Source: Delcroix, E. 2011. Green turtle nesting in Guadeloupe: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: On Basse-Terre Island: Anse a Sable, Anse Caraibe, Bananier, Cayenne, Cluny Beach, Fort Royal, Galets Rouges, Grande Anse Deshaies, Grande Anse Trois-Rivieres, La Perle Beach, Les Esclaves, Machette, Malendure, Nogent, Plage de Mambia, Pointe Allegre, Pointe Vieux–Habitants Etang, Rifflet, Rivieres Sens, Sainte-Claire, and Tillet; on Grand-Terre Island: Anse a l'eau–Anse a la croix, Anse des Chateaux, Anse La Chapelle, Anse Laborde, Anse Lavolvaine, Baie Olive, Bois Jolan, La Gourde, La Grotte, La Saline, Le Souffleur, Les Alizes, Les Rouleaux, Pointe d'Antigues–Cimetière Souffleur, Port-Louis Sud, and Raisins Clairs; on Iles de la Petite Terre: Petite-Terre; on Les Saintes: Anse Figuier, Grande Anse de Terre-de-Haut, Pain de Sucre, and Pompierre; on Marie Galante Island: Anse Canot, Anse de May, Anse l'Eglise, Feuillard, Feuillere, Les Galets, Petite Anse, Trois-Ilets and Folle Anse beaches, and Vieux-Fort **Year:** 2009 **Counts:** Petite-Terre—31 clutches, Les Galets—31 clutches, Port-Louis Sud—17 clutches, Anse La Chapelle—12 clutches, La Gourde—7 clutches, Feuillard—6 clutches, La Saline—4 clutches, Grande Anse de Terre-de-Haut—4 clutches, Anse Laborde—2 clutches, Anse Lavolvaine—2 clutches; 1 clutch each at Grande Anse Trois-Rivieres, Les Esclaves, Nogent, Tillet, La Grotte, Pointe d'Antigues–Cimetière Souffleur, Anse Figuier, Pompierre, and Anse de May; 0 clutches at all other beaches
SWOT Contact: Eric Delcroix

GUAM

DATA RECORD 73

Data Sources: (1) Division of Aquatic and Wildlife Resources (DAWR). 2009. *Final Annual Progress Report for the Guam Sea Turtle Recovery Project. Award Period 8/1/2006 – 7/31/2008. NOAA Fisheries Grant No. NA06NMF4540214*. Unpublished report. **(2)** Farley, J., and G. Grimm. 2008. DRAFT Sea Turtle nesting Activity on Navy Base Guam 2007–2008. Guam: NAVFAC Marianas. Unpublished report. **(3)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: 12 beaches throughout Haiti **Year:** 2008
Counts: 1–10 clutches at each beach
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

GUATEMALA

DATA RECORD 74

Data Source: Muccio, C. 2011. Green turtle nesting in Guatemala: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Hawaii **Year:** 2008 **Count:** 1 clutch
SWOT Contact: Colum Muccio

GUINEA-BISSAU

DATA RECORD 75

Data Source: Amadeu, A., C. Barbosa, L. Benoit, P. Bruno, I. Bucar, et al. 2009. Status, ecology, and conservation of sea turtles in Guinea-Bissau. *Chelonian Conservation and Biology* 8(2): 150–160.
Nesting Beach: Poilao in the Bijagos Archipelago **Year:** 2007
Count: 29,016 clutches

GUYANA

DATA RECORD 76

Data Source: DeFreitas, R., M. Kalamandeen, and P. Pritchard. 2007. *Aspects of Marine Turtle Nesting in Guyana, 2007*. Georgetown, Guyana: Guianas Forests and Environmental Conservation Project (GFECP), World Wildlife Fund. Technical report.
Nesting Beaches: Almond and Annette Beaches **Year:** 2007
Count: 208 nesting females, combined
SWOT Contact: Michelle Kalamandeen

HAITI

DATA RECORD 77

Data Sources: (1) Ottenwalder, J. A. 1996. The current status of sea turtles in Haiti. In Henderson, R. W., and R. Powell, eds. 1996. C*ontributions to West Indian Herpetology—A Tribute to Albert Schwartz*, 291–393. Society for the Study of Amphibians and Reptiles. **(2)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Anse a Chou Chou, Anse Pitres, Belle-Anse, Baie de Caracol, Cayes Jacmel, Raymond, Cotes de Fer, Cotes de Fer Fond Larange, Freycinau, Mayette, Mouillage, and Pointe de Tois Lataniers **Year:** 1982 **Count:** Unquantified
Nesting Beaches: Ile-a-Vache and Laborieux **Year:** 1983
Count: Unquantified
SWOT Contact: Jean Wiener

HONDURAS

DATA RECORD 78

Data Sources: (1) Macias, F. S. 2006. *Honduras Second Annual Report: Inter-American Convention for the Protection and Conservation of Sea Turtles*. Honduras: Secretario de Estado en el Despacho Recursos Naturales y Ambiente (SERNA). Unpublished report. **(2)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Bahia de Tela, Cayo Bobel, Cayo Port Royal or Tortuga, Isla de Utila, Punta Castilla, and Tocamacho
Years: 2006, 2006, 2006, 2007, 2002, and 2006, respectively
Counts: 1–25 crawls, 100–500 crawls, 1–25 crawls, unquantified, 25–100 crawls, and unquantified, respectively
SWOT Contacts: Michelle Fernandez, Justin Gerlach, Carlos Molinero, Lidia Salinas, FUCAGUA, Carlos Molinero, and Gerson Martinez

INDIA

DATA RECORD 79

Data Source: Giri, V. 2006. Sea turtles of Maharashtra and Goa. In Choudhury, B. C., and K. Shanker, eds. 2006. *Marine Turtles of the Indian Subcontinent*. Hyderguda, India: Universities Press.
Nesting Beaches: Mumbai; 5 beaches in Sindhudurg district; and 4 beaches in Ratnagiri district, all in Maharashtra **Year:** 2000
Count: Unquantified

DATA RECORD 80

Data Source: Joshua, J., V. V. Kumar, and S. F. W. Sunderraj. 2006. Sea turtles and their nesting habitats in Gujarat. In Choudhury, B. C., and K. Shanker, eds. 2006. *Marine Turtles of the Indian Subcontinent*. Hyderguda, India: Universities Press.
Nesting Beaches: In Gujarat: Adri-Navapara, Junagadh; Baidher Island, Jamnagar; Kantla-Kachhadi, Junagadh; Kharakhetar-Kuranga, Jamnagar; Lamba, Jamnagar; Lamba-Miyani, Jamnagar; Mangrol-Bada, Junagadh; Mojap-Sivrajpur, Jamnagar; Navodra-Lamba, Jamnagar; Rahij-Maktupur, Junagadh; Ratadi-Kantla, Junagadh; and Shill-Lohej, Junagadh **Year:** 2000 **Counts:** 6, 3, 39, 26, 24, 27, 28, 18, 33, 9, 24, and 14 clutches, respectively

DATA RECORD 81

Data Source: Choudhury, B. C., Shanker, K., and B. Tripathy. 2006. Sea Turtles and their Habitats in the Lakshadweep Islands. In Choudhury, B. C., and K. Shanker, eds. 2006. *Marine Turtles of the Indian Subcontinent*. Hyderguda, India: Universities Press.
Nesting Beaches: In Kerala: Quilon; in the Lakshadweep Archipelago: Kalpitti Islet, Laccadive Island Group; Kadmat Island, Amindivi Island Group; Kalpeni Island, Laccadive Island Group; Kavaratti Island, Laccadive Island Group; Kiltan Island, Amindivi Island group; Minicoy Island, Minicoy Island Group; Pitti Island, Laccadive Island Group; Suheli Cheriyakara, Laccadive Island Group; Suheli Valiakara Island, Laccadive Island Group; Tinnakara and Parali Islands, Laccadive Island Group; Agatti Island, Laccadive Island Group; Amini Island, Amindivi Island Group; Andrott Island, Laccadive Island Group; Bitra Island, Amindivi Island group; Chetlat Island, Amindivi Island Group; in Gujarat: Gulf of Kutchh; in Tamil Nadu: Gulf of Mannar **Years:** 2000 for Quilon, 2001 all other beaches **Counts:** Unquantified, 28 nesting females, 11, 4, 2, 3, 10, 10, 5, 379, 20, 80, 8, 2, 6, and 7 clutches, unquantified, and unquantified

INDONESIA

DATA RECORD 82

Data Source: Broderick, D., et al. 2006. See complete citation in Data Record 11.
Nesting Beaches: Enu Island and Pangumbahan (in West Java) and Sangalaki Island (in Berau) **Year:** 2000 **Counts:** 540, 370, and 4,500 clutches, respectively

DATA RECORD 83

Data Source: Bakarbessy, J., S. Benson, P. H. Dutton, C. Hitipeuw, and J. Thebu. 2007. Population status and internesting movement of leatherback turtles, *Dermochelys coriacea*, nesting on the northwest coast of Papua, Indonesia. *Chelonian Conservation and Biology* 6(1): 28–36.
Nesting Beaches: Pulau Ai and Pulau Sayang **Year:** 2002
Count: Unquantified

DATA RECORD 84

Data Source: Muurmans, M., and Yayasan Pulau Banyak. 2011. Green turtle nesting in Aceh, Indonesia: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Amandangan, Pulau Banyak **Year:** 2009
Count: 1,207 clutches
Nesting Beach: Rantau Salang in Bakongan, South Aceh
Year: 2007 **Count:** Unquantified
SWOT Contact: Maggie Muurmans

DATA RECORD 85

Data Source: Putrawidjaja, M. 2000. Marine turtles in Irian Jaya, Indonesia. *Marine Turtle Newsletter* 90: 8–10.
Nesting Beach: Northwest Papua **Year:** 1999
Count: 171 clutches

DATA RECORD 86

Data Source: Bangkaru, M., L. Bateman, A. P. J. M. Steeman, and T. Stringell. 2000. Green turtle nesting at Pulau Banyak (Sumatra, Indonesia). *Marine Turtle Newsletter* 90: 6–8.
Nesting Beach: Bangkaru (in the Pulau Banyak Archipelago)
Year: 1999 **Count:** 82 clutches

IRAN

DATA RECORD 87

Data Source: Mobaraki, A. 2004. Green turtle nesting on the Gulf of Oman coastline of the Islamic Republic of Iran. *Marine Turtle Newsletter* 104: 11.

Nesting Beaches: Cholotr, Karatti, and Kohpansar **Year:** 2004 **Count:** Unquantified

JAMAICA

DATA RECORD 88

Data Sources: (1) Donaldson, A., M. Hamilton, A. Haynes-Sutton, and R. Kerr-Bjorkland. 2005. *Sea Turtle Recovery Action Plan for Jamaica*. Draft. Kingston, Jamaica: United Nations Environment Program Caribbean Environment Programme. **(2)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.

Nesting Beaches: Bush Cay and Southwest Cay (Pedro Bank) **Years:** 1995 and 2005, respectively **Counts:** Unquantified and 1–25 crawls, respectively

SWOT Contacts: Andrea Donaldson and Rhema Kerr Bjorkland

JAPAN

DATA RECORD 89

Data Source: Balazs, G. H., A. B. Bolten, K. A. Bjorndal, M. Chaloupka, L. M. Ehrhart, et al. 2007. Encouraging outlook for recovery of a once severely exploited marine megaherbivore. *Global Ecology and Biogeography* 17: 297–304.

Nesting Beach: Chichi-jima (in Ogasawara) **Year:** 2003 **Count:** 500 clutches

KENYA

DATA RECORD 90

Data Source: Okemwa, G. M., and A. Wamukota. 2006. An overview of the status of green turtles (*Chelonia mydas*) in Kenya. In M. Frick, A. Panagopoulou, A. F. Rees, and K. Williams, eds. *Proceedings of the Twenty-Sixth Annual Symposium on Sea Turtle Biology and Conservation, 376*. Athens, Greece: International Sea Turtle Society.

