SWOT report

Volume II

The State of the World's Sea Turtles

A Global Glimpse *of* Loggerhead Nesting

Special Feature: Unsolved Mysteries: The Sea Turtle Files

Sea Turtles in the Middle East | U.S. Marine Turtle Conservation Act
How Tourism, Tourists, and Coastal Residents Can Be Stewards of Sea Turtles
and more…

Yellow tangs clean a green turtle near Puako, Hawaii. © MICHAEL CAREY / TURTLEPHOTOGRAPHER@YAHOO.COM

SWOT The State of the World's Sea Turtles

A global challenge. A global network. A global solution.

Foreword

A suburban TV room, 1977. My sisters and I were flopped on the floor, watching something astonishing: hundreds of freshly hatched sea turtles, scrambling across the sand toward their new home in the waves.

Stirring music swelled, a la "Born Free." Then, a shock. Something swooped down and made off with one of the babies! It was a horrible, filthy seagull! "Hey!" we yelped.

The next shot showed dozens of marauding gulls, dive-bombing the helpless babies and carrying them off for lunch.

We were beside ourselves, shouting at the television, "Leave them alone, you stupid birds!"

I wanted to crash through the screen and punch those birds in their stupid, greedy beaks. Sure, I'd seen nature shows with lions pouncing on zebras or praying mantises eating their husbands, but this was truly monstrous. How could any animal be so black-hearted as to gobble up tiny newborn turtles?

Thirty years later, I know those seagulls weren't evil; they were just playing their role in the ecosystem. And birds aren't the sea turtles' biggest headache—we are. We ransack the marine environment for seafood, smother ancient beaches with condos, and dump enough chemicals in the ocean to kill a tugboat. In short, we're at war with Neptune himself, and we might just end up with tridents in our behinds. Metaphorically, that is.

The turtles can't write to the government for help. They can't rally in the streets, banging pots and pans. All they can do, as their numbers dwindle, is stick to business, paddling the globe on their mysterious rounds.

These improbable seafarers have managed to hang on for 110 million years. They've survived ice ages, huge comets slamming into the earth, even the horror of Y2K. If the last loggerhead or leatherback goes extinct on our watch, it will be worse than tragic. It will be lame.

That's why I'm thrilled that the sea turtles have a new armada of guardians. The SWOT Team comprises hundreds of people around the world who are captivated by these elegant creatures and simply refuse to let them disappear.

Our task is challenging, but manageable. We're focused on seven species. And they can all bounce back from disaster with our ingenuity and teamwork.

So please check out the articles inside. At least look at the pictures. If a deeply alienated weirdo like me can believe in this mission, maybe you can too.

George Meyer

George Meyer is a longtime writer for "The Simpsons." He lives in Los Angeles, California, U.S.A.

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FRONT COVER: A loggerhead hatchling swims at the ocean's surface. © MICHELE WESTMORLAND; THIS PAGE, AT LEFT: A woman holds a loggerhead turtle hatchling at Cape Island, South Carolina, U.S.A. © ANNIE GRIFFITHS BELT / CORBIS AT RIGHT: A hawksbill turtle near the coast of Palau. © STUART WESTMORLAND

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The State of the World's Sea Turtles

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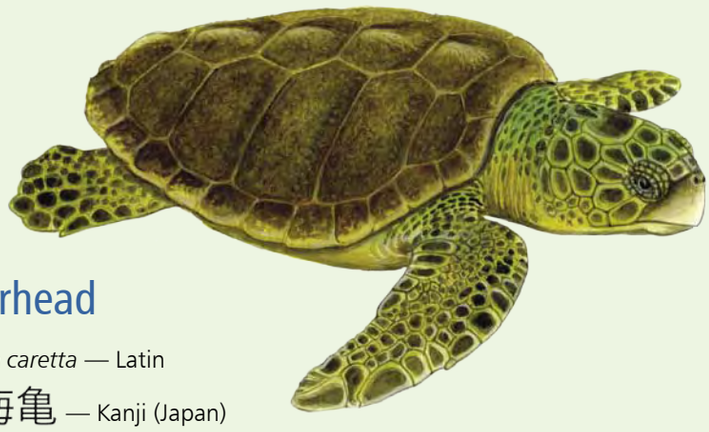
Sea Turtles of the World

The seven species of sea turtle are found pan-globally. They have played significant roles both in ancient traditions and in modern society and are known by many different names among many different cultures.

Even within individual countries, a species may be christened with multiple names by various peoples. Far from being an exhaustive list, the examples below are but a very few of the many monikers given to sea turtles around the world.



Loggerhead

- *Caretta caretta* — Latin
- 赤海亀 — Kanji (Japan)
- *İri başlı deniz kaplumbağası* — Turkish
- Καρέττα καρέττα — Greek
- *Tartaruga cabeçuda* — Portuguese
- *Tortuga caguama* — Spanish

Kemp's Ridley
(also, Atlantic Ridley)

- *Lepidochelys kempii* — Latin
- *Tortue de Kemp* — French
- *Tortuga lora* — Spanish

Hawksbill

- *Eretmochelys imbricata* — Latin
- *Penyu sisik* — Bahasa (Indonesia), Malay
- *Sissassambanga* — Shangane (Mozambique)
- *Tartaruga de pente* — Portuguese
- *Tortue imbriquée* — French
- *Tortuga carey* — Spanish

Major Global Hazards to Sea Turtles

Fisheries Impacts | **Coastal Development** | **Climate Change** | **Directed Take** | **Pollution and Pathogens**

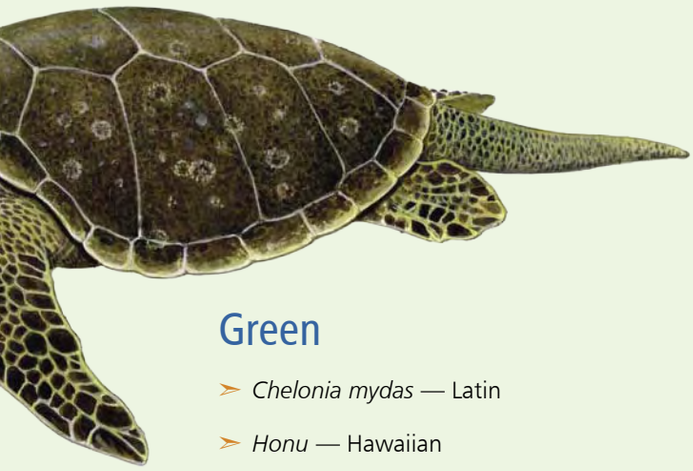
These threats to sea turtles—identified in the IUCN Marine Turtle Specialist Group's Burning Issues 2 workshop in 2005—also imperil other ocean wildlife and entire marine ecosystems spanning the globe. The hazards are pervasive, but the eradication of each one is possible and depends on human action.

Flatback

- *Natator depressus* — Latin
- *Chelonée à dos plat* — French
- *Marrpan* — Aboriginal
- *Tortuga aplanada, tortuga franca oriental* — Spanish

Leatherback (also, trunkback turtle)

- *Dermochelys coriacea* — Latin
- *Kudu longa* — Fang (Gabon)
- *Letaback trosel* — Tok Pisin (Papua New Guinea)
- *Moosnipol* — Seri (Mexico)
- *Penyu belimbing* — Bahasa (Indonesia), Malay
- *Tartaruga de couro* — Portuguese
- *Tortue luth* — French
- *Tortuga baula, tortuga laúd* — Spanish



Green

- *Chelonia mydas* — Latin
- *Honu* — Hawaiian
- *Kudu ndiva* — Fang (Gabon)
- *Pawikan* — Pilipino/Tagalog (Philippines)
- *Penyu agar* — Malay
- *Penyu hijau* — Bahasa (Indonesia)
- *Tartaruga verde* — Portuguese
- *Tortue verte* — French
- *Tortuga verde, tortuga blanca* — Spanish

Olive Ridley (also, Pacific Ridley)

- *Lepidochelys olivacea* — Latin
- *Batu kasbava* — Sihala (Sri Lanka)
- *Penyu lekang* — Bahasa (Indonesia)
- *Tartaruga oliva* — Portuguese
- *Tortuga golfina, tortuga lora* — Spanish
- ସମୁଦ୍ର କଇଁଛ — Oriya (Orissa, India)

Sea turtles have plied Earth's seas for more than 100 million years. They have been cultural icons since the early days of humankind, appearing repeatedly in history, lore, and legend. For the past 50 years, sea turtles have been popular subjects for modern scientific research in a variety of disciplines. Today, they are media darlings as well; nary a week goes by without a newspaper, magazine, or online article discussing sea turtles, and a Google search yields hundreds of sea turtle–related Web sites with a spectrum of themes from science to entertainment to spirituality.