Nesting Beach: Watamu **Year:** 2000 **Count:** 2 clutches

DATA RECORD 91

Data Source: Olendo, M. 2011. Green turtle nesting in the Kiunga Marine National Reserve, Kenya: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).

Nesting Beaches: Chandani, Kitanga Kikuu, Kiunga, Kiwaiyu, Kongowale, Kui, KSV, Magogo, Mongoni, Mtumumwe, Mwanabule, Mwongo Shariff, and Porcupine **Year:** 2007 **Counts:** 21, 17, 8, 4, 7, 1, 3, 15, 8, 5, 5, 20, and 1 clutches, respectively

SWOT Contact: Mike Olendo

KIRIBATI

DATA RECORD 92

Data Sources: (1) Balazs, G. H. 1975. *Marine Turtles in the Phoenix Islands: Atoll Research Bulletin No. 184*. Washington, DC: Smithsonian Institution. **(2)** Balazs, G. H. 1995. Status of sea turtles in the central Pacific Ocean. In Bjorndal, K., ed. *Biology and Conservation of Sea Turtles*. Washington, DC: Smithsonian Institution Press. **(3)** Bebe, R., L. A. J. Bell, and N. Ruata. 2009. *Kiribati Marine Turtle Profile. Draft Report for the Secretariat of the Pacific Regional Environment Program*. Apia, Samoa: Secretariat of the Pacific Regional Environment Program. Unpublished report. **(4)** Bailey, S., R. Barrel, C. Holloway, S. Mangubhai, D. Obura, et al. 2001. Marine biological surveys of the Phoenix Islands: Summary of an expedition conducted from June 24 to July 25, 2000. In Obura, D., and G. S. Stone, eds. 2002. *Phoenix Islands: Summary of Marine and Terrestrial Assessments in the Republic of Kiribati June 5–July 10 2002*. Boston: New England Aquarium. **(5)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey. 2010. *Green Turtle Nesting Sites and Sea Turtle Legislation throughout Oceania*, NOAA Technical Memorandum NMFS-F/SPO-110. Honolulu, Hawaii: U.S. Department of Commerce.

Nesting Beach: Canton Island (in the Phoenix Islands) **Year:** 1970 **Count:** 100–500 nesting females

Nesting Beaches: 4 sites in the Line Islands **Year:** 1990 **Count:** Unquantified

Nesting Beaches: 2 sites in the Gilbert Islands **Year:** 2008 **Count:** Unquantified

Nesting Beach: Tarawa Atoll (Gilbert Islands) **Year:** 2008 **Count:** 20 clutches

Nesting Beaches: Birnie Island, Enderbury Island, Hull Island (Orona), McKean, Nikumaroro, Phoenix Island, and Sydney (Manra) **Year:** 2002 **Count:** Unquantified

SWOT Contacts: Kim Maison and Irene Kinan-Kelly

LEBANON

DATA RECORD 93

Data Source: Aureggi, M., M. Khalil, and H. Syed. 2007. *Marine Turtle Monitoring at El Mansouri and El Koliala, Lebanon*. Unpublished report.

Nesting Beaches: El Monsouri and El Koliala **Year:** 2007 **Count:** 5 clutches, combined

SWOT Contact: Mona Khalil

MADAGASCAR

DATA RECORD 94

Data Source: Bourjea, J., S. Ciccione, and R. Rantsimbazafy. 2006. Marine turtle survey in Nosy Iranja Kely, northwestern Madagascar. *Western Indian Ocean Journal of Marine Science* 5(2): 209–212.

Nesting Beach: Nosy Iranja Kely **Year:** 2003 **Count:** 104 clutches

SWOT Contacts: Jerome Bourjea, IFREMER, Stephane Ciccione, and KELONIA

DATA RECORD 95

Data Source: United Nations Environment Programme—World Conservation Monitoring Centre. 2010. See complete citation in Data Record 32.

Nesting Beach: Tulear **Year:** 1999 **Count:** 100–500 nesting females

DATA RECORD 96

Data Source: Leroux, G. 2005. *Réseau interdisciplinaire pour une gestion durable de la biodiversité marine: diagnostic environnemental et social autour des tortues marines dans le sud-ouest de l'Océan Indien*. Geneva: Réseau Universitaire International de Genève. Final report.

Nesting Beach: Barrens Archipelago **Year:** 2005 **Count:** Unquantified

MALAYSIA

DATA RECORD 97

Data Source: Broderick, D., et al. 2006. See complete citation in Data Record 11.

Nesting Beaches: Turtle Islands and Sipidan Island (in Sabah) **Year:** 2000 **Counts:** 8,000 and 800 clutches, respectively

Nesting Beaches: Palau Redang, and Paka Island (in Terengganu) **Year:** 1993 **Counts:** 2,000 clutches and unquantified, respectively

DATA RECORD 98

Data Source: Daman, C., and C. Fisher. 2010. Nesting population of sea turtles in four main beaches of eastern Tioman Island, Malaysia. Malaysia: Juara Turtle Project. Unpublished data.

Nesting Beaches: In Tioman, Pahang: Mentawak, Munjur, and Penut **Years:** 2010, 2010, and 2009, respectively **Counts:** 6, 27, and 2 clutches, respectively

SWOT Contact: Charles Fisher

DATA RECORD 99

Data Source: Bali, J., and O. B. Tisen. 2002. Current status of marine turtle conservation programmes in Sarawak, Malaysia. In *Proceedings of the Twentieth Annual Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC-477, compilers B. Brost, A. Foley, and A. Mosier, 369. Miami, Florida: National Marine Fisheries Service.

Nesting Beach: Turtle Islands (in Sarawak) **Year:** 2000 **Count:** 2,000 clutches

MARSHALL ISLANDS, REPUBLIC OF THE

DATA RECORD 100

Data Sources: (1) McCoy, M. 2004. *Defining parameters for sea turtle research in the Marshall Islands*. NOAA Administrative Report AR-PI-0-04. Silver Spring, Maryland: NOAA National Marine Fisheries Service. Unpublished report. **(2)** National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998. *Recovery Plan for U.S. Pacific Populations of the Green Turtle*. Silver Spring, Maryland: National Marine Fisheries Service. **(3)** Kilma, N., and W. K. Puleloa. 1992. *The Sea Turtles of the Northern Marshalls: A Research Expedition to Bikar and Erikup Atolls, and Jemo Island*. Manuscript. **(4)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey. 2010. *Green Turtle Nesting Sites and Sea Turtle Legislation throughout Oceania*, NOAA Technical Memorandum NMFS-F/SPO-110. Honolulu, Hawaii: U.S. Department of Commerce.

Nesting Beach: Bikar Atoll **Year:** 1992 **Count:** 100–500 nesting females

Nesting Beaches: Erikub Atoll and Jemo Island **Year:** 1992 **Count:** Unquantified

Nesting Beaches: Ailuk Atoll, Bikini Atoll, Enewetak Atoll, Likiep Atoll, Taongi Atoll (Bokak), and Wotje Atoll **Year:** 2004 **Count:** Unquantified

SWOT Contacts: Kim Maison and Irene Kinan-Kelly

MARTINIQUE

DATA RECORD 101

Data Source: Cayol, C., and S. Raigné. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.

Nesting Beach: St. Anne: Anse Grosse Roche (on the southern coastline) **Year:** 2006 **Count:** 1–25 crawls

SWOT Contacts: Claire Cayol and Séverine Raigné

DATA RECORD 102

Data Source: Le Scao, R., and National Wildlife and Hunting Agency. 2011. Green turtle nesting in Martinique: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).

Nesting Beaches: Diamant (on the Southern coast), and Vauclin: Grand, and Petit Macabou (on the Atlantic eastern coastline) **Year:** 2008 **Counts:** 1 clutch and 1 crawl, respectively

SWOT Contact: Rozenn Le Scao

MAURITANIA

DATA RECORD 103

Data Source: Fretey, J. 2001. See complete citation in Data Record 61.

Nesting Beach: Banc d'Apos in Arguin **Year:** 2001 **Count:** Unquantified

MAYOTTE

DATA RECORD 104

Data Source: Bourjea, J., S. Ciccione, J. Frappier, G. Hughes, H. Grizel, et al. 2007. Mayotte Island: Another important green turtle nesting site in the South West Indian Ocean. *Endangered Species Research* 3: 273–282.

Nesting Beach: Grande Saziley beach **Year:** 2005 **Count:** 299 nesting females

Nesting Beaches: Maoussi, and Majicavo 1, 2, 3, and 4 (combined) **Year:** 2005 **Count:** 4,976 crawls combined

SWOT Contacts: Claire Jean, Jerome Bourjea, and Stephane Ciccione

MEXICO

DATA RECORD 105

Data Source: Awbrey, F. T., S. Leatherwood, E. D. Mitchell, and W. Rogers. 1984. Nesting green sea turtles (*Chelonia mydas*) on Isla Clarión, Islas Revillagigedos, Mexico. *Bulletin of the Southern California Academy of Sciences* 83: 69–75.

Nesting Beach: Isla Clarion (in the Islas Revillagigedos) **Year:** 1984 **Count:** Unquantified

DATA RECORD 106

Data Source: Avise, J. C., G. H. Balazs, B. W. Bowen, C. J. Limpus, A. B. Meylan, et al. 1992. Global population structure and natural history of the green turtle (*Chelonia mydas*) in terms of matriarchal phylogeny. *Evolution International Journal of Organic Evolution* 46(4): 865–881.

Nesting Beach: Isla Cozumel **Year:** 1991 **Count:** Unquantified

DATA RECORD 107

Data Source: Comisión Nacional De Áreas Naturales Protegidas (CONANP), and Comite Estatal para la Protección y Conservación de las Tortugas Marinas del Estado de Campeche. 2011. Green turtle nesting in Campeche, Mexico: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).

Nesting Beach: Victoria-Xicalango in Campeche **Year:** 2009 **Count:** 4 clutches

SWOT Contact: Vicente Guzman

DATA RECORD 108

Data Sources: (1) Bravo, G., P. R. Martínez, and R. C. Martínez. 2007. *Breve Reseña y Resultados en la Protección y Conservación de las Tortugas Marinas en el Estado de Veracruz, 2003–2006*. Veracruz, Mexico: SEMARNAT–Comisión Nacional De Áreas Naturales Protegidas. **(2)** Arias R., G. M. 2006. *Informe de Resultados de la Temporada 2006*. Veracruz, Mexico: Comisión Nacional para el Desarrollo de los Pueblos Indígenas, Centro de Desarrollo Indigenista. Unpublished report. **(3)** Jaramillo, A. P. 2006. Mexico 2005: *First Annual Report for the Inter-American Convention for the Protection and Conservation of Sea Turtles*. **(4)** Jaramillo, A. P. 2007. *Mexico 2006: Second Annual Report for the Inter-American Convention for the Protection and Conservation of Sea Turtles*. **(5)** Guzman, V. 2006. *Informe Tecnico Final del Programa de Conservación de Tortugas Marinas de Campeche, Mexico, en 2005*. Technical report. **(6)** Ana Erosa-Aguilar, C. C., F. S. Aguilar, T. V. Bernal, A. S. Erosa, R. R. Fanjul, et al. 1994. *Programa de Protección de la Tortuga Marina, Temporada 1994*. Puerto Morelos, Mexico: Instituto Nacional de la Pesca, SEPESCA-SEDESOL. Unpublished report. **(7)** Erosa, S. A. I. 2003. *Informe de Resultados del Programa de Protección de Tortugas Marinas en la Zona Hotelera de Cancún, Temporada 2002*. Benito Juárez, Quintana Roo, Mexico: Dirección General de Ecología. **(8)** Erosa, S. A., and J. G. Juarez G. 1998. Marine turtle protection in the hotel zone of Cancun, Q. Roo: A retrospective. In *Proceedings of the Eighteenth Annual International Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC-436, compilers F. A. Abreu-Grobois, R. Briseño-Duenas, R. Marquez-Millan, and L. Sarti-Martinez. Miami, Florida: National Marine Fisheries Service. **(9)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.

Nesting Beaches: Barra de Galindo, Boca de Lima-Barra Tecolutla, Capulteotl, Central Nucleoelectrica Laguna Verde, Isla Contoy, Pena Hermosa, Punta Herrero, Vida Milenaria, and Zapotitlan **Year:** 2006 **Count:** 1–25 crawls

Nesting Beaches: Akumal, Arrecifes, Chachalacas, Del Faro, El Callejon del Pajaro y Cangrejo, Isla Cancun, Isla Mujeres, Paraiso Escondido, and Punta Pajaros **Year:** 2006 **Count:** 25–100 crawls

Nesting Beaches: Arrecife Alacranes, Bahia de Cochinos–Villamar, Cabo Rojo, Marcelino Yepez, Nizuc–Pt. Morelos, Punta Sur, and Santander **Year:** 2006 **Counts:** 100–500 crawls at each beach

Nesting Beaches: Lechuguillas–El Llano and Mezcalitos
Year: 2006 **Count:** 500–1,000 crawls
Nesting Beaches: Chen-Rio, Farallon-Cazones, and Las Coloradas
Year: 2006 **Count:** 1,000–5,000 crawls
Nesting Beaches: Aguadas del Sur, Bosh, Campismo, Celarain, Chenyuyu, Chiqueros, Cinco Puertas, Cocos, De la Cruz, Dunas del Norte, Fatima, Fidecaribe, Herradura, Ixmapoit, L. Muerta, Lagunade Garzas, Majahual, Mirador, Pajarera Norte, Pajarera Sur, Pajaros, Puerto Angel, Puerto Viejo, Punta Allen, Punta Moreno, Reserva Sur, San Martin, Tortugas, Xcalak, and Xpu-ha
Year: 2006 **Count:** Unquantified
SWOT Contacts: Adriana Laura Sarti Martinez and CONANP

DATA RECORD 109
Data Source: Gladys Porter Zoo Sea Turtle Conservation Program. 2011. Green turtle nesting in Tamaulipas, Mexico: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: La Pesca, Playa Dos–Barra del Tordo, Playa Miramar–Ciudad Madero, Playa Tesoro–Altamira, Rancho Nuevo, and Tepehuajes **Year:** 2010 **Counts:** 101, 79, 11, 3, 443, and 251 clutches, respectively
SWOT Contacts: Patrick Burchfield and Luis Jaime Peña

DATA RECORD 110
Data Source: Guzman, V., and EIOC-III Region Naval Military Secretaría de Marina-Armana (SEMAR). 2011. Green turtle nesting in Campeche, Mexico: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Cayo Arcas (in Campeche) **Year:** 2010
Count: 80 nesting females
SWOT Contact: Vicente Guzman

DATA RECORD 111
Data Source: Guzman, V., and Área de Protección de Flora y Fauna Laguna de Términos (APFFLT), Comisión Nacional De Áreas Naturales Protegidas (CONANP). 2011. Green turtle nesting in Campeche, Mexico: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Chenkan and Isla Aguada (in Campeche)
Year: 2010 **Counts:** 4 and 463 nesting females, respectively
SWOT Contact: Vicente Guzman

DATA RECORD 112
Data Source: Guzman, V., and Desarollo Ecologico Ciudad del Carmen, AC. 2011. Green turtle nesting in Campeche, Mexico: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Isla del Carmen (in Campeche) **Year:** 2010
Count: 2 nesting females
SWOT Contact: Vicente Guzman

DATA RECORD 113
Data Source: Guzman, V., and Universidad Autónoma del Carmen. 2011. Green turtle nesting in Campeche: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Sabancuy (in Campeche) **Year:** 2010
Count: 28 nesting females
SWOT Contact: Vicente Guzman

DATA RECORD 114
Data Source: Seminoff, J. A., B. A. Schroeder, S. MacPherson, E. Possardt, and K. Bibb. 2007. See complete citation in Data Record 45.
Nesting Beaches: Isla Socorro (in Islas Revillagigedos) and Islas Tres Marias **Years:** 2001 and 2007, respectively
Counts: 47 clutches and unquantified, respectively

DATA RECORD 115
Data Source: Tiburcio-Pintos, G., P. Marquez Almansa, J. M. Sandez Camilo, and J. R. Guzmán. 2004. First nesting report of black sea turtles (*Chelonia mydas agassizii*) in Baja California Sur, Mexico. In *Proceedings of the Twenty-fourth Annual Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC-567, compilers R. B. Mast, B. J. Hutchinson, and A. H. Hutchinson, 147. Miami, Florida: National Marine Fisheries Service.
Nesting Beaches: Baja California del Sur: Cabo del Este, La Laguna, Playa la Turqueza, Playas del Camino a la Costa, Pueblo Bonito, Romerios, San Cristobal, Todos Santos, and Zacaton **Years:** 2009, 2006, 2005, 2009, 2007, 2001, 2004, 2006, and 2003, respectively **Counts:** 7, 1, and 1 clutch(es); 3 nesting females; 2 clutches; 1 nesting female; 2, 1, and 1 clutch(es), respectively
SWOT Contact: Graciela Tiburcio

DATA RECORD 116
Data Source: Torres, B. R. S. 2008. *Estado de Conservación de la Población de Tortuga Negra (*Chelonia agassizii*) en Michoacán*. Michoacan, Mexico: Universidad Michoacana de San Nicholas de Hidalgo. Master's thesis.
Nesting Beaches: Arenas Blancas, Bahia Maruata, Cachan de Echeverria, La llorona, Motin de Oro, Paso de Noria, La Placita de Morelosall, Playa Colola, and La Ticla **Year:** 2007
Counts: 30, 383, 40, 30, 80, 75, 30, 1,660, and 50 nesting females, respectively
SWOT Contacts: Wallace J. Nichols and Catherine Hart

MICRONESIA, FEDERATED STATES OF
DATA RECORD 117
Data Source: Cruce, J. 2010. *Monitoring of Nesting Green Turtles (*Chelonia mydas*) on Loosiep Island, Ulithi Atoll, Marine Resources Management Division Report*. Yap, Federated States of Micronesia: Joint Institute for Marine and Atmospheric Research (JIMAR). Technical report.
Nesting Beaches: Gielop Island and Loosiep Island (in Yap, Ulithi Atoll) **Year:** 2010 **Counts:** 396 and 87 nesting females, respectively
SWOT Contact: Jennifer Cruce

DATA RECORD 118
Data Source: Cruce-Johnson, J. 2006. *Yap State Sea Turtle Conservation Program, Ulithi Tagging Project, Gielop and Iar Islands, Summer 2005*. Yap, Federated States of Micronesia: Marine Resources Management Division Report. Unpublished report.
Nesting Beach: Iar Island (in Yap, Ulithi Atoll) **Year:** 2000
Count: 124 nesting females
SWOT Contact: Jennifer Cruce

DATA RECORD 119
Data Source: Kinan, I., and J. Cruce. 2011. Green turtle nesting in Micronesia: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Bulbul and Yeew **Year:** 2010
Count: Unquantified at both beaches
SWOT Contacts: Jennifer Cruce and Irene Kinan-Kelly

DATA RECORD 120
Data Source: Naughton, J. J. 2001. Sea turtle survey at Oroluk Atoll and Minto Reef, Federated States of Micronesia. *Marine Turtle Newsletter* 55: 9–12.
Nesting Beach: Oroluk Atoll **Year:** 1990
Count: 12 nesting females

DATA RECORD 121
Data Sources: (1) Kolinski, S. 1993. *Outer Island Turtle Project Stage III: Report on Elato Atoll Fieldwork*. Yap, Federated States of Micronesia: Marine Resources Management Division. Final Report. **(2)** Hachiglou., V., S. Kolinski, and A. Smith. 1991. *Outer Island Turtle Project, Yap State, F.S.M., Status Report*. The South Pacific Regional Environment Programme's Regional Marine Turtle Conservation Programme Meeting, August 1991, Noumea, New Caledonia. **(3)** Pritchard, P. C. H. 1995. Marine turtles of Micronesia. In Bjorndal, K., ed. *Biology and Conservation of Sea Turtles*. Washington, DC: Smithsonian Institution Press. **(4)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: Elato Atoll, Ngulu Atoll, and Olimarao Atoll
Years: 1993, 1993, and 1990, respectively **Counts:** 30–40, 70–75, and 27 nesting females, respectively
Nesting Beaches: 5 sites in Yap State; Chuuk State: East Fayu Island, Fanang Island, and Murilo Atoll **Year:** 1970
Count: Unquantified
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

MONTSERRAT
DATA RECORD 122
Data Sources: (1) Godley, J., J. Jeffers, and C. S. Martin. 2005. The status of marine turtles in Montserrat (Eastern Caribbean). *Animal Biodiversity and Conservation* 28(2): 159–168. **(2)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Bunkum Bay, Fox's Bay–Bransby Point, Hot Water Pond–Sugar Bay–Kinsale, Rendezvous Bay, Trant's Bay–Farm Bay, and Woodlands Beach **Year:** 2003
Counts: 1–25 crawls at each beach
SWOT Contact: John Jeffers

MOZAMBIQUE
DATA RECORD 123
Data Source: Costa, A., and A. Mate. 2011. Green turtle nesting in Mozambique: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Quirimbas National Park and Rongui and Vamizi Islands **Year:** 2008 **Counts:** 1 and 188 clutch(es), respectively
SWOT Contacts: Alfredo Mate and Alice Costa

DATA RECORD 124
Data Source: Costa, A., J. João, C. M. M. Louro, H. Motta, M. A. M. Pereira, et al. 2007. Marine turtles in Mozambique: Towards an effective conservation and management program. *Marine Turtle Newsletter* 117: 1–3.
Nesting Beaches: Primeiras Islands and Segundas Islands
Year: 2004 **Count:** Unquantified

DATA RECORD 125
Data Source: Mate, A. 2011. Green turtle nesting in Mozambique: Personal communication.In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Bazaruto National Park (in Inhambane)
Year: 2009 **Count:** 3 clutches
SWOT Contact: Alfredo Mate

MYANMAR
DATA RECORD 126
Data Source: Khaing, S. T., S. G. Platt, and J. B. Thorbjarnarson. 2000. Sea turtles in Myanmar: Past and present. *Marine Turtle Newsletter* 88: 10–11.
Nesting Beach: Kaingthaung Kyun **Year:** 1999 **Count:** 1 clutch
Nesting Beaches: Gayetgyi Kyun, Kadonkalay Kyun, and Thamihla Kyun **Year:** 1999 **Count:** Unquantified

NEW CALEDONIA
DATA RECORD 127
Data Sources: (1) Pritchard, P. C. H. 1994. Les D'Entrecasteaux Enfin! Report of an expedition to study the sea turtles of the D'Entrecasteaux Reefs, north of New Caledonia. In *Proceedings of the Thirteenth Annual Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC-341, compilers B. A. Schroeder and B. E. Witherington, 143–145. Jekyll Island, Georgia: National Marine Fisheries Service. **(2)** Downer, A., C. Limpus, and S. Mounier. Forthcoming. Project to determine the distribution and population sizes of nesting marine turtles in New Caledonia, and to enhance the capacity of local governments to protect and manage these species. In *Proceedings of the Twenty-ninth Annual Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC. Miami, Florida: National Marine Fisheries Service. **(3)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: d'Entrecasteaux Reefs: Fabre Island, Huon Island, and Surprise Island **Year:** 2009 **Count:** Unquantified at individual beaches, approximately 5,700 clutches nationwide
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

NICARAGUA
DATA RECORD 128
Data Source: Torres, P. 2009. *Informe Proyecto de Conservación de Tortuga Tora (*Dermochelys coriacea*) en el Refugio de Vida Silvestre Rio Escalante*. Chacocente, Nicaragua: Fauna and Flora International. Unpublished report.
Nesting Beach: Veracruz de Acayo (in Carazo) **Year:** 2008
Count: 1 nesting female