With all this attention, one might believe that humans have figured out sea turtles, yet this is far from true. Like nature itself, the natural history of sea turtles is riddled with unanswered questions. Indeed, what modern science does *not* know vastly eclipses what *is* known. The mystery surrounding these antediluvian creatures is one of the many attributes that inspires human interest and compassion for their well-being. Today, sea turtles face hazards never encountered before, to the point that their continued survival and the long-term health of their ocean habitats are in question. Drawing attention to **SEA TURTLE MYSTERIES** and beginning to unravel them will be critical to clinching the survival of these animals…

Flotilla of mating green turtles at Raine Island, Great Barrier Reef, Australia.

In August 2006, a handful of international sea turtle experts gathered in Washington, D.C., to address critical issues in sea turtle conservation at the third Burning Issues retreat of the IUCN–World Conservation Union's Marine Turtle Specialist Group, a meeting now referred to as BI:3. Much like the film *MI:3,* the BI:3 team tackled the "Mission Impossible" of defining the great unanswered questions, armed with only a few centuries of cumulative firsthand experience and the results of a simple survey administered among some 300 of the world's leading sea turtle experts from 80 countries.

Framing the questions is a first step in creating plans and strategies that will eventually fill critical knowledge gaps and lead to sound conservation strategies. The results of BI:3—the seven unsolved mysteries described in these next articles—highlight the great unknowns about sea turtles. They provide a framework for focusing scientific progress, intellectual powers, and investment in global research, and they serve as a public relations tool to generate greater interest and financing for conserving marine turtles and their habitats.

Roderic B. Mast, Co-Chair, IUCN Marine Turtle Specialist Group

The Unsolved Mysteries of Sea Turtles

Where do sea turtles spend their first years of life?

What are the ecological roles of sea turtles, and how many turtles are needed to fulfill those roles?

What proportion of males to females is necessary to maintain a healthy sea turtle population?

How do sea turtles sense their environment?

How do sea turtles navigate?

What causes fibropapillomas?

How will climate change affect sea turtles?

Source: These questions are the result of BI:3, the third Burning Issues retreat of the IUCN Species Survival Commission's Marine Turtle Specialist Group, Washington, D.C., August 2006.

The Mystery of Lost Little Turtles

Where do sea turtles spend their first years of life?

On entering the world, sea turtles almost immediately get lost. These tiny, finger-length hatchlings scramble from their sandy nests, rush into the surf, and beat their flippers out to sea beyond where scientists can comfortably catalog their lives.

It is not that the turtles themselves are lost. To the contrary, even little turtles in a big ocean seem to know a lot about where they are and where they would like to be. *"Elusive"* is a better word to describe these youngsters. They are certainly lost to us, as terrestrial observers, until they reappear as juveniles swimming in coastal waters where we can more easily locate them. Most important for the turtles, life upon the open ocean means that they are lost to the wide variety of coastal predators that would make them a meal during this initial, bite-sized life stage. Indeed, disappearing into a big ocean is reasoned to be an important survival strategy for young sea turtles.

Hatchlings of all sea turtle species disperse as they swim away from the nesting beach. This scattering begins with the hatchling frenzy—a burst of swimming that propels them away from the shore, where predatory fish concentrate and where currents could sweep them back onto land. For all species but the flatback, this initial burn of swim energy often boosts hatchlings into currents that orbit entire ocean basins. For these hatchlings, a few days of directed swimming launches a drifting journey that may span many years and thousands of miles.

Life is distributed in patches in the open ocean—a great benefit to a tiny drifter wishing to avoid predatory encounters. To live and to grow, however, a turtle must find food in this vast liquid desert. There are occasional concentrations of food at the surface, but these oceanic oases are fleeting. Such phenomena occur at the whim of shear zones between ocean currents, eddy centers, downwellings where currents collide, and upwellings where deep water meets the surface. These are oceanographic events that assemble floating life, such as plankton, seaweed, creatures that cling to flotsam, and young turtles. The menu at these sea turtle smorgasbords includes tiny crustaceans, jelly plankton, sailing snails, blue-button chondrophores, and a wide variety of small, slow-moving creatures such as barnacles, hydroids, bryozoans, and tubeworms.

To avoid being part of the menu themselves, little turtles have ways of avoiding attention. Young loggerheads, hawksbills, and Ridleys try to blend in with the flotsam. When small, these turtles are lumpy

Hawksbill hatchlings emerge from the nest and make their way toward the sea.

and grayish or brownish, much like the other floating matter at the surface. Most young turtles seen on the open ocean remain close to other floating items and are almost as inactive as their surroundings, frequently floating in a "tuck" position, with their flippers held tightly against their body. Small green turtles and leatherbacks are a bit more active, relying on countershading to hide them from predators both above and below. This is most evident in young oceanic green turtles, which are bright white underneath (like the bright sky seen from below) and deep charcoal blue on top (like the dark ocean depths as seen from above).

There are many other mysteries about the lives of these smallest sea turtles. How quickly do they grow? How long is their oceanic stage? Which food items are most important? How do they conserve energy between meals? Do they depend on currents to bring meals, or do they actively seek their food? Are we able to pinpoint the areas of ocean where young sea turtles concentrate? What proportion of turtles survives the oceanic stage? How many succumb to effects from ingesting ubiquitous plastics and tar? Are oil spills and other floating hazards that concentrate with turtles critical threats to their populations?

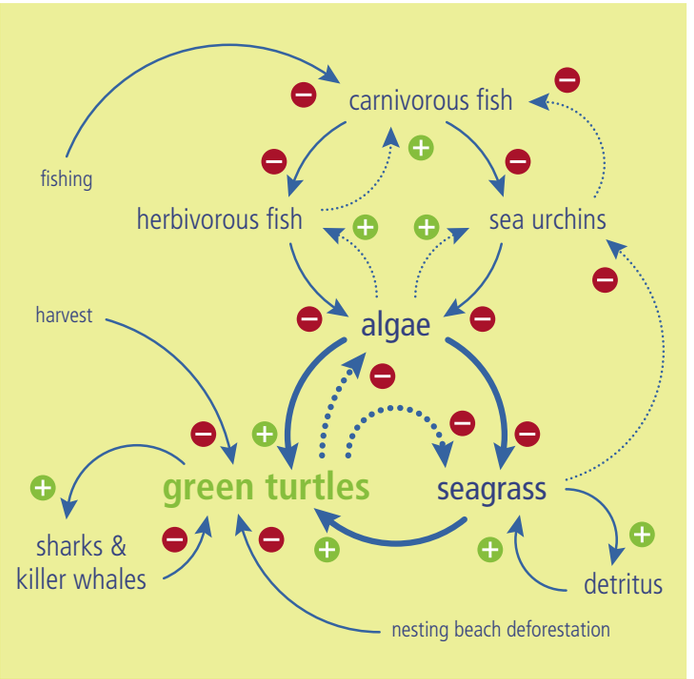
The clues will not come easily. Sea turtles, it seems, are animals for which mystery is an adaptation. Getting lost and remaining elusive is to be expected, especially for the segment of their lives lived in the wildest and most remote portions of our planet.

Blair Witherington *is a research scientist with the Florida Fish and Wildlife Conservation Commission's Research Institute.*

The Mystery of Their Purpose

What are the ecological roles of sea turtles, and how many turtles are needed to fulfill those roles?

A leatherback sea turtle feeds on a Cyanea species of jellyfish in the Trinity Bay area of Newfoundland, Canada. © CANADIAN SEA TURTLE NETWORK



This conceptual diagram shows a virtual green turtle population in the context of its ecosystem, using causal loop techniques for *qualitative* modeling of complex biological systems. It is remarkably difficult to develop *quantitative* models of this sort without a substantial amount of time-series data. Such data do not currently exist for any marine species.
DIAGRAM COURTESY OF MILANI CHALOUPKA

Nature is a wise organizer. After 100 million years of survival and co-evolution, marine turtles surely play critical roles in coastal and oceanic ecology. But what are those roles, and how important are turtles in ecosystem services and functions? Are marine turtle populations regulated more by food availability or by predation? And given that sea turtles have been seriously depleted over the past four centuries, have their ecological roles changed? Most important, what would happen to Earth (ecologically speaking) if sea turtles were to disappear? Challenging questions such as these make ecological roles one of the great unsolved mysteries of marine turtle natural history.

Marine turtles are found in habitats from the shores to the abyss, and they range in their oceanic movements from the tropics to polar waters. They are a food source for marine, terrestrial, and airborne predators and even for some people. They are major consumers of sea life, and their lifestyles and waste products make them *ecosystem engineers* through their effects on coral reefs, seagrass pastures, sea-bottom habitats, and possibly oceanographic forces. Their reproductive routines make sea turtles a dynamic link between land and sea, resulting in the transfer of vast amounts of energy and matter from the oceans to the nesting beaches that affect the ecology of terrestrial consumers from raccoons to soil microbes.

Marine turtles are major consumers, spanning several levels in the food web (see figure above). The green turtle is the most abundant of marine megaherbivores, consuming countless tons of seagrasses and algae. Similarly, the hawksbill is an abundant spongivore on coral reefs, while leatherbacks focus on gelatinous zooplankton. Olive Ridleys, Kemp's Ridleys, flatbacks, and loggerheads consume vast amounts of invertebrates, from crustaceans to conch shells. However, consumption rates are not well known for marine turtles, and we are unsure what effect the historic depletion of turtles has had on marine food webs and ecosystem functions. Moreover, functional predator–prey responses remain a mystery for sea turtles, and we cannot estimate the extent of prey switching when preferred prey is depleted. An understanding

Loggerhead sea turtles mating, Florida Keys, U.S.A. © 2005 DAVID DOUBILET

of these and other variables will be necessary before we can develop meaningful models of the ecological role of marine turtles today and in the past.

In addition to what they consume, marine turtles also transfer nutrients and energy from the ocean to the land at nesting beaches when they deposit their eggs, and they are bioturbators, affecting the structure and functioning of foraging habitats such as coral reefs, seagrass meadows, algal beds, and soft substrate sea bottom. This ecosystem engineering contributes to nutrient recycling, as do the vast amounts of waste excreted from millions of turtles worldwide. Leatherbacks, which spend most of their lives in the oceanic habitat, and loggerheads, which aggregate in pelagic productivity hotspots, likely affect even long-term oceanographic patterns. Furthermore, marine turtles are important hosts for parasites and pathogens and are dispersal platforms for a vast range of epibionts, including barnacles, tunicates, and mollusks.

By themselves, the aforementioned observations of ecological functions and services tell us little about the effect marine turtles have on their habitats. Greater insights will derive from experimentation and ecosystem modeling and will require much more and better data than are currently available. In April 2006, a special session was held at the Annual Sea Turtle Symposium in Crete, Greece, with the purpose of addressing the gaps in our understanding of the ecological roles of marine turtles. The session brought together a range of people working on different facets of sea turtles' ecological roles, and we are expecting exciting new developments in the months and years ahead as we struggle to unlock these mysteries.

Milani Chaloupka *is the director of Ecological Modelling Services P/L in Australia and is a vice chair of the IUCN Marine Turtle Specialist Group.*

The Mystery of "Enough"

What proportion of males to females is necessary to maintain a healthy sea turtle population?

Populations are groups of animals that share genes and other characteristics such as nesting or feeding locations. The "health" of a sea turtle population—its likelihood of persistence over time—may be evaluated with information on how fast the turtles within the population grow, how long they live, how productive they are as adults, and the numbers and proportions of juveniles and adult males and adult females in the population.

A healthy population is a resilient one that can withstand natural variability, such as hurricanes, disease, large-scale nesting beach erosion, and some human impacts. Predicting how populations will decline or recover in response to changes (both positive and negative ones) is fundamentally important as we try to identify the most effective conservation methods. The best conservation mechanisms depend on sound understanding of the turtle populations and the threats that cause declines. There are many black holes in our knowledge of the structure of sea turtle populations, and in examining any individual population, one of these unsolved mysteries is: *Are there enough males present for the population to survive?*

One egg and one sperm: a simple recipe to make a turtle, but it is a recipe with a lot of critical biology behind it. To produce viable hatchlings, there must be enough mature males and females in the right place at the right time and enough good nesting beaches to incubate the eggs. Because higher temperature nests tend to produce more

females than males, the sex ratios of these commonly tropical and subtropical turtle nests—and, thus, the sea turtle populations—are often skewed.

For a healthy population to have "enough" male and female breeders under skewed conditions implies at least three things: first, that females are able to find viable males; second, that one male can mate with many females; and finally, that females can store sperm and then allocate these gametes over the season to successfully fertilize several clutches of eggs. Currently, clutches of infertile eggs are rare, and some clutches have more than one father.

Simply having enough males to fertilize the eggs may not be enough. The consequence of small proportions of males in populations is unclear. Does a low number of viable males reduce the number of healthy, fertile eggs that each female lays? Does a low number of males increase the number of years between nesting seasons? Our understanding of these aspects of sea turtle biology is truly limited because we do not know the resilience of populations with low numbers of males. In some animal species, when animal populations are seriously depleted, there may be insufficient numbers of males to mate with the females or too few breeders to ensure adequate genetic mixing, thereby exacerbating the population decline and complicating recovery efforts.

One critical need for assessing sea turtle population health is to understand how fast turtles grow, how long it takes them to grow up to adulthood, and if males and females reach reproductive maturity at the same age or even the same size. New methods for counting "growth rings" in the bones of dead turtles can help us to better define how long sea turtles live, as well as how old they are when they migrate into new habitats or reproduce for the first time.

It is essential that populations have a critical mass that can cope with change. In most instances, we do not know what that number should be for sea turtles, but we do know that global sea turtle numbers are a small fraction of what they were a few centuries ago. While we are working to restore their numbers, we must simultaneously understand how individuals and their environments vary and what factors are most important in determining how their populations will respond to change. Ultimately we must understand the family of "hows": *how many, how big, how long,* and *how old is enough* to ensure that populations will be healthy "enough" for sea turtles to thrive.

Jeanette Wyneken *is an associate professor of biological sciences at Florida Atlantic University, where she studies sea turtle biology and conservation.* ***Selina Heppell*** *is an assistant professor of marine fisheries and conservation biology at Oregon State University who studies the population dynamics of long-lived marine species.*

A loggerhead surfaces to breathe. © JAMI GARRISON

The Mystery of Turtle Senses

How do sea turtles sense their environment?

Sensory information plays a vital role in helping animals find food, locate mates, evade predators, and navigate from place to place. The way an animal senses its environment can determine its survival strategies. A bat, for instance, uses echolocation to locate prey and thus can hunt at night; a human being uses vision and is thus restricted to daylight. So how do sea turtles sense the world? How do their abilities influence their survival? Such questions are critical in assessing the habitat needs of sea turtles and other endangered species and in identifying risks that might otherwise be overlooked.

Sea turtles, like humans, have a well-developed visual sense. They can perceive color and have visual acuity sufficient for detecting small benthic prey and for recognizing and evading sharks. They may also have visual adaptations that suit them for their marine environment. The distribution of rods in the eye suggests good low-light vision for foraging at depth and for finding the sea as hatchlings. Evidence suggests that turtles might perceive some visual cues that humans cannot, including ultraviolet light and possibly polarized light. If so, these abilities may help turtles to perceive prey such as jellyfish that would otherwise be transparent.

Sea turtles are capable of hearing, but they appear sensitive only to low-frequency sounds commonly found in near-shore waters (such as the sounds of ocean waves breaking on beaches). It has been suggested, though not proven, that adult turtles use these sounds to help them locate nesting beaches once they have drawn into the vicinity. The possibility that turtles can detect infrasound (sound too low for humans to hear) has also not yet been investigated.

Like all other aquatic animals, sea turtles can sense chemicals in sea water. Amino acids and other biochemicals emanate from all organisms and enable turtles to locate underwater food sources. In principle, turtles might also use chemoreception to identify the chemical signatures of particular geographic areas, but again, this is unknown. Similarly, it is possible that sea turtles detect airborne chemicals when surfacing to breathe, although such ability has not yet been demonstrated.

Sea turtles are exceedingly sensitive to water movements associated with ocean waves. Hatchlings entering the sea for the first time use this ability to guide themselves offshore by orienting their swimming relative to wave direction. We do not know if adults retain this sensitivity. The ability might be useful in maintaining consistent courses, in detecting wave patterns associated with islands (from distances at which the islands cannot be seen), or in detecting changes in underwater landscape in relatively shallow water.