NORTHERN MARIANA ISLANDS, COMMONWEALTH OF THE
DATA RECORD 129
Data Sources: (1) Commonwealth of the Northern Mariana Islands (CNMI) Division of Fish and Wildlife. 2009. *Annual Report: Population Dynamics of Sea Turtles at the Northern Marianas: NOAA Grant No. NA08NMF4540613*. Mariana Islands: National Marine Fisheries Service–Pacific Islands Regional Office (NMFS PIRO). Unpublished report. **(2)** Alepuyo, C., G. P. Camacho, and L. Ilo. 2005. *2005 Sea Turtle Nesting and In-Water Assessment Report for the Commonwealth of the Northern Mariana Southern Inhabitant Islands of Saipan, Tinian, and Rota*. Mariana Islands: CNMI, Division of Fish and Wildlife. Unpublished report. **(3)** Wenninger, P. 2010. Fiscal Year *2009 Annual Report Sea Turtle Nesting: Military Leased Lands*. Tinian, CNMI:. Unpublished report. **(4)** Wenninger, P. 2010. *Fiscal Year 2010 Annual Report Sea Turtle Nesting: Military leased lands*. Tinian, CNMI. Unpublished report. **(5)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: On Saipan: Bird Island Beach, Laulau Beach, Obyan Beach, Tank Beach, and Wing Beach; on Rota: Okgok Beach and Tatgua Beach **Year:** 2009 **Counts:** 1–10 nesting females at each beach
Nesting Beaches: On Rota: Apanon and Goanan, Cave Beach, Coral Garden Beach, Gagani, Kokomo Beach, Latte Stone (Lalayak or I Batko), Mochong, Sagua, Songton Beach, Teteto Beach, Tinian Island, and Uyulan Beach **Year:** 2010
Counts: 1–10 nesting females at each beach
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

OMAN
DATA RECORD 130
Data Source: Avise, J. C., G. H. Balazs, B. W. Bowen, C. J. Limpus, A. B. Meylan et al. 1992. Global population structure and natural history of the green turtle (*Chelonia mydas*) in terms of matriarchal phylogeny. *Evolution* 46(4): 865.
Nesting Beach: Ras al Had **Year:** 1985 **Count:** 44,000 clutches

DATA RECORD 131
Data Source: Pilcher, N. 2011. Green turtle nesting in Oman: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Masirah Island **Year:** 2009 **Count:** Unquantified
SWOT Contact: Nicolas Pilcher

PAKISTAN

DATA RECORD 132

Data Source: Asrar, F. F. 1999. Decline of marine turtle nesting populations in Pakistan. *Marine Turtle Newsletter* 83: 13–14.
Nesting Beaches: Sandspit and Hawkes Bay **Year:** 1997
Count: 2 clutches, combined

DATA RECORD 133

Data Source: Wildlife of Pakistan. Green Sea Turtle. www.wildlifeofpakistan.com/ReptilesofPakistan/greenseaturtle.htm. Accessed 2010.
Nesting Beach: Astola Island **Year:** 1997 **Count:** Unquantified

PALAU

DATA RECORD 134

Data Sources: (1) Barr, J. 2006. *Master's Thesis: Community Based Sea Turtle Monitoring and Management at Helen Reef, Hatohobei State, Republic of Palau*. Corvallis, Oregon: Oregon State University. Unpublished report. **(2)** Palau Bureau of Marine Resources. 2005. *Palau Marine Turtle Conservation and Monitoring Program Final Report*. Republic of Palau. Unpublished grant report. **(3)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: Helen Island and Tobi (Hatohobei) Island in Hatohobei State; 4 sites in Sonsorol State; 3 sites in Kayangel State; Babeldoab Island in Melekeok State; Peleliu Island in Peleliu State; Ngerechur Island in Ngarchelong State **Years:** 2005 except Merir Reef and Ngerechur Island, which are both 2008 **Counts:** 47 nesting females, unquantified,unquantified, 739, 5, unquantified, 1, 1, 5, unquantified, unquantified, and 5 clutch(es), respectively
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

PANAMA

DATA RECORD 135

Data Sources: (1) Meylan, A., P. Meylan, C. Ordoñez, A. Ruiz, and S. Troeng. 2006. *Final Project Report 2005 Hawksbill (*Eretmochelys imbricata*) Research and Population Recovery at Chiriqui Beach and Escudo de Veragas Island, and Bastimentos Island National Marine Park*. Panama. Unpublished report. **(2)** Castillo, I., N. Decastro Gonzales, A. Meylan, P. Meylan, C. Ordoñez, et al. 2006. *Bastimentos Island National Marine Park and Playa Chiriqui: Protected Areas Vital to the Recovery of the Hawksbill Turtle in Caribbean Panama*. Panama. Unpublished report. **(3)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beach: Small Zapatilla Cay **Year:** 2005
Count: 1–25 crawls
SWOT Contacts: Argelis Ruiz, Meylan Anne, and Caribbean Conservation Cooperation

DATA RECORD 136

Data Source: Abrego, M., H. Chacon, C. Peralta, J. Rodriguez, and A. Ruiz, A. 2011. Green turtle nesting in Panama: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Ballena (in Veraguas) **Year:** 1999
Count: Unquantified
SWOT Contacts: Argelis Ruiz, Carlos Peralta, Harold Chacon, Jacinto Rodriguez, and Marino Abrego

PAPUA NEW GUINEA

DATA RECORD 137

Data Source: (1) Kinch, J. 2003. *Sea Turtle Resources in the Milne Bay Province, Papua New Guinea: Results of a Nesting Survey (21–27/01/03) at Panayayapona and Panadaludalu Islands (Jomard Islands), with Additional Notes*. Papua New Guinea: Milne Bay Community-Based Coastal and Marine Conservation Program. Unpublished report. **(2)** Wangunu, N., D. Kwan, I. Bell, and J. Pita. 2004. *Turtle Tagging and Monitoring in Milne Bay Province, December 2003: A Report Prepared for Conservation International, Papua New Guinea Department of Environment and Conservation, and South Pacific Regional Environmental Program*. Papua New Guinea: Milne Bay Community-Based Marine Conservation Program. Unpublished report. **(3)** National Fisheries Authority, Papua New Guinea. 2007. *A Review of Fisheries and Marine Resources in New Ireland Province, Papua New Guinea*. Papua New Guinea: National Fisheries Authority and Coastal Fisheries Management and Development Project. Unpublished report. **(4)** Pritchard, P. C. H. 1979. *Marine Turtles of Papua New Guinea. Unedited Field Notes. Account of fieldwork conducted on behalf of Papua New Guinea Wildlife Division by Peter C.H. Pritchard and Suzanne Rayner, August to October 1978*. Fisheries Archive Paper No. P87. Unpublished report. **(5)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: Atmago (Egmakau), Emirau Island, Lemus, Mussau Island, Nago Island, Nusalaman (Nusalomon), Ral, and Usen (Usang) **Year:** 2007 **Count:** Unquantified
Nesting Beaches: Irai Island, Pananiu Island, and Tobiki Island in the Conflicts Group, Milne Bay Province; Panadaludalu (Panarairai) Island in the Jomard Islands, Milne Bay Province; Siva in the Bramble Haven Group, Milne Bay Province **Year:** 2004
Counts: 1–10 nesting females at each beach
Nesting Beach: Long Island **Year:** 1979 **Count:** Unquantified
Nesting Beaches: Panayayapona (Panawaipona) Island in the Jomard Islands, Milne Bay Province **Year:** 2004 **Count:** 16 clutches
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

PERU

DATA RECORD 138

Data Source: Wester, J. H., S. Kelez, and X. Velez-Zuazo. 2010. Nuevo limite sur de anidacion de las tortuga verde *Chelonia mydas* y golfina *Lepidochelys olivacea* en el Pacifico Este. Presentation at the *II Congreso de Ciencias del Mar del Peru*. Piura, Peru: Universidad Nacional de Piura.
Nesting Beach: Tres Cruces in Piura **Year:** 2010
Count: 1 nesting female
SWOT Contact: Shaleyla Kelez

PHILIPPINES

DATA RECORD 139

Data Source: Cruz, R. D. 2002. Marine turtle distribution in the Philippines. In Kinan, I., ed. 2002. *Proceedings of the First Western Pacific Sea Turtle Cooperative Research and Management Workshop, Honolulu, Hawaii*. Honolulu, Hawaii: Western Pacific Regional Fishery Management Council.
Nesting Beaches: Languil Island, Basilian; Panikian Island, Zamboanga del Sur; and San Miguel Islands **Year:** 2000
Count: Unquantified

DATA RECORD 140

Data Source: Broderick, D., et al. 2006. See complete citation in Data Record 11.
Nesting Beach: Turtle Islands **Year:** 1993 **Count:** 2,500 clutches

PITCAIRN ISLANDS, U.K. OVERSEAS TERRITORY

DATA RECORD 141

Data Sources: (1) Brooke, M. de L. 1995. Seasonality and numbers of green turtles *Chelonia mydas* nesting on the Pitcairn Islands. *Biological Journal of the Linnean Society* 56: s325–s327. **(2)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beach: Henderson Island **Year:** 1992
Count: 10 nesting females
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

PUERTO RICO

DATA RECORD 142

Data Source: Diez, C., H. Horta, and L. Montero. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Shooting Range and Vieques **Year:** 2004
Counts: 25–100 crawls at each beach
SWOT Contacts: Carlos Diez, Hector Horta, and Lesbia Montero

SAINT KITTS AND NEVIS

DATA RECORD 144

Data Source: Stewart, K., and E. Pemberton. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beach: Belle Tete **Year:** 2006 **Count:** Unquantified
Nesting Beaches: Cades Bay, Dog Bay, Sea Haven (Lovers) Beach, South Friars, and White Bay **Year:** 2006
Counts: 1–25 crawls at each beach
Nesting Beaches: Halfmoon Bay and North Frigate **Year:** 1999
Counts: 1–25 crawls at each beach
SWOT Contacts: Kimberly Stewart and Emile Pemberton

SAINT LUCIA

DATA RECORD 145

Data Sources: (1) d'Auvergne, C., and K. L. Eckert. 1993. *Sea Turtle Recovery Action Plan for St. Lucia*. CEP Technical Report No. 26. Kingston, Jamaica: UNEP Caribbean Environment Programme. **(2)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beach: Playa Grande Anse **Year:** 2006
Count: Unquantified
SWOT Contact: Dawn Pierre-Nathoniel

SAINT VINCENT AND THE GRENADINES

DATA RECORD 146

Data Sources: (1) Scott, N. McA., and J. A. Horrocks. 1993. *Sea Turtle Recovery Action Plan for St. Vincent and the Grenadines*. CEP Technical Report No. 27. Kingston, Jamaica: UNEP Caribbean Environment Programme. **(2)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: 3 beaches on Union Island; and Frigate Island
Year: 1987 **Count:** Unquantified
Nesting Beaches: 3 beaches in Canouan; 2 beaches on Union Island **Year:** 1993 **Count:** Unquantified
Nesting Beaches: Palm and Prune Island **Year:** 1979
Count: Unquantified
SWOT Contact: Lucine Edwards

SÃO TOMÉ AND PRÍNCIPE

DATA RECORD 147

Data Source: Loureiro, N. S., and D. Matos, Programa SADA. 2011. Green turtle nesting on Príncipe Island: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Príncipe **Year:** 2009 **Count:** 66 clutches
SWOT Contact: Nuno de Santos Loureiro

DATA RECORD 148

Data Source: Loureiro, N. S., Carvalho, H., and Z. Rodrigues. Forthcoming. The Praia Grande of Príncipe Island (Gulf of Guinea): An important nesting beach for the green turtle *Chelonia mydas*. *Arquipélago—Life and Marine Sciences*.
Nesting Beach: Praia das Conchas to Praia Juventude
Year: 2009 **Count:** 122 nesting females
SWOT Contact: Nuno de Santos Loureiro