Sea turtles have at least one major sensory ability that humans lack: the ability to perceive Earth's magnetic field. The magnetic sense of sea turtles appears to be remarkably sophisticated, allowing them to obtain both directional and positional information. Turtles can perceive the direction of the magnetic field much as a compass does and can thus distinguish between north and south, as one example. In addition, they can detect subtle variations in Earth's magnetic field, and they use this ability in long-distance navigation. The magnetic field is a particularly useful source of navigational information in the ocean, because it is present at all depths, remains constant during day and night, and does not vary with weather or season.

Many questions remain. What sensory abilities are used in locating mates or in communication? Do sea turtles possess any other major sensory abilities that have been overlooked? At this time, there is no evidence that they have the anatomical structures needed for echolocation, electroreception, or infrared detection. But there is, of course, no way to be sure that they do not have other sensory abilities or use common abilities in novel ways. Only time and careful research will tell.

Catherine M. F. Lohmann *is a lecturer in biology at the University of North Carolina at Chapel Hill. A specialist in animal behavior, she has studied sea turtle sensory systems for nearly 20 years.*

The Mystery of Getting Where They Need to Go

How do sea turtles navigate?

The long-distance migrations of sea turtles involve some of the most remarkable feats of orientation and navigation in the animal kingdom. As hatchlings, turtles chart unerring courses toward the open sea and maintain course even beyond sight of land. Juvenile turtles often follow complex migratory pathways that lead across entire ocean basins and back. As adults, turtles migrate from their feeding grounds, to specific mating and nesting areas, and back again to the feeding grounds. How turtles migrate so precisely and consistently across vast distances in the seemingly featureless ocean is among the most long-standing mysteries of sea turtle biology—a mystery that scientists are only now beginning to solve.

Considerable progress has been made in understanding the cues that guide hatchling turtles from their nests to the open ocean. Florida loggerhead hatchlings appear to use three sets of cues in sequence. After emerging from their nests, they find the ocean using visual cues. In the sea, they establish offshore headings by swimming directly into oncoming waves, which in shallow water move directly toward shore and reliably lead the turtles seaward. Farther out to sea, where waves may move in any direction relative to the shoreline, the turtles switch to using Earth's magnetic field to guide themselves in much the same way that we use a magnetic compass to steer ourselves north or south.

In the open ocean, turtles add still another navigational trick: they use Earth's magnetic field not only as a compass, but also as a source of information about where they are. Earth's field varies in such a way that each oceanic region has a unique magnetic field associated with it. Turtles detect these subtle differences and follow inborn instructions

A juvenile green turtle in a cloth harness is tethered to an electronic tracking system inside a magnetic coil. This methodology is used for magnetic navigation studies.

that tell them how to respond to each field and, thus, in which direction to swim at different locations along the migratory route.

Juvenile turtles living in coastal feeding grounds also use Earth's magnetic field in navigation. They apparently learn the magnetic landscape of the areas in which they live and use this information as a kind of magnetic map to guide them to particular destinations. Unraveling the organization, capabilities, and limitations of this remarkable magnetic navigational system will be an exciting area of research in coming years.

Many questions about sea turtle navigation remain. For example, do turtles use environmental cues other than ocean wave direction and Earth's magnetic field in navigation? Although many navigational cues have been discussed—including chemical cues, visual landmarks (such as mountains along a coast), features of the underwater landscape, oceanic temperature gradients, and low-frequency sounds (caused, for example, by waves breaking on distant islands)—there is no clear evidence that turtles use any of these.

And how do adult turtles navigate back to their natal beaches? It is possible that they imprint on the magnetic signature of the home region, but whether they imprint on any aspect of the natal beach, magnetic or otherwise, remains an important mystery to be investigated.

Finally, to what extent is the migratory route of a young turtle inflexibly hardwired into its genes? Loggerhead hatchlings from Florida appear programmed to steer along a set course by recognizing and responding to magnetic fields characteristic of specific geographic locations. If these responses have a genetic basis, then populations that follow different migratory routes presumably inherit different responses to different regional fields. If so, attempts to reestablish an extinct nesting population by transplanting hatchlings from one location to another would fail, if the normal migratory route of the introduced turtles differs significantly from that of the extinct group. An improved understanding of sea turtle navigation will clearly assist efforts to protect and restore sea turtle populations throughout the world.

Kenneth J. Lohmann *is a biology professor at the University of North Carolina at Chapel Hill. He is an expert in the behavior and physiology of marine animals and has studied sea turtle navigation for almost 20 years.*

The Mystery of the Tumors

What causes fibropapillomas?

Pathogens—new pathogens and the reemergence of common pathogens made virulent by anthropogenic changes to the biosphere—are some of the key hazards to biodiversity today, and sea turtles are no exception to that threat. Fibropapillomatosis is a disease that manifests in sea turtles as benign, cutaneous tumors on the turtles' soft and hard tissues, including flippers, neck, plastron and carapace, eyelids, and cornea. The tumors, which often have a "cauliflower" look to them, can weigh up to three pounds. They cause turtles to become weak and anemic and to lose maneuverability; at times, they even result in blindness and starvation. The growths are also found on turtles' internal organs such as lungs, kidneys, and liver. External tumors can be removed but grow back. While fibropapillomas can kill many turtles, observations suggest that some turtles may spontaneously recover (called tumor regression).

The disease was first described in a green turtle captured in Key West, Florida, in 1938 and was later sent to the New York Aquarium for display. Since that time, fibropapillomas in greens have increased dramatically. In some populations in Florida, it is estimated that as many as 70 percent of juvenile and sub-adult turtles are afflicted. Fibropapillomas have also been recorded in adult green turtles in Hawaii and are occasionally seen in loggerheads, Kemp's Ridleys, and olive Ridleys. Worldwide, fibropapillomatosis has been reported throughout the Caribbean, Hawaii, Australia, and Japan, and it seems to be more common in warm, equatorial waters. Thus far, cases have not been reported in colder waters. Fibropapillomatosis has been most intensively studied in Florida and Hawaii where differences are apparent. In Florida, few turtles have oral tumors, whereas these are much more common in Hawaii. Also, while the epizootic continues in Florida, fibropapillomatosis is declining in wild turtles from Hawaii. The reasons for this decline are unclear.

Research in Florida showed that fibropapillomas can be experimentally transmitted among turtles. Subsequent studies in Hawaii and Florida revealed the presence of herpes virus DNA in tumored but not non-tumored tissue of fibropapilloma-afflicted green and loggerhead turtles. This, along with occasional microscopic evidence of herpes viral-like particles in tumors, provides the most compelling evidence that a herpes virus is associated with the disease. The unexplained lack of fibropapillomas in certain areas of Florida and Hawaii also suggests environmental factors play a role in the disease.

In the end, much mystery remains. Why did fibropapillomas appear? Is it a virus that actually causes the disease? Could other pathogens be involved, alone or in conjunction with a virus? Are there environmental factors that contribute to fibropapillomas? Theories abound, but only time and study will tell.

The author of this article, ***Sue Schaf****, has been the manager of The Turtle Hospital in Marathon, Florida, for the past 10 years.* ***Thierry Work****, wildlife disease specialist at the USGS–National Wildlife Health Center's Honolulu Field Station, provided valuable insight to this piece.*

Fibropapilloma on a green turtle. © CHRIS JOHNSON

A female leatherback lays eggs under moonlight on a beach in Costa Rica.

The Mystery of How They Will Adapt

How will climate change affect sea turtles?

Global warming is the environmental problem of the century. The Earth's climate is warming quickly, by geological standards. Climate change will affect weather patterns, cause polar ice caps to melt, and ultimately result in sea levels rising. There are other lesser-known and perhaps related phenomena—the consequences of which could be enormous—such as changes in ocean water quality. Given what we know of sea turtles' ecological roles, at best we can only speculate about the long-term impacts of the changing climate on sea turtle survival, but we can identify some venerable parts of their lifecycle where climate change will likely impact. Not surprisingly, in 2005, the IUCN Marine Turtle Specialist Group identified climate change as one of five key hazards to sea turtles worldwide, making the issue a high priority for further study.

During the next 100 years, the predicted rise in sea level of up to 120 centimeters, combined with the increased frequency and intensity of storms and higher air and water temperatures (estimated at an average 4°C rise), will impact sea turtles in both their foraging areas and at their nesting beaches.

In the foraging areas—seagrass beds, coral reefs, and the open ocean—increasing storm frequency and intensity will add to the turbidity or murkiness of the water. Combined with greater water depth, this turbidity will disrupt the growth of seagrasses, sponges, corals, mollusks, and crustaceans on which sea turtles feed, in turn affecting the frequency of sea turtle reproduction, which is linked closely to food availability.

Sea turtles are perhaps most vulnerable to climate change at their nesting beaches. The females require nesting sites that are accessible from the sea and stable for digging; the sites must also be suitable for incubation of the eggs and adjacent to ocean currents to facilitate hatchling dispersal. These beach characteristics must coincide and be stable through time, because nesting sites are used by successive generations. An increase in storm intensity and frequency will likely alter the topography of beaches through erosion. As primary nesting beaches erode, turtles will be forced to use sub-optimal nesting sites where incubation may not be as successful. Further, as the sea level rises, some nesting areas will be lost altogether. The combined impacts will cause a reduction in hatchling production, affecting the viability of turtle populations decades later.

Before this occurs, however, several less obvious impacts of climate change will add to the pressure. When deposited on the beach, sea turtle eggs are subject to changes in beach conditions—temperature, moisture, and oxygen availability—during development. As the atmospheric temperature increases, so will that of the sand surrounding the eggs, and too much exposure to temperatures over 34°C can be lethal to embryos. At sublethal levels, incubation temperature determines the sex of sea turtle hatchlings; hence, as beach temperatures rise, more females will be produced.

Beach sand moisture content of 2 to 12 percent provides adequate hydric conditions for egg development. As beaches are eroded by storms, waves inundate beaches, and as sea spray splashes ashore, salinity will build up in the nesting beaches. Higher salt content sand reduces available moisture and can cause eggs to dehydrate and die.

The increase in tidal height may also flood eggs from underneath. If the sand is saturated by storm-driven waves or subsurface flooding and does not drain adequately, the embryos will drown.

It is not clear precisely how great the effects of climate change on sea turtle reproduction will be. Comprehensive long-term data sets are needed to fully research the matter. Until then, how the turtles will respond to climatic change remains a matter of speculation. Will sea turtles respond in concert with changing environmental conditions, or will environmental change outpace their ability to adapt to change? The answers to these questions will determine the long-term survival of these remarkable species.

Jeff Miller *is a member of the IUCN Marine Turtle Specialist Group.*

Recovery at Ascension

The nesting green turtles were incapacitated by turning them onto their backs. Ascension Island, circa early 1900s. © ASCENSION ISLAND HERITAGE SOCIETY

The remote island of Ascension lies just south of the equator, equidistant between Africa and South America. At only 90 square kilometers, it is easy to miss. Indeed, in the Second World War, pilots were told, "If you miss Ascension, your wife gets a pension!" But the green turtles that migrate more than 2,000 kilometers from the waters off Brazil to breed there appear to have little difficulty reaching the isle.

A barren volcanic island, Ascension provided little in the way of food for mariners; hence, sea turtles became a valuable source of meat along their route. In 1815, the island was occupied by the British Marines, who traded turtles to passing ships and, fortunately, kept detailed records. Females that ventured onto the beaches to nest were captured and stored in purpose-built ponds until they were traded. A record 1,500 females were captured in one year, with many transported to the United Kingdom to become turtle soup for the Lords of the Admiralty.

Turned onto their shells, the green turtles were transported to turtle ponds, where they were sold to passing ships or to the local community for consumption. Ascension Island, circa early 1900s. © ASCENSION ISLAND HERITAGE SOCIETY

After a few decades, it was clear that the trade was having a severe impact on the turtle population. In the 1930s, the trade was no longer economically viable, with fewer than 50 females captured in a season. Analysis of harvest records between 1822 and 1936 revealed that in excess of 19,000 females must have nested at Ascension Island before 1822 for the population to have survived such high levels of harvest.

In addition to the steadfast protection of the Ascension greens on their nesting grounds since the 1950s, their successful recovery can be attributed to the impressive conservation efforts of Projeto TAMAR, which protects these animals on their foraging grounds in Brazil. Thanks to the collaboration of these far-flung conservationists, and the resilience of nature itself, the Ascension greens illustrate a dramatic recovery, with more than 12,000 females currently nesting and numbers rising annually. The steepness of the rise indicates that this population may, in the future, double its current size.

Since 1998, ***Annette Broderick*** *of the Marine Turtle Research Group (www.seaturtle.org/mtrg) has led teams of researchers from the University of Exeter and on Ascension Island to monitor the marine turtles at Ascension.*

The Natural History and Modern Challenges of the North Atlantic Loggerhead

For generations, sea turtle biologists in the southeastern United States have watched loggerhead hatchlings emerge from their nests and enter the ocean. They are not seen again along those coasts until they reach approximately 50 centimeters (19.69 inches) in length. Archie Carr referred to that interim period as the "lost year," and for years, we asked the question, "Where do those little loggerheads go?"

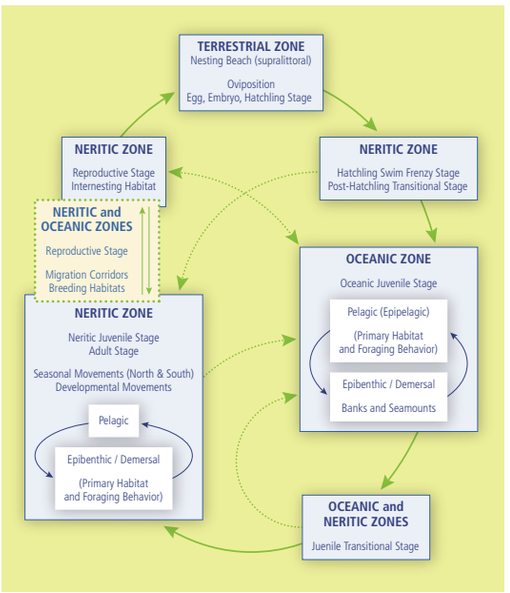
At the end of the 19th century, Albert I, Prince of Monaco, was contemplating the reciprocal question from the other side of the sea. On eastern Atlantic research voyages aboard his royal yacht, he asked, "Where do these little loggerheads come from?"

Researchers at the Archie Carr Center for Sea Turtle Research in Gainesville, Florida, U.S.A., answered his query nearly a century later. Prince Albert I speculated that they came from the Caribbean or Florida. Analyzing complementary body size distributions and genetic markers, Archie Carr Center and University of the Azores scientists have demonstrated that the juvenile loggerheads in the eastern Atlantic waters around the Azores are offspring from Florida nesting beaches.

Using computer models of length-frequency distributions, mark-recapture, and skeletochronology, scientists have determined that juvenile loggerheads spend 7 to 12 years in the oceanic stage of their life—making the "lost year" more accurately the "lost decade."

After the decade in open ocean habitat, these juveniles become resident in the shallower, coastal, neritic waters of the western Atlantic. There they continue to develop for another 20 years before reaching sexual maturity at around 30 to 35 years of age. With the change in habitat, the loggerheads undergo a dramatic shift in diet—from jellyfish in the oceanic ecosystem to hard-bodied crustaceans and mollusks in the neritic waters—and an allometric growth change that results in their characteristically large heads with bone-crushing jaws.

The figure at left illustrates the complexity of the North Atlantic loggerhead lifecycle. A number of technologies such as satellite telemetry, genetic markers, and stable isotopes are helping to elucidate that this lifecycle is not simply a linear passage from one stage to another but one with numerous points of connectivity. For instance, after juvenile loggerheads recruit to the neritic habitat, individuals may return to the oceanic habitat. Alternatively, some turtles may remain in oceanic habitats throughout their life except during copulation and nesting.



The lifecycle of the North Atlantic loggerhead. COURTESY OF ALAN BOLTEN

Because the Azores provide an accessible location to study North Atlantic loggerheads, scientists know more about their lifecycle—especially the oceanic juvenile stage—than any other population.