SAUDI ARABIA

DATA RECORD 149

Data Source: United Nations Environment Programme—World Conservation Monitoring Centre. 2010. See complete citation in Data Record 32.
Nesting Beach: Ras Baridi **Year:** 2007 **Count:** 10–100 nesting females

DATA RECORD 150

Data Source: Pilcher, N. J., and M. Al-Merghani. 2000. Reproductive biology of green turtles at Ras Baridi, Saudi Arabia. *Herpetological Review* 31(3): 142–147.
Nesting Beaches: Jana Island, Juraid Island, and Karan Island
Year: 1991 **Counts:** 122, 341, and 408 nesting females, respectively

SENEGAL

DATA RECORD 151

Data Source: Fretey, J. 2001. See complete citation in Data Record 61.
Nesting Beach: Langue de Barbarie **Year:** 2001
Count: Unquantified

SEYCHELLES

DATA RECORD 152

Data Source: Bourjea, J., S. Lapegue, L. Gagnevin, D. Broderick, J. A. Mortimer, et al. 2007. Phylogeography of the green turtle, Chelonia mydas, in the Southwest Indian Ocean. *Molecular Ecology* 16(1): 175–186.
Nesting Beach: Farquhar Group **Year:** 2002
Count: 4,145 nesting females

DATA RECORD 153

Data Source: French, G., and D. Monthy. 2011. Green turtle nesting on Mahe Island, Seychelles: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Anse Cachee, Anse Grand Police, Anse Intendance, and Anse Petite Boileau on Mahe Island **Year:** 2009
Counts: 1, 1, 4, and 1 clutches, respectively
SWOT Contacts: Devis Monthy and Georgia French

DATA RECORD 154

Data Source: Gerand, G. D., Nature Seychelles. 2011. Green turtle nesting in Cousin Island Special Reserve: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Cousin Island Special Reserve **Year:** 2007
Count: 2 clutches
SWOT Contact: Gilles-David Derand

DATA RECORD 155

Data Source: United Nations Environment Programme—World Conservation Monitoring Centre. 2010. See complete citation in Data Record 32.
Nesting Beaches: Bijoutier Island and Coetivy Island **Year:** 1984
Counts: 10–100 nesting females at each beach
Nesting Beaches: Frigate Island and Poivre Islands **Year:** 2010
Count: Unquantified

DATA RECORD 156

Data Source: Joliffe, K. 2011. Green turtle nesting on Cousin Island, Seychelles: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Cousin Island **Year:** 2007 **Count:** 12 clutches
SWOT Contact: Kevin Joliffe

DATA RECORD 157

Data Source: Mathiot, M., and E. Talma. 2011. Green turtle nesting on Mahe Island, Seychelles: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Anse Petite Marie Louise, Petite Marie Louise, and unnamed beach on Mahe Island **Year:** 2008
Counts: 0, 1, and 0 clutch(es), respectively
SWOT Contact: Elke Talma

DATA RECORD 158
Data Source: Matombe, R., and E. Talma. 2011. Green turtle nesting on Mahe Island, Seychelles: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Anse Georgette, Grande Anse Kerlan, Petite Anse Kerlan, and President Villa on Mahe Island **Year:** 2008
Counts: 0 clutches at beaches
SWOT Contact: Elke Talma

DATA RECORD 159
Data Source: Seminoff, J. A., B. A. Schroeder, S. MacPherson, E. Possardt, and K. Bibb. 2007. See complete citation in Data Record 45.
Nesting Beaches: Aldabra Islands and Assumption Island
Year: 2007 **Count:** Unquantified

DATA RECORD 160
Data Source: Stiponovich, J., and E. Talma. 2011. Green turtle nesting on Annonyme Island, Seychelles: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Anse Bonne Care, Jetty Beach, Presidents Beach, Turtle Beach, and Villa Beach in Pezula Resort on Annonyme Island **Year:** 2006 **Counts:** 0 clutches at each beach
SWOT Contact: Elke Talma

DATA RECORD 161
Data Source: Talma, E. 2005. *Report on the 2004–05 Turtle Nesting Season*. Seychelles: Marine Conservation Society Seychelles. Technical report.
Nesting Beach: Baie Lazare on west Mahe Island **Year:** 2004
Count: 0 clutches
SWOT Contact: Elke Talma

DATA RECORD 162
Data Source: Talma, E. 2008. *Report on Turtle Nesting Activity Recorded by MCSS and Banyan Tree Resort in the South of Mahe, Seychelles, during the 2007–08 Season*. Seychelles: Marine Conservation Society Seychelles. Technical report.
Nesting Beach: Beach No. 6 on south Mahe Island **Year:** 2007
Count: 5 clutches
SWOT Contact: Elke Talma

DATA RECORD 163
Data Source: Talma, E. 2011. Green turtle nesting in Seychelles: Personal communications from 2007–2009. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Anse Forbans, Mahe Island **Year:** 2007
Count: 0 clutches
Nesting Beaches: Anse Soleil and Petite Anse Soleil, Mahe Island
Year: 2006 **Count:** 0 clutches
Nesting Beaches: Anse Barbarons, Anse Louis, Anse Parnell, Anse Riviere Gaspart, Anse Takamaka, and Petite Anse on Mahe Island **Year:** 2008 **Counts:** 0 clutches at each beach
Nesting Beaches: South Mahe Island beaches **Year:** 2008
Count: 6 clutches
SWOT Contact: Elke Talma

DATA RECORD 164
Data Source: Talma, E. 2011. Green turtle nesting on Desroches Island, Seychelles: Personal communication from Dive Centre staff and Elke Talma. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Southwestern end (Mme Zabre to Bombay) of Desroches Island
Year: 2004 **Count:** 7 clutches
SWOT Contact: Elke Talma

SOLOMON ISLANDS

DATA RECORD 170
Data Sources: (1) Vaughan, P. 1981. *Marine turtles: A review of their status and management in the Solomon Islands*. Honiara, Solomon Islands: Solomon Islands Fisheries Division. Technical report. **(2)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: Ausilala Island, Balaka Island, and Maifu Island in the Shortlands Islands; Malaulalo and Malaupaina in the Three Sisters Islands; Wagina (Vaghena) in Choiseul **Year:** 1981
Counts: 50–100 nesting females at each beach
Nesting Beaches: Hakelake Island, and Kerehikapa in the Arnavon Islands **Year:** 1995 **Counts:** 15–20 and 53 clutches, respectively
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

SRI LANKA

DATA RECORD 171
Data Sources: (1) Amarasooriya, K. D. Classification of sea turtle nesting beaches of southern Sri Lanka. In Pilcher, N., and G. Ismail. 2000. *Sea Turtles of the Indo-Pacific: Research, Management, and Conservation*. London: ASEAN Academic Press. **(2)** Kapurusinghe, T. Status and conservation of marine turtles in Sri Lanka. In Shanker, K., and B. C. Choudhury, eds. 2006. *Marine Turtles of the Indian Subcontinent*. Hyderguda, India: Universities Press.
Nesting Beaches: 38 sites throughout the southern Sri Lankan coast **Year:** 1999 **Count:** Unquantified

DATA RECORD 172
Data Source: Rajakaruna, R. S., D. M. N. J. Dissanayake, E. M. L. Ekanayake, and K. B. Ranawana. 2009. Sea turtle conservation in Sri Lanka: Assessment of knowledge, attitude and prevalence of consumptive use of turtle products among coastal communities. *Indian Ocean Turtle Newsletter* 10: 1–13.
Nesting Beach: Rekawa in Hambantota District **Year:** 2009
Count: 0 clutches

ST. EUSTATIUS

DATA RECORD 165
Data Source: Berkel, J. 2010. *St. Eustatius Sea Turtle Conservation Annual Report 2009*. Unpublished report.
Nesting Beach: Zeelandia Beach **Year:** 2009
Count: 7 nesting females
SWOT Contacts: Nicole Esteban and Jessica Berkel

DATA RECORD 166
Data Sources: (1) Le Scao, R., and N. Esteban. 2005. *St. Eustatius Sea Turtle Monitoring Programme: Annual Report 2004*. St. Eustatius: STENAPA. Unpublished report. **(2)** Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Kay Bay and Turtle Beach **Year:** 2006
Counts: 1–25 crawls at each beach
SWOT Contacts: Nicole Esteban and Arturo Herrera

DATA RECORD 167
Data Source: Esteban, N., and J. Berkel. 2011. Green turtle nesting in St. Eustatius: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Oranje Bay and Turtle Beach **Year:** 2010
Counts: 1 and 7 crawls, respectively
SWOT Contacts: Nicole Esteban and Jessica Berkel

ST. MAARTEN

DATA RECORD 168
Data Source: Vissenberg, D. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beach: Guana Bay Beach **Year:** 2005
Count: 1–25 crawls
SWOT Contact: Dominique Vissenberg

ST. MARTIN

DATA RECORD 169
Data Source: Delcroix, E. 2011. Green turtle nesting in St. Martin: Personal communication. Unpublished data. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Baie aux prunes, Baie longue, Baie rouge, Bell beach, Galion, Grandes Cayes, Petites cayes, Pinel arrière, Pinel côté, and Tintamarre **Year:** 2009 **Counts:** 7, 0, 4, 0, 7, 15, 0, 0, 0, and 15 clutches, respectively
SWOT Contact: Eric Delcroix

SURINAME

DATA RECORD 173
Data Source: Seminoff, J. A., B. A. Schroeder, S. MacPherson, E. Possardt, and K. Bibb. 2007. See complete citation in Data Record 45.
Nesting Beach: Matapica **Year:** 2007 **Count:** 1,803 clutches

SYRIA

DATA RECORD 174
Data Sources: (1) Rees, A. F., A. Saad, and M. Jony. 2005. Tagging green turtles (*Chelonia mydas*) and loggerhead turtles (*Caretta caretta*) in Syria. Testudo 6(2): 51–55. **(2)** Rees, A. F., A. Saad, and M. Jony. 2008. Discovery of a regionally important green turtle Chelonia mydas rookery in Syria. *Oryx* 42(3): 456–459.
Nesting Beach: Latakia **Year:** 2004 **Count:** 104 clutches
SWOT Contact: Mohammad Jony

TAIWAN, REPUBLIC OF CHINA

DATA RECORD 175
Data Source: Cheng, I-J., C-T. Huang, P-Y. Hung, B-Z. Ke, C-W. Kuo, et al. 2009. Ten years of monitoring the nesting ecology of the green turtle, *Chelonia mydas*, on Lanyu (Orchid Island), Taiwan. *Zoological Studies* 48(1): 83–97.
Nesting Beach: Taipin Tao **Year:** 2009
Count: 1–25 nesting females
SWOT Contact: I-Jiunn Cheng

DATA RECORD 176
Data Source: Cheng, I.-J. 2011. Green turtle nesting in Tawain, R.O.C.: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Wan-an and Lanyu **Year:** 2009
Counts: 6 and 4 nesting females, respectively
SWOT Contact: I-Jiunn Cheng

TANZANIA

DATA RECORD 177
Data Source: World Wildlife Fund. 2005. *Marine Turtle Conservation Activities in Mozambique, August 2004 to June 2005*. Maputo, Mozambique: World Wildlife Fund. Unpublished report.
Nesting Beaches: Kilindoni (Mafia Island) and Mtwara **Year:** 2004 **Counts:** 153 clutches and 10–20 nesting females, respectively
Nesting Beaches: Pembe (Misali Island) and Unguja (Mnemba Island) **Year:** 2002 **Counts:** 25 and 36 clutches, respectively

THAILAND

DATA RECORD 178
Data Source: Settle, S. 1995. Status of nesting populations of sea turtles in Thailand and their conservation. *Marine Turtle Newsletter* 68: 8–13.
Nesting Beaches: Ko Khram and Tarutao National Park in Satun Province **Year:** 1993 **Counts:** 51 nesting females and 3 clutches, respectively

DATA RECORD 179
Data Source: Yasuda, T., H. Tanaka, K. Kittiwattanawong, H. Mitamura, W. Klom-in, et al. 2006. Do female green turtles (*Chelonia mydas*) exhibit reproductive seasonality in a year-round nesting rookery? *Journal of Zoology* 269: 451–457.
Nesting Beach: Huyong Island **Year:** 2004 **Count:** 59 clutches

TOKELAU

DATA RECORD 180
Data Sources: (1) Balazs, G. H. 1983. Sea turtles and their traditional usage in Tokelau. *Atoll Research Bulletin* 279: 1–32. **(2)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: Atafu Atoll, Fakaofo Atoll, and Nukunonu Atoll **Year:** 1983 **Count:** Unquantified
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

TONGA

DATA RECORD 181
Data Sources: (1) Bell, L. A. J., L. Matoto, and `U. Fa`anunu. 2009. *Project Report: Marine Turtle Monitoring Programme in Tong, Marine Turtle Conservation Act Project Report*. Unpublished report. **(2)** Havea, S., and K. T. MacKay. 2009. Marine turtle hunting in the Ha`apai Group, Tonga. *Marine Turtle Newsletter* 123: 15–17. **(3)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: Luanamo Island and Nukulei Island in Ha`apai Group, and Vava`u Group **Years:** 2008 and 2009
Counts: 1–10 nesting females at each beach
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

TRINIDAD AND TOBAGO

DATA RECORD 182
Data Sources: (1) Bacon, P. R. 1973. The Status and Management of Sea Turtles of Trinidad and Tobago: Report to the Permanent Secretary, Ministry of Agriculture. Unpublished report. **(2)** Fournillier, K., and K. L. Eckert. 1998. *Draft WIDECAST Sea Turtle Recovery Action Plan for Trinidad and Tobago*. Kingston, Jamaica: United Nations Caribbean Environment Programme. **(3)** Sammy, D., S. Eckert, S. Poon, Grande Riviere Environmental Trust, Grande Riviere Nature Tour Guide Association, T. Boodoo, T. Clovis, H. Yeates, and P. Turpin. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Cambleton, Fishing Pond, Grafton Beach (Stone Haven Bay), Grand Riviere, Hermitage, L'Anse Fourmi Beach, Manzanilla Beach–Cocos Bay, Pirate's Bay (Charlotteville), Rocky Point (Mt. Irvine Back Bay), and Turtle Beach (Great Courland Bay) **Years:** Years spanning 1997–2007 **Counts:** 1–25 crawls at each beach
Nesting Beaches: Big Bay, Bloody Bay, Buccoo Bay, Celery Bay, Kilygwyn Bay, Man O War, Mayaro Bay, Moruga, Parlatuvier Beach (Erasmus Cove), and Sans Souci **Years:** Years spanning 1997–2007 **Count:** Unquantified
SWOT Contacts: Thakoorie Boodoo, Tonya Clovis, Scott Eckert, Grande Riviere Environmental Trust, Grande Riviere Nature Tour Guide Association, Stephen Poon, Dennis Sammy, Pat Turpin, and Heather Yeates

TURKEY

DATA RECORD 183
Data Source: Casale, P., G. Abbate, D. Freggi, N. Conte, M. Oliverio, et al. 2008. Foraging ecology of loggerhead sea turtles Caretta caretta in the central Mediterranean Sea: Evidence for a relaxed life history model. *Marine Ecology Progress Series* 372: 265–276.
Nesting Beach: Sugozu **Year:** 2008 **Count:** 213 clutches

DATA RECORD 184
Data Source: Turkozan, O., and Y. Kaska. Turkey. In Casale, P., and D. Margaritoulis, eds. 2010. *Sea Turtles in the Mediterranean: Distribution Threats and Conservation Priorities*. Gland, Switzerland: IUCN.
Nesting Beaches: Akyatan, Alata, Kazanli, and Samandag
Year: 2006 **Counts:** 562, 198, 385, and 440, respectively

TURKS AND CAICOS ISLANDS

DATA RECORD 185
Data Source: Garland-Campbell, J., and L. Slade. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.

Nesting Beaches: Long Bay (East Caicos), Gibbs Cay, and Big Sand Cay **Years:** 2005, 2005, and 2004, respectively **Counts:** 1–25 crawls at each beach
SWOT Contacts: Judith Garland-Campbell and Lorna Slade

TUVALU

DATA RECORD 186

Data Sources: (1) Alefaio, S., T. Alefaio, and A. Resture. 2006. *Turtle Monitoring on Funafuti, Tuvalu December 4th–14th 2006. Report of Survey administered by the Institute of Marine Resources, the University of the South Pacific, Suva, Fiji*. Unpublished report. **(2)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beach: Funafuti **Year:** 2006 **Count:** 1–10 nesting females
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

UNITED STATES

DATA RECORD 187

Data Source: Addison, D. 2011. Green turtle nesting on Keewaydin Island, Florida: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Keewaydin Island, Florida **Year:** 2009
Count: 15 clutches
SWOT Contact: David Addison

DATA RECORD 188

Data Source: Dutton, P. H., G. H. Balazs, R. A. LeRoux, S. K. K. Murakawa, P. Zarate, et al. 2008. Composition of Hawaiian green turtle foraging aggregations: mtDNA evidence for a distinct regional population. *Endangered Species Research* 5: 37–44.
Nesting Beach: French Frigate Shoals, Hawaii **Year:** 2005
Count: 560 clutches

DATA RECORD 189

Data Sources: (1) National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998. *Recovery Plan for U.S. Pacific Populations of the Green Turtle (*Chelonia mydas*)*. Silver Spring, Maryland: National Marine Fisheries Service. **(2)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: Jarvis Island and Palmyra Atoll, both in Pacific Remote Island Area of Hawaii **Years:** 1930 and 1987, respectively
Count: Unquantified
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

DATA RECORD 190

Data Sources: (1) National Oceanic and Atmospheric Administration Pacific Islands Fisheries Science Center. 2010. Unpublished data. **(2)** Maison, K., I. Kinan-Kelly, and K. P. Frutchey, 2010. See complete citation in Data Record 1.
Nesting Beaches: Kauai, Lanai, Laysan, Lisianski, Maui, Molokai, and Oahu, Hawaii **Year:** 2010 **Counts:** 1–10 nesting females at each beach
SWOT Contacts: Kim Maison and Irene Kinan-Kelly

DATA RECORD 191

Data Source: Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute. 2011. Green turtle nesting in Florida, USA: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Beaches in the counties of Bay, Brevard, Broward, Charlotte, Collier, Duval, Escambia, Flagler, Franklin, Gulf, Hillsborough, Indian River, Lee, Manatee, Martin, Miami-Dade, Monroe, Nassau, Okaloosa, Palm Beach, Pinellas, Santa Rosa, Sarasota, St. Johns, St. Lucie, Volusia, and Walton, Florida
Year: 2008 **Counts:** 0, 4,169, 276, 3, 1, 1, 1, 35, 2, 9, 0, 609, 5, 0, 1,111, 0, 16, 0, 7, 2,272, 0, 0, 7, 19, 297, 381, and 7 clutch(es), respectively
SWOT Contact: Anne Meylan

DATA RECORD 192

Data Source: Shaver, D. 2011. Green turtle nesting at South Padre Island and North Padre Island: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: North Padre Island and South Padre Island, Texas **Years:** 2010 and 2008, respectively **Counts:** 5 clutches and 1–25 clutches, respectively
SWOT Contact: Donna Shaver

DATA RECORD 193

Data Source: Williams, K. L, M. G. Frick, and J. B. Pfaller. 2006. First report of green, *Chelonia mydas*, and Kemp's ridley, Lepidochelys kempii, turtle nesting on Wassaw Island, Georgia, USA. *Marine Turtle Newsletter* 113: 8.
Nesting Beach: Wassaw Island, Georgia **Year:** 2003
Count: 1 clutch

VANUATU

DATA RECORD 194

Data Source: Fletcher, M. 2011. Green turtle nesting in Vanuatu: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beaches: Akamb, 11 beaches on Ambae, 6 beaches on Ambrym, 2 beaches on Aneytium, 2 beaches on Aniwa, 8 beaches on Aore, Araki, 5 beaches on Efate, 2 beaches on Emao, 17 beaches on Epi, 4 beaches on Erromango, 2 beaches on Futuna, 4 beaches on Gaua, 4 beaches on Hiu, Kakula, Lamen Island, Lathu, Leumanag, 3 beaches on Linua, Loh, 16 beaches on Malekula, Malheunvol, 10 beaches on Malo, 5 beaches on Mavea, 2 beaches on Moso, Mota Lava, Mystery Island, Nguna, Pele, 5 beaches on Pentecost, Rano, 19 beaches on Santo, 7 beaches on Tanna, 4 beaches on Tegua, 2 beaches on Thion, 2 beaches on Toga, Vanua Lava, and Varo **Year:** 2007 **Counts:** Counts range from 1 to 7 clutches at each beach, some unquantified
SWOT Contact: Michelle Fletcher

DATA RECORD 195

Data Source: Petro, G., Wan Smolbag. 2011. Green turtle nesting in Vanuatu: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Bamboo Bay, Malacula Island **Year:** 2006
Count: 28 nesting females
SWOT Contact: George Petro

VENEZUELA

DATA RECORD 196

Data Sources: (1) Buitrago, J., and H. J. Guada. 2002. La tortuga carey (*Eretmochelys imbricata*) en Venezuela. *INTERCIENCIA* 27(8): 392–399. **(2)** de los Llanos, V. 2002. *Evaluación de la Situación de las Poblaciones de Tortugas Marinas en el Parque Nacional Archipiélago Los Roques*. Venezuela: Universidad Central de Venezuela. Unpublished report. **(3)** Guada, H. J. 2000. *Areas de Anidación e Impactos Hacia las Tortugas Marinas en la Peninsula de Paria y Lineamientos de Protección*. Sartenejas, Venezuela: Universidad Simón Bolívar. Master's thesis. **(4)** Quijada, A., and C. Balladares. Conservación de las tortugas marinas en el Golfo de Paria. In Babarro, R., A. Sanz, and B. Mora, eds. 2004. *Tortugas Marinas en Venezuela: Acciones Para Su Conservación*. Caracas, Venezuela: Oficina Nacional de Diversidad Biológica, Fondo Editorial Fundambiente Caracas. **(5)** Guada, H. J., and G. Solé. 2000. *Plan de Accion para la Recuperacion de las Tortugas Marinas de Venezuela*. Informe tecnico del PAC No. 39. Technical report. **(6)** Provita. 2004. Programa Procosta: Proyecto Integral de Conservación y Desarrollo (PICD-Costa) Barlovento. In Babarro, R., A. Sanz, and B. Mora, eds. 2004. *Tortugas Marinas en Venezuela: Acciones Para Su Conservación*. Caracas, Venezuela: Oficina Nacional de Diversidad Biológica, Fondo Editorial Fundambiente Caracas. **(7)** Gallardo, A. 2007. *Importancia de las Playas del Este del Estado Vargas Para la Anidación de las Tortugas Marinas*. Caracas, Venezuela: Universidad Central de Venezuela. Unpublished report. **(8)** Pritchard, P. C. H., and P. Trebbau. 1984. *The Turtles of Venezuela*. Oxford, Ohio: Society for the Study of Amphibians and Reptiles. **(9)** Guada, H., and V. Vera. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Refugio de Fauna Silvestre Isla de Aves
Year: Years spanning 1994–2006 **Count:** 1,000–5,000 crawls
Nesting Beaches: Southeast extreme of Parque Nacional Peninsula de Paria, La Orchila, Macurito, Mapurite, other beaches on the southeast of Peninsula de Paria, beaches of Parque Nacional Archipielago Los Roques, beaches of Parque Nacional Laguna de Tacarigua, various beaches in Miranda State
Years: 1994–2006 **Counts:** 1–25 crawls at each beach
Nesting Beaches: Cangua, El Guamo, La Blanquilla, La Sabana, La Tortuga, Los Testigos Archipelago, Parque Nacional Mochima, Peninsula de Paraguana, Puy Puy, San Juan de las Galdonas, and various beaches in Vargas State **Years:** 1994–2006
Count: Unquantified
SWOT Contacts: Clemente Balladares, Juan Carlos Figuera, Alejandro Gallardo, Diego Giraldo, Hedelvy Guada, Kelvin García Sanabria, Genaro Solé, Vincent Vera, and Fundación Científica Los Roques