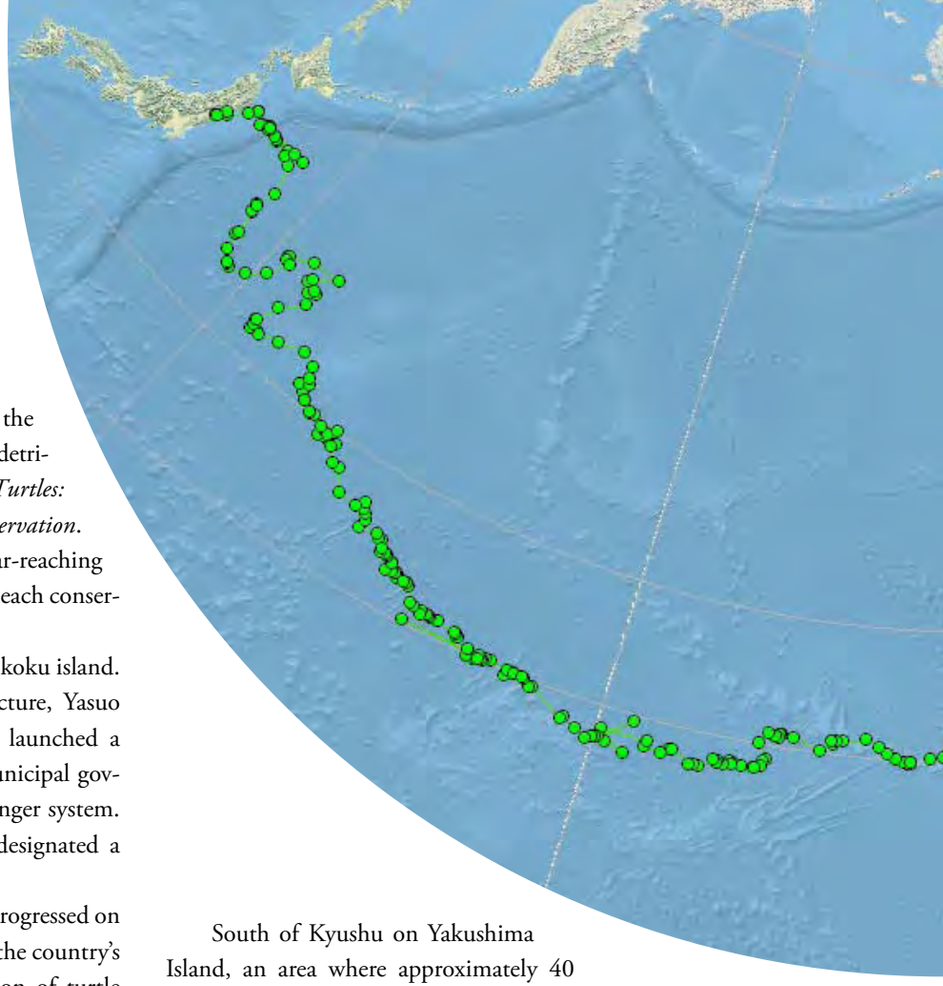
Scientists also understand very clearly that each of the three major ecosystems in the loggerhead's lifecycle presents major hazards to loggerhead conservation. Nesting beaches suffer from coastal development, erosion, and sea level rise, while threats of drowning in fishing trawls and incidental capture by longline fisheries loom in the turtles' oceanic and neritic habitats. Efforts are underway worldwide to address these hazards.

Alan B. Bolten *works at the Archie Carr Center for Sea Turtle Research and in University of Florida's Department of Zoology.*

Depiction of the marine habitat around Florida, U.S.A. in the North Atlantic as it may have appeared during the Pleistocene Era (approximately 1.8 million to 11,000 years ago). Mural prepared for the University of Florida Museum of Natural History. © MICHAEL ROTHMAN, 2003.

Despite our understanding of its natural history, the northern Atlantic loggerhead is in steep decline. A report released in November 2006 by Florida's Fish and Wildlife Conservation Commission tells the story clearly: nest counts have declined by 22 percent since 1989. In the past seven years, nesting at Florida's most important nesting beaches has declined by 40 percent. Ninety percent of loggerhead nesting in the United States occurs in Florida, and the Archie Carr National Wildlife Refuge on Florida's Atlantic coast is one of the two largest remaining loggerhead aggregations in the world.

Japan:
Looking Beyond the Nesting Beach



Japan, the sole breeding area for loggerhead turtles in the North Pacific, was recently ranked as the country most detrimental to sea turtle conservation in James R. Spotila's *Sea Turtles: A Complete Guide to Their Biology, Behavior, and Conservation*. Despite Japan's hawksbill shell (bekko) trade and its far-reaching fishing fleets, it has one of the longest histories of nesting beach conservation and research in the world.

The effort began in 1950 on the southern coast of Shikoku island. There, in the town of Hiwasa in the Tokushima prefecture, Yasuo Kondo, a junior high school teacher, and his students launched a conservation and research project. Ten years later, the municipal government took over the project and established a beach ranger system. The nesting beach and its loggerhead sea turtles were designated a national natural treasure.

In the 1970s, conservation of rookeries dramatically progressed on the southern island of Kyushu, which is home to many of the country's loggerhead nesting beaches. Until that time, consumption of turtle eggs by the local people had been commonplace.

In 1971, Hiroshi Takeshita, founder of Miyazaki Wildlife Research Group, found that 85 percent of all the nests were poached in Miyazaki, a key loggerhead nesting beach on the eastern side of Kyushu. The research group began nightly patrols on the nesting beach, tagging nesters and relocating nests as necessary, and conducted a nutritional analysis of sea turtle eggs. With the results of the nutritional research, Takeshita's group implemented an educational campaign to communicate to the public that sea turtle eggs are no more nutritious than chicken eggs. Within a few years, the egg poaching had ceased. Soon after, the local government designated the loggerhead sea turtle a protected species and began to support the conservation activities.

Sign reads, "17th Japan Sea Turtle Symposium Social Gathering." In Nov. 2006, fishermen, researchers, and resource managers from Mexico, Japan, and the United States gathered to commemorate the 10th anniversary of Adelita's track from Baja California Sur to Japan—the first loggerhead sea turtle to provide physical proof of their trans-Pacific migration via satellite telemetry. The objective of the trip was to share experiences, raise awareness and work toward reducing bycatch of loggerhead sea turtles during a two-week journey throughout the Japan Archipelago. © PROPENINSULA / I. KINAN

South of Kyushu on Yakushima Island, an area where approximately 40 percent of all loggerheads in the North Pacific nest, some local communities had a bidding system for the right to collect eggs. In other communities, children collected and sold eggs to buy school supplies. By the end of the 1970s, a conservation ordinance and beach ranger system implemented by the local government had completely halted egg consumption throughout the area.

These are but a few of the examples of nesting beach protection in Japan. Over the past 25 years, conservation initiatives have continued to increase protection of nesting females, their eggs, and hatchlings on the beaches throughout the country.

Despite these long-standing efforts, Japan's loggerhead nesting population has not recovered. Initial short-term increases in the population during the first years of conservation led to a longer-term decline. While nesting has been increasing since 1998, the population is nowhere near restored. For example, in Kamoda on Shikoku Island, nesting turtles came ashore almost 800 times in 1959, while fewer than 50 have emerged each year over the past decade. Also, at least 300 loggerheads are found stranded on Japanese beaches each year, emphasizing what we already know. These facts emphasize that no matter how well we protect the nesting habitat, conservation on the beach is not enough.

Conservation of such global animals must be addressed on a global basis. In Japan, we must work with other conservationists to mitigate the hazards that our nesting loggerhead population confronts in the open ocean and along their foraging grounds in the eastern Pacific, where they feed. By cooperation and collaboration, we will one day succeed in protecting the loggerheads throughout their migratory paths, and we will welcome hundreds of nesting loggerheads to our shores once again.

Yoshimasa Matsuzawa *is a researcher at the Sea Turtle Association of Japan in Osaka and a member of the IUCN Marine Turtle Specialist Group.*

This map shows satellite telemetry data from a loggerhead known as Adelita, the first sea turtle ever tracked on a trans-Pacific journey. Adelita was released in Santa Rosalita, Baja, Mexico, and tracked to the Japanese coast before her satellite transmitter stopped sending signals. She most likely became caught in fishing gear and drowned. Adelita's journey was recorded in 1996 by researchers Wallace J. Nichols, Jeffrey Seminoff, and Antonio and Beatris Resendiz.

Baja Fishers Work to Conserve Loggerhead Foraging Grounds

The small Mexican fishing community of Puerto Lopez Mateos has a big influence on loggerhead sea turtle conservation. Facing a massive bycatch problem in their halibut and shark fisheries, fishermen are partnering with researchers to better understand sea turtles and to avoid turtle bycatch.

Adult loggerheads in the North Pacific nest exclusively on Japanese beaches, but their juvenile migrations can span the entire Pacific Basin. Some travel more than 10,000 kilometers (6,213 miles) to the west coast of North America. On reaching maturity, they return to Japanese coasts to reproduce.

The legendarily rich waters of Baja California Sur attract thousands of juvenile loggerheads to feed and mature. However, these waters are also a place of intense fishing, where catastrophically high bycatch occurs. This bycatch is one of the greatest known threats to the critically endangered North Pacific loggerhead population—one of the 10 most threatened sea turtle populations in the world, as identified by the IUCN Marine Turtle Specialist Group.

Demographic models suggest that bycatch in this hotspot may preclude the North Pacific loggerhead population's recovery. Local fishermen accidentally kill as many as 30 loggerheads per day, per boat. In 2005 alone, conservationists estimate that more than 900 loggerheads died in fishing nets in just two of the region's fleets. The fishermen reported, however, that they catch loggerheads only in certain areas.

In 2003, the Grupo Tortuguero formed a task force of local fishers, community members, and managers to study turtle habitat use and to design and conduct experiments to reduce turtle bycatch. Ultimately, they developed a research program to engage local fishers in understanding, assessing, and reducing their bycatch.

The task force deployed more than 40 satellite transmitters and tracked turtles to better understand if loggerheads congregate in specific areas. The research revealed that although they range widely throughout their lifetimes, juvenile loggerheads off the Baja California Peninsula spend most of their time in a narrow feeding hotspot that overlaps with massive swarms of their primary prey, the pelagic red crab.

Fishermen from Puerto López Mateos, Baja California Sur, satellite track a loggerhead on her trans-Pacific journey. © GRUPO TORTUGUERO

Testing of various types, sizes, arrangements, and locations of gillnets demonstrated that loggerheads are caught almost exclusively within the hotspot. The tests ascertained that the only reliable method of preventing turtle bycatch is to avoid fishing with bottom-set gillnets and longlines in the hotspot.

In March 2006, the community task force combined local ecological knowledge with these new data to declare the loggerhead hotspot a "fisher's turtle reserve," where turtle ecotourism can thrive and where locals work to eliminate loggerhead bycatch by changing their fishing techniques.

Since then, the Grupo Tortuguero has worked with state and federal authorities to formally establish the turtle reserve as a federally protected refuge zone that will give local fishermen the authority to defend turtles in the area from destructive local and outside fishing practices. During summer 2006, several fishing crews left nets and hooks ashore to take ecotourists to sea to witness the natural beauty of loggerheads in their waters.

Long-term solutions to mitigate bycatch must be based on good science, policy, and enforcement, but ultimately success derives from fishers' direct interest and participation. The capacity to conduct and apply research and to enforce legislation for bycatch reduction in Baja California Sur is limited—as it is in many coastal fisheries around the world. The Grupo Tortuguero demonstrates the power of a small cadre of committed local citizens to effect change when they steward the resources on which their livelihoods depend.

Hoyt Peckham *is a marine conservation scientist at ProPeninsula and a doctoral candidate at the University of California at Santa Cruz.* ***Johath Laudino Santillán*** *is a coordinator of environmental education for the Grupo Tortuguero.* ***Wallace J. Nichols*** *(www.wallacejnichols.org) works with a number of organizations to further marine conservation efforts and has studied Pacific sea turtles for 15 years.*

Modern Genetics Reveals Ancient Diversity in the Loggerhead

What makes a loggerhead turtle a loggerhead turtle? Over the years, "loggerhead" has meant many different things. At one time, the term "loggerhead" included the Ridley turtles. More recently, it encompassed two different subspecies (*Caretta caretta caretta* and *Caretta caretta gigas*).

Owing largely to modern genetics, the identity of loggerhead turtles is no longer ambiguous. We now know that the loggerhead turtle, *Caretta caretta,* is in fact a single species. But what does this mean for the loggerhead—and for its conservation and management?

Life is certainly not simple, and much like the loggerhead's genetic structure, our knowledge of loggerhead genetics is continually evolving.

Using mitochondrial DNA sequence analysis, scientists have been able to identify different genetic stocks that represent rookeries or groups of rookeries that are genetically isolated from each other, as detailed in the inset on the following page. These studies have also traced the relationships among different stocks and have proposed scenarios of how the different lineages have evolved. Today's lineages can all be traced back to a common ancestral stock that existed approximately 3 million years ago, when the Atlantic Ocean was separated from the Indo-Pacific Ocean by the formation of the Panama Isthmus.

Since then, geographic, environmental, and biological forces (natal homing, for example) have shaped dispersal patterns, extinctions, and recolonization events. All of these events have left clues in the loggerhead's DNA, and these continue to be revealed through ongoing studies. The global genetic diversity that we now see in loggerhead turtles has evolved over the last three million years as they adapted to changing climate and geography to colonize new rookeries, while other rookeries disappeared. This genetic diversity is reflected in the current population structure as we understand it. Although we know a great deal about loggerhead genetics, a complete understanding will require new research that targets the many genetically unknown populations.

Genetic markers have also been used as tags to map transoceanic migrations and to uncover the linkages between foraging areas—enabling researchers to identify the stock origin of turtles that are caught incidentally by fishers on the high seas and in coastal areas. These studies have revealed a great deal. Loggerheads born of the North Pacific (Japanese) stock, for example, spend part of their lives some 7,000 miles away off the coast of Baja California, Mexico. Similarly, studies suggest that loggerheads of the eastern Australian stock may inhabit waters off Peru and Chile—more than 10,000 miles from their natal shores. In the Atlantic, juvenile loggerheads born on the shores of

A loggerhead swims off the coast of Florida, U.S.A. Loggerheads of the Florida peninsula genetic stock generally grow to be larger than those from the Mediterranean genetic stocks. © BRIAN SKERRY / NATIONAL GEOGRAPHIC

the United States venture into the Mediterranean and eventually return to reside in coastal U.S. waters. New genetic data suggest that these larger juveniles generally take residence near their natal beaches, where the females return to nest as adults.

The most important fact that we have learned in the field of loggerhead genetics is this: conserving the loggerhead is less about protecting the species at the global scale and more about focusing on the survival of each of the many distinct parts that make up the loggerhead species. After all, genetic diversity is the key to a species' ability to adapt and persist through environmental change—a truth that bears even greater poignancy amid today's changing climate.

Brian J. Hutchinson *is the SWOT science editor, program officer of the IUCN Marine Turtle Specialist Group, and coordinator of Conservation International's Sea Turtle Flagship Program.* ***Dr. Peter Dutton*** *of the National Marine Fisheries Service provided significant input into this article.*

The Known Genetic Stocks of the Loggerhead Sea Turtle

In the **Pacific Ocean,** there appear to be three main genetic stocks:

1. a western Australian stock;
2. an eastern Australian stock, possibly including turtles born in New Caledonia; and
3. a North Pacific or Japanese stock including all loggerhead rookeries in the Japanese archipelago.

In the **Atlantic Ocean** and **Caribbean Sea** the loggerhead stock structure appears to be divided among at least eight genetic stocks:

1. a northern U.S.A. stock, including rookeries from southern Virginia, southward to the northern Florida border;
2. a Florida peninsula, U.S.A. stock, which includes rookeries from the northeastern Florida border through southwestern Florida (Pinellas County);
3. a Dry Tortugas stock including islands west of Key West;
4. a northern gulf (U.S.A.) stock that extends from northwestern Florida into Texas;
5. a Cay Sal Bank, western Bahamas stock;
6. a Quintana Roo, Mexico stock, including all loggerhead rookeries on Mexico's Yucatan Peninsula;
7. a Brazilian stock; and
8. a Cape Verde stock.

The genetic composition of loggerheads that nest through much of the **wider Caribbean region** remains unknown due to lack of research. This category includes loggerheads born of beaches in Caribbean Central America, the Bahamian Archipelago, Cuba, Colombia, Venezuela, and the eastern Caribbean islands.

Similarly, the loggerhead populations along the **western African coast** remain a mystery in many regards.

In the **Mediterranean Sea** there are two distinct genetic stocks: one that centers on rookeries in Turkey, and a second that centers on Greece. **Libya** also hosts a large loggerhead population, whose genetic composition remains unknown but may prove to be distinct.

The genetic structure of loggerhead rookeries in the **Indian Ocean** is somewhat less clear.

It is apparent, however, that the **South African rookery** is a distinct genetic stock (and may include sites in Mozambique), and rookeries in **Oman** and **Yemen** also represent a distinct genetic stock. It is unclear where the nesting beaches in Madagascar and Sri Lanka fall.

A Global Snapshot of Loggerheads and Leatherbacks

"The Unsolved Mysteries of Sea Turtles" (pp. 6–13) underscores one of the greatest challenges that conservationists face in preventing extinctions: insufficient data.

Scientists the world over are working to meet this challenge in their research efforts. The SWOT Team with its global perspective is identifying, collecting, and presenting sea turtle data from around the world—an effort that will ultimately enable the conservation community to take collective actions when sea turtle populations decline and to focus resources on the highest priorities.