VIETNAM

DATA RECORD 197

Data Source: Hamann, M., C. The Cuong, N. Duy Hong, P. Thuoc, and B. Thi Thuhien. 2006. Distribution and abundance of marine turtles in the Socialist Republic of Viet Nam. *Biodiversity and Conservation* 15: 3703–3720.
Nesting Beaches: Gulf of Thailand and Con Dao **Years:** 2002 and 2001, respectively **Counts:** 1–25 clutches and 290 nesting females, respectively
Nesting Beaches: Spratly Archipelago; Minh Chau and Quan Lam Islands (Gulf of Tonkin); and Nui Chua and Ninh Thuan
Year: 2006 **Count:** Unquantified
SWOT Contact: Mark Hamann

DATA RECORD 198

Data Source: Hien, T. M. The status of marine turtle conservation in Vietnam. In Kinan, I., ed. 2002. *Proceedings of the Western Pacific Sea Turtle Cooperative Research and Management Workshop*. February 5–8, 2002, Honolulu. Honolulu, Hawaii: Western Pacific Regional Fishery Management Council.
Nesting Beaches: Beaches of Ba Ria Vung Tau Province, Binh Dinh Province, Ca Mau Province, Khanh Hoa Province, Kien Giang Province, Phu Quoc Island, and Thanh Hoa Province
Year: 2002 **Count:** Unquantified

VIRGIN ISLANDS (BRITISH)

DATA RECORD 199

Data Sources: (1) Eckert, K. L., J. A. Overing, and B. B. Lettsome. 1992. *WIDECAST Sea Turtle Recovery Action Plan for the British Virgin Islands*. CEP Technical Report No. 15. Kingston, Jamaica: UNEP Caribbean Environmental Programme. **(2)** Lettsome, B., M. Hastings, and S. Gore. Personal communication. In Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4.
Nesting Beaches: Various beaches on Guana Island, Little Jost Van Dyke Island, Little Camanoe Island, Tortola Island, Prickly Pear Island, Virgin Gorda Island, and Anegada Island
Years: 1991 and 1992 **Counts:** 1–25 clutches at each beach
Nesting Beaches: Guana Island: North Beach and Dig-a-Low Beach; Little Jost Van Dyke Island: Crawl Beach; Little Camanoe Island: East End–South Bay; Tortola Island: Halfmoon Bay, Sophie Bay, and Smuggler's Cove; Prickly Pear Island: Optuntia Point; Virgin Gorda Island: Oil Nut Bay and Bercher's Bay; Anegada Island: Capoon's Bay, East Point, Loblolly Bay, West End, and Windlass **Years:** 1991 and 1992 **Count:** Unquantified
SWOT Contacts: Bertrand Lettsome, Mervin Hastings, and Shannon Gore

VIRGIN ISLANDS (UNITED STATES)

DATA RECORD 200

Data Source: Buck Island Sea Turtle Research Program, National Park Service. 2011. Green turtle nesting at Buck Island Reef National Monument, St. Croix, U.S. Virgin Islands: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Nesting Beach: Buck Island Reef National Monument
Year: 2007 **Count:** 12 nesting females
SWOT Contact: Ian Lundgren

DATA RECORD 201

Data Sources: (1) Dow, W. E., and K. L. Eckert. 2007. See complete citation in Data Record 4. **(2)** Mackay, A. L. 2006. *Sea Turtle Monitoring Program at the East End Beaches of St. Croix, U.S. Virgin Islands, 2006*. St. Croix, U.S. Virgin Islands: WIMARCS.
Nesting Beaches: Good Hope, Halfpenny, Pelican Cove, Second Target, Sprat Hall, and Stony Ground **Year:** 2006 **Counts:** 1–25 crawls at each beach
Nesting Beaches: Coakley Bay, Manchenil, Prune Bay, and Southgate Pond **Year:** 2006 **Counts:** 25–100 crawls at each beach
Nesting Beaches: East End Bay, Isaac's Bay, and Jack's Bay
Year: 2006 **Counts:** 100–500 crawls at each beach
SWOT Contacts: Steve Garner and U.S. Virgin Islands Department of Fish and Wildlife

YEMEN

DATA RECORD 202

Data Source: Seminoff, J. A., B. A. Schroeder, S. MacPherson, E. Possardt, and K. Bibb. 2007. See complete citation in Data Record 45.
Nesting Beach: Sharma **Year:** 1999 **Count:** 15 nesting females

GREEN TURTLE TELEMETRY DATA CITATIONS

ATLANTIC OCEAN

Data Sources: (1) Blumenthal, J. M., J. L. Solomon, C. D. Bell, T. J. Austin, G. Ebanks-Petrie, et al. 2006. Satellite tracking highlights the need for international cooperation in marine turtle management. *Endangered Species Research* 2: 51–61. **(2)** Coyne, M. S., and B. J. Godley. 2005. Satellite Tracking and Analysis Tool (STAT): An integrated system for archiving, analyzing and mapping animal tracking data. *Marine Ecology Progress Series* 301: 1–7. **(3)** Read, A. J., P. N. Halpin, L. B. Crowder, B. D. Best, and E. Fujioka, eds. 2010. OBIS-SEAMAP: Mapping Marine Mammals, Birds and Turtles. http://seamap.env.duke.edu. Accessed December 2010.
Metadata: Nine tracks from the Cayman Islands from tags deployed between 2003 and 2006.
SWOT Contact: Janice Blumenthal

Data Source: Godley, B. J., C. Barbosa, M. Bruford, A. C. Broderick, P. Catry, et al. 2010. Unravelling migratory connectivity in marine turtles using multiple methods. *Journal of Applied Ecology* 47: 769–778.
Metadata: Four tracks of post-nesting females in Guinea-Bissau; tags were deployed in 2001 and 2002.
SWOT Contact: Annette Broderick

Data Sources: (1) Regional Program for Sea Turtle Research and Conservation of Argentina, and V. Carman. 2011. Green turtle satellite tracks in Argentina: Personal communication. In *SWOT*

Report—The State of the World's Sea Turtles, vol. 6 (2011). **(2)** Coyne, M. S., and B. J. Godley. 2005. Satellite Tracking and Analysis Tool (STAT): An integrated system for archiving, analyzing and mapping animal tracking data. Marine Ecology Progress Series 301: 1–7. **(3)** Read, A. J., P. N. Halpin, L. B. Crowder, B. D. Best, and E. Fujioka, eds. 2010. OBIS-SEAMAP: Mapping Marine Mammals, Birds and Turtles. http://seamap.env.duke.edu. Accessed December 2010.
Metadata: Three tracks are from Argentina from tags deployed in 2008 and 2009.
SWOT Contact: Victoria Carman

Data Source: Delcroix, E. 2007. Marine Turtles in Guadeloupe 2006–07: Green Turtles. Project sponsored by the Association Kap'Natirel and DIREN-Guadeloupe. Funded by TOTAL Foundation for Biodiversity and the Ocean, TOTAL Guadeloupe, SARA, Fondation Nature et Découvertes, Conseil Régional de la Guadeloupe, and Petite-Terre Nature Reserve.
Metadata: Four tracks of post-nesting females in Guadeloupe; three tags were deployed in 2006 and one in 2007; location class Z removed.
SWOT Contact: Eric Delcroix

Data Sources: (1) Luschi, P., G. C. Hays, C. Del Seppia, R. Marsh, and F. Papi. 1998. The navigational feats of green sea turtles migrating from Ascension Island investigated by satellite telemetry. *Proceedings of the Royal Society of London B* (1998) 265: 2279–2284. **(2)** Papi, F., P. Luschi, S. Akesson, S. Capogrossi, and G. C. Hays. 2000. Open-sea migration of magnetically disturbed sea turtles. *Journal of Experimental Biology* 203: 3435–3443.
Metadata: Fifteen tracks of post-nesting females on Ascension Island; satellite tags deployed in 1997 and 1998.
SWOT Contact: Paolo Luschi

Data Sources: (1) McClellan, C., and A. Read. *Duke Marine Lab Sea Turtle Tagging Along North Carolina Coast, 2002–2007*. **(2)** Coyne, M. S., and B. J. Godley. 2005. Satellite Tracking and Analysis Tool (STAT): An integrated system for archiving, analyzing and mapping animal tracking data. *Marine Ecology Progress Series* 301: 1–7. **(3)** Read, A. J., P. N. Halpin, L. B. Crowder, B. D. Best, and E. Fujioka, eds. 2010. OBIS-SEAMAP: Mapping Marine Mammals, Birds and Turtles. http://seamap.env.duke.edu. Accessed December 2010.
Metadata: Fourteen tracks of turtles were tracked off the U.S. coast. These are a subset of a larger set of tracks that includes green, loggerhead, and Kemp's ridley turtles.
SWOT Contact: Catherine McClellan

INDIAN OCEAN

Data Sources: (1) Girard, C., J. Sudre, S. Benhamou, D. Roos, and P. Luschi. 2006. Homing in green turtles *Chelonia mydas*: Oceanic currents act as a constraint rather than as an information source. *Marine Ecology Progress Series* 322: 281–289. **(2)** Luschi, P., S. Benhamou, C. Girard, S. Ciccione, D. Roos, et al. 2007. Marine turtles use geomagnetic cues during open-sea homing. *Current Biology* 17: 126–133. **(3)** Benhamou, S. Green turtle satellite tracks in the Indian Ocean: Personal communication. 2011. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Metadata: Three tracks from Europa, deployed as part of homing studies in 2003, with some post-nesting satellite fixes continuing into 2004. Eighteen tracks from Mayotte, deployed for homing studies in 2004 and 2005, with some post-nesting satellite fixes continuing into 2005. Locations have been filtered.
SWOT Contact: Simon Benhamou

Data Sources: (1) Rees, A. F., M. Jony, D. Margaritoulis, B. J. Godley, and ARCHELON, with support of the British Chelonia Group. 2008. Satellite tracking of a green turtle, *Chelonia mydas*, from Syria further highlights importance of North Africa for Mediterranean turtles. *Zoology in the Middle East* 45: 49–54. **(2)** Alan F. Rees and Nancy Papathanasopoulou with support of TOTAL Corporation—Foundation for Biodiversity and the Sea; and TOTAL SA: Muscat Branch. Unpublished data.
Metadata: Two tracks from Masirah, Oman, reported as daily filtered satellite fixes. One track from Syria, filtered but not interpolated.
SWOT Contact: Alan Rees

Data Sources: (1) Richardson, P. B., M. C. Calosso, J. Claydon, W. Clerveaux, B. J. Godley, et al. 2010. Suzie the green turtle: 6,000 kilometres for one clutch of eggs? *Marine Turtle Newsletter* 127: 26–27. **(2)** Richardson, P. B., A. C. Broderick, M. S. Coyne, L. Ekanayake, T. Kapurusinghe, C. Premakumara, S. Ranger, M. M. Saman, M. J. Witt, and B. J. Godley. In prep. Satellite tracking suggests size-related differences in migratory behaviour of female green turtles.
Metadata: One track from the Turks and Caicos Islands (filtered satellite data from 2009–2010), and 10 tracks from Sri Lanka (filtered satellite data from 2006–2007).
SWOT Contact: Peter Richardson

MEDITERRANEAN SEA

Data Source: Broderick, A. C., M. S. Coyne, W. J. Fuller, F. Glen, and B. J. Godley. 2007. Fidelity and overwintering of sea turtles. *Proceedings of the Royal Society B* (2007) 274: 1533–1538.
Metadata: Thirteen tracks from Cyprus; satellite fixes from 1998 to 2004.
SWOT Contact: Annette Broderick

PACIFIC OCEAN (EAST)

Data Sources: (1) Amorocho, D. 2010. Green turtle movements at Gorgona National Park. Colombian Pacific Sea Turtle Tracking Project. Gorgona, Colombia: CIMAD—National Parks Administrative Unit—CI-Colombia. Unpublished report. **(2)** Coyne, M. S., and B. J. Godley. 2005. Satellite Tracking and Analysis Tool (STAT): An integrated system for archiving, analyzing and mapping animal tracking data. *Marine Ecology Progress Series* 301: 1–7.
Metadata: Six tracks followed from Gorgona National Park during CIMAD's 2009–2010 Colombian Pacific Satellite Tracking Project.
SWOT Contact: Diego Amorocho

Data Sources: (1) Madrigal, J., and the Cocos Islands Monitoring and Research Project. 2011. Green turtle satellite tracking near Cocos Island: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011). **(2)** Coyne, M. S., and B. J. Godley. 2005. Satellite Tracking and Analysis Tool (STAT): An integrated system for archiving, analyzing and mapping animal tracking data. *Marine Ecology Progress Series 3*01: 1–7.
Metadata: Seven filtered tracks of green turtles (four sub-adults and three adults) released from Cocos Island in 2009.
SWOT Contact: Jeffery Madrigal

Data Sources: (1) Nichols, W. J. 2003. *Biology and Conservation of Sea Turtles in Baja California, Mexico*. Tucson, Arizona: University of Arizona. Doctoral dissertation. **(2)** Coyne, M. S., and B. J. Godley. 2005. Satellite Tracking and Analysis Tool (STAT): An integrated system for archiving, analyzing and mapping animal tracking data. *Marine Ecology Progress Series* 301: 1–7.
Metadata: Nine tracks from Mexico with satellite fixes spanning 1997 to 2001; locations are filtered.
SWOT Contact: Wallace J. Nichols

Data Sources: (1) Seminoff, J. 2011. Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011). **(2)** Dutton, P., and M. Donoso. 2011. Unpublished data from 2004: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011). **(3)** Seminoff, J., and T. T. Jones. 2011. Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Metadata: Thirteen tracks from the Galapagos Islands, Ecuador; four in 2003 and nine in 2005 (Seminoff 2011). Four tracks from the Gulf of California, Mexico (three from Seminoff 2011, one from Seminoff and Jones 2011). Seven tracks from San Diego Bay, California (Seminoff 2011). Three tracks from Chile in 2004 (Dutton and Donoso 2011). Location class Z locations were removed.
SWOT Contact: Jeffrey Seminoff

PACIFIC OCEAN (WEST) AND SOUTHEAST ASIA

Data Source: Cheng, I-J. Green turtle satellite tracking data from Taiwan: Personal communication. 2011. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Metadata: Ten tracks from Wan-an Island, Penghu Archipelago, between 1998 and 2009. Six tracks from Taipin Tao, Nansha Archipelago, between 2000 and 2003. Two tracks from Lanyu Island in 1997 and 1999.
SWOT Contact: I-Jiunn Cheng

Data Source: Hamann, M. 2011. Green turtle tracking in the north Great Barrier Reef: Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Metadata: Thirteen tracks of breeding and foraging adult females and one track from an adult male during courtship; tracking start dates range from 2005 to 2009. Satellite fixes have been filtered and include locations from migration, inter-nesting, and foraging. Six tracks include two-way migrations.
SWOT Contact: Mark Hamann

Data Source: Hatase, H., K. Sato, M. Yamaguchi, K. Takahashi, and K. Tsukamoto. 2006. Individual variation in feeding habitat use by adult female green sea turtles (*Chelonia mydas*): Are they obligately neritic herbivores? *Oecologia* 149: 52–64.
Metadata: Four tracks of post-nesting adult females at Ogasawara Islands, Japan. All locations, except for the locations that required a high speed of travel (>7.2 kilometers per hour, or 4.3 miles per hour), were used for route reconstruction.
SWOT Contact: Hideo Hatase

Data Source: Luschi, P., F. Papi, H. C. Liew, E. H. Chan, and F. Bonadonna. 1996. Long-distance migration and homing after displacement in the green turtle (*Chelonia mydas*): A satellite tracking study. *Journal of Comparative Physiology* 178: 447–452.
Metadata: Five tracks of post-nesting females in Malaysia; satellite fixes from 1993 to 1994.
SWOT Contact: Paolo Luschi

Data Sources: (1) Marine Research Foundation—Marine Turtle Programme, and N. Pilcher. Personal communication. 2011. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011). **(2)** Coyne, M. S., and B. J. Godley. 2005. Satellite Tracking and Analysis Tool (STAT): An integrated system for archiving, analyzing and mapping animal tracking data. *Marine Ecology Progress Series* 301: 1–7. **(3)** Read, A. J., P. N. Halpin, L. B. Crowder, B. D. Best, and E. Fujioka, eds. 2010. OBIS-SEAMAP: Mapping Marine Mammals, Birds and Turtles. http://seamap.env.duke.edu. Accessed December 2010. **(4)** Pilcher, N. 2011. Personal communication. In *SWOT Report—The State of the World's Sea Turtles*, vol. 6 (2011).
Metadata: Seven tracks, with satellite fixes spanning 2006 to 2009, that are part of a broad marine turtle research and conservation initiative in Vietnam undertaken by WWF Greater Mekong's Vietnam Marine Programme in partnership with IUCN Vietnam, TRAFFIC Indochina, and the Ministry of Fisheries, and with full cooperation from Con Dao National Park. Location class Z and lower were removed. Six tracks from the Maldives with satellite fixes spanning 2002 to 2005. Location class Z and lower were removed.
SWOT Contact: Nicolas Pilcher

Data Sources: (1) Shiba, N., N. Arai, W. Sakamoto, T. Wannakiat, and C. Mickmin. 2001. The relationship between shrimp trawl fishing grounds and adult female green turtles in the Gulf of Thailand. *Proceedings of the Second SEASTAR2000 Workshop*. Kyoto: Graduate School of Informatics, Kyoto University. **(2)** Yasuda, T., H. Tanaka, K. Kittiwattanawong, H. Mitamura, W. Klom-In, et al. 2006. Do female green turtles exhibit reproductive seasonality in a year-round nesting rookery? *Journal of Zoology* 269: 451–457.
Metadata: Twenty-four tracks from the Gulf of Thailand and Andaman Sea; turtles were tagged in 2000 and 2001. Of those, 23 were adult females, and 1 was a juvenile.
SWOT Contacts: Tohya Yasuda and Nobuaki Arai

GREEN TURTLE GENETIC STOCK CITATIONS

Genetic stock information for the map on pages 32–33 was derived from Wallace et al. 2010, which cites many data sources. Complete citations are available in Wallace et al. 2010 and in the SWOT database and map viewer at http://seamap.env.duke.edu/swot.

Wallace, B. P., A. D. DiMatteo, B. J. Hurley, E. M. Finkbeiner, A. B. Bolten, et al. 2010. Regional management units for marine turtles: A novel framework for prioritizing conservation and research across multiple scales. PLoS ONE 5(12): e15465.

NESTING MAP: DATA CONVERSIONS AND CITATIONS

In the green turtle nesting map (pages 30–31), we present abundance data in number of clutches. We converted data that were reported in number of crawls using nesting success estimates (i.e., number of crawls that result in successful clutches). Conversions used were: 49% for East Atlantic Ocean[1]; 66% for Australia[2]; 77% for West Indian Ocean[3]; global average 64%. Similarly, We converted data that were reported as number of nesting females using observed or estimated clutches per female. Conversions used were: 5.6 for Australia[4]; 3.0 for West Indian Ocean[3]; 3.0 for Mediterranean Sea[5]; 3.1 for East Pacific Ocean[6]; 4.0 for West Pacific Ocean[6]; 3.0 for Wider Caribbean Region[6]; global average: 3.6.

1. Tomas, J., J. Castroviejo, and J. A. Raga. 1999. Sea turtles in the South of Bioko Island (Equatorial Guinea). *Marine Turtle Newsletter* 84:4–6
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3. Bourjea, J., S. Ciccione, J. Frappier, G. Hughes, H. Grizel et al. 2007. Mayotte Island: Another important green turtle nesting site in the South West Indian Ocean. *Endangered Species Research* 3: 273–282.
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In Memoriam

Sinkey Boone (1937–2010)

Sinkey Boone was born in Darien, Georgia, into a shrimp fishing family. He was a welder, a net-maker, and a generous purveyor of folk wisdom. He is credited with the invention of the turtle excluder device (TED), which has saved the lives of thousands of sea turtles. He liked to call the TED a "trawling efficiency device" because it helped reduce unwanted catch of many species, and he thought it would help make shrimpers more accepting of its use. Sinkey worked hard to promote TED use worldwide and to bring together fishermen and conservationists; he opened his home and his heart to environmentalists, shrimpers, and the public. Sinkey's contribution to the oceans was monumental, and his passing is a loss for the Earth.

Thelma Richardson (1943–2011)

Thelma Richardson began working on the Little Cumberland Island loggerhead patrol in 1966, a week after marrying Jim Richardson, and helped create the Georgia Sea Turtle Cooperative in 1970. From 1980 until the late 1990s, she worked tirelessly behind the scenes to "make things happen" at the Annual Sea Turtle Symposia in a variety of roles. She would be in her "computer room" from first light to midnight helping hundreds of students with their abstracts, and doing myriad other labors of love. These were good years for Thelma, surrounded by friends from around the world on a common mission for research and conservation of sea turtles. She never regretted her sea turtle odyssey that became such a defining part of her life.

Thank You

The Editors of *SWOT Report* are grateful to many. The SWOT Team has made invaluable contributions of data, articles, and images. Thank you all for your time, resources, and expertise, and for your dedication to the mission of SWOT to create a global network that makes a difference for sea turtles and the ocean. We are particularly indebted to all of our authors (listed below); our photographers (credited along with their photos in this issue); our Editorial and Scientific Advisory Boards (see masthead, page 4); and the many generous donors, including Dirk Aguilar; the Chiamulon family; Dan Cohen; Goldring Family Foundation; the Hufschmid Family; George Meyer, Maria Semple, and Poppy; Moore Family Foundation; Yasmin Namini; Offield Family Foundation; Panaphil Foundation; Nancy Ritter; and Susan Yarnell.

Authors and Affiliations

Marydele Donnelly	Sea Turtle Conservancy, United States
Mariana Fuentes	ARC Centre of Excellence for Coral Reef Studies, James Cook University, Australia
Alexander Gaos	Eastern Pacific Hawksbill Initiative (ICAPO), United States
Heidi Gjertsen	Independent Consultant, United States
Lucy Hawkes	Bangor University, United Kingdom
George Hughes	Independent Scientist, South Africa
Alyssa Irizarry	The Island School, the Bahamas
T. Todd Jones	Joint Institute for Marine and Atmospheric Research (JIMAR), University of Hawaii at Manoa, National Oceanic and Atmospheric Administration (NOAA), Hawaii, United States
Michelle Kalamandeen	Guyana Marine Turtle Conservation Society, Guyana
Maggie Muurmans	Yayasan Pulau Banyak, Indonesia
Ronel Nel	Nelson Mandela Metropolitan University, South Africa
S. Hoyt Peckham	Grupo Tortuguero, Mexico
Nicolas J. Pilcher	Marine Research Foundation, Sabah, Malaysia
Peter C. H. Pritchard	Chelonian Research Institute, Oviedo, Florida, United States
Andrew J. Schneller	The School for Field Studies, Center for Coastal Studies, Mexico
Perla Torres	Fauna and Flora International, Nicaragua
Jenny Tucek	Nelson Mandela Metropolitan University, South Africa
José Urteaga	Fauna and Flora International, Nicaragua
Blair Witherington	Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, Florida, United States

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SWOT report
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State of the World's Sea Turtles
2011 Crystal Drive, Suite 500
Arlington, VA 22202
USA

www.SeaTurtleStatus.org