The inaugural volume of *SWOT Report* and its presentation of worldwide leatherback nesting beaches was the first step. With plans to tackle one species at a time, one year at a time, the SWOT Team has addressed its next priority for global data collection: the loggerhead sea turtle.

Like leatherbacks, loggerheads are found in almost every ocean. Both species are threatened nearly everywhere they are found by hazards at their nesting beaches and during transoceanic journeys. Listed as Endangered on the *IUCN Red List of Threatened Species*, loggerheads face threats including coastal development, fisheries bycatch, direct hunting (for eggs and meat), pollution, and climate change.

The following two maps document just one slice of the long and complex lives of some of Earth's most widely ranging and mysterious animals. Here we present the loggerhead and leatherback nesting beaches of the world, with the number of nests laid at each site during the 2005 nesting season. Each dot represents the contributions of the patrollers who walk each beach, collecting data day and night, as well as the institutions and donors who make these efforts possible. As such, every data point is numbered to correspond with a citation that acknowledges its source (pp. 42–48). The featured first-year loggerhead data are printed with comprehensive citations, while leatherback data citations are abbreviated. Both sets of data are available in full on the SWOT Web site at www.SeaTurtleStatus.org.

The global snapshot of loggerhead nesting in this report is the first presentation of its kind. The leatherback map presents the SWOT Team's second year of leatherback data, building on the inaugural data presented in *SWOT Report, Volume I*. In total, the 166 SWOT Team data providers have documented 203 loggerhead beaches from 68 sources in 45 countries, and 204 leatherback beaches from 76 sources in 52 countries.

These maps were developed under the guidance of the SWOT Scientific Advisory Board (pg. 2) that has agreed on specific protocols for the development of the maps. The number of nests documented at each beach is used as the display value for each data point. In areas where only a count of nesting females was available, that count was used to estimate the number of nests by applying a conversion—the average number of nests laid per female, per season (the clutch frequency)—from the geographically closest available beach during the same nesting season. Recognizing that these conversions are imperfect, we have chosen to report only the original count values in the citations.

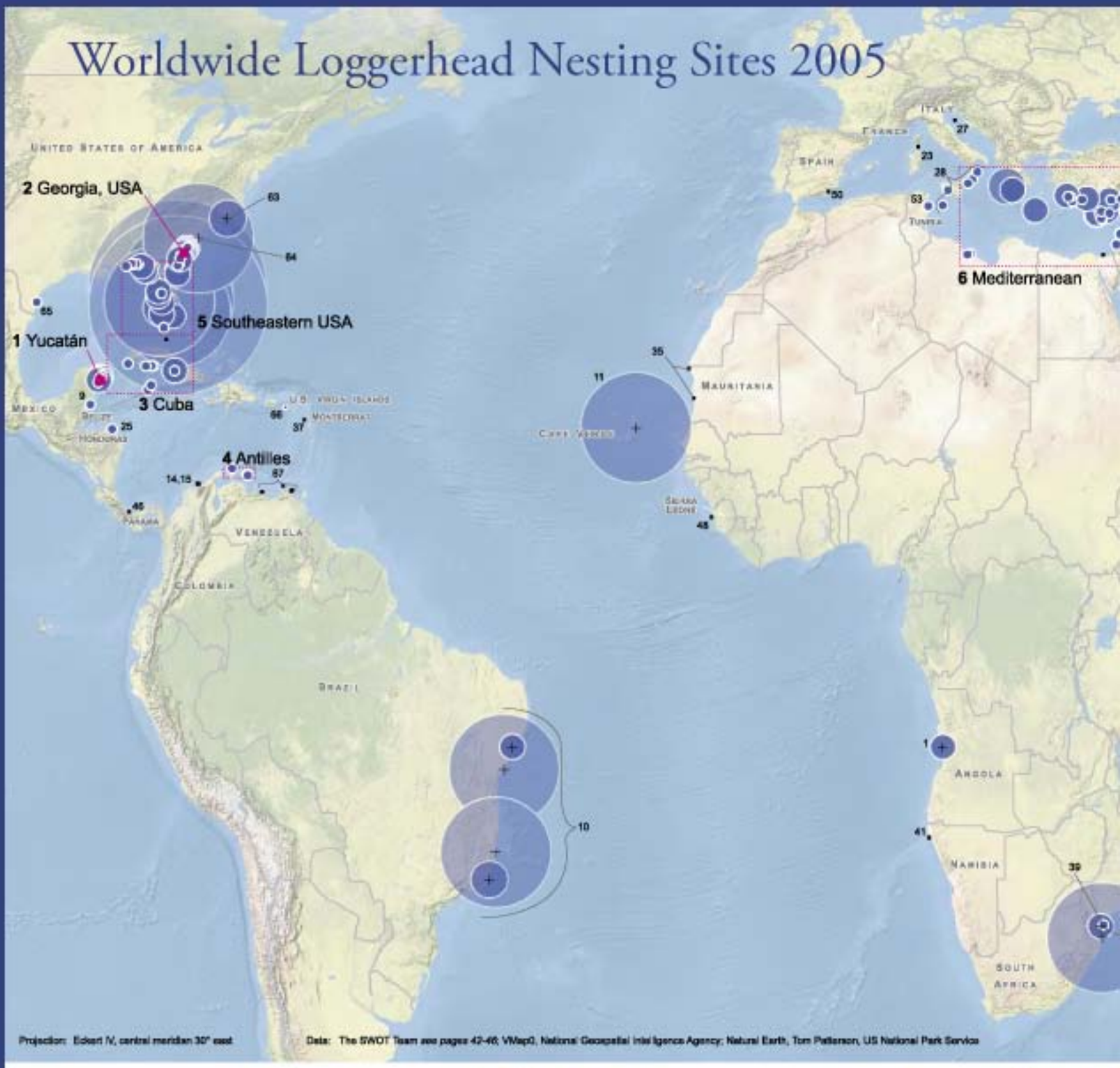
SWOT Team members have also contributed information on the procedures used to gather their data, so that each piece of data may be evaluated for its completeness. Specifically, in each citation we present the techniques used for beach monitoring, the period of beach monitoring, the period of the full nesting season, and the peak period of nesting.

The maps on the following pages represent a momentous second step into the future of data sharing and sea turtle conservation planning. With hawksbill nesting sites of the world on the SWOT Team's horizon, we continue toward our vision of presenting a continually contemporized view of all seven species of sea turtles across the globe.

*This article is written by **Brian J. Hutchinson** and **Alec Hutchinson**, on behalf of the SWOT Team. Brian is program officer of the IUCN Marine Turtle Specialist Group and coordinator of Conservation International's (CI) Sea Turtle Flagship Program. Alec is SWOT data coordinator and associate of CI's Sea Turtle Flagship Program. They are not related. For a comprehensive listing of SWOT Team data contributors, see pages 42–48.*

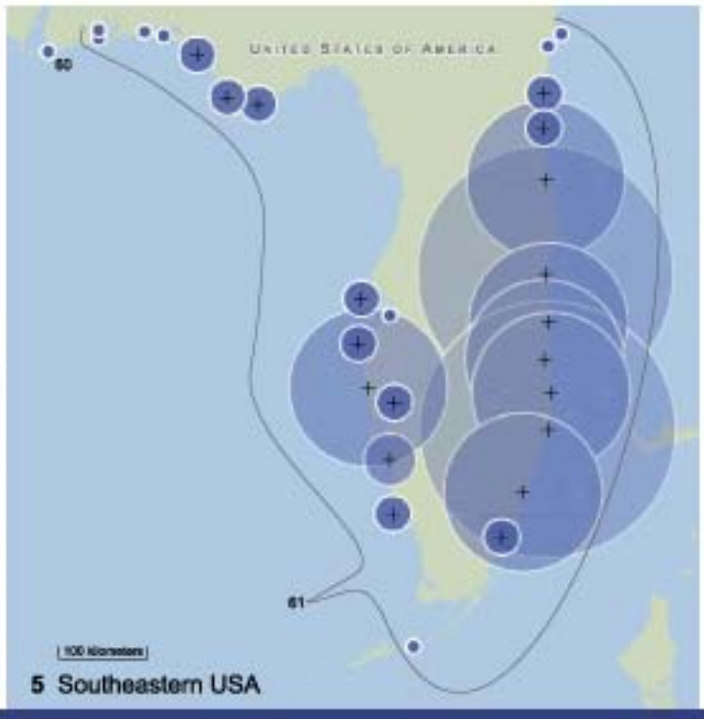
A young loggerhead turtle swims near its nesting beach off the coast of Florida, U.S.A.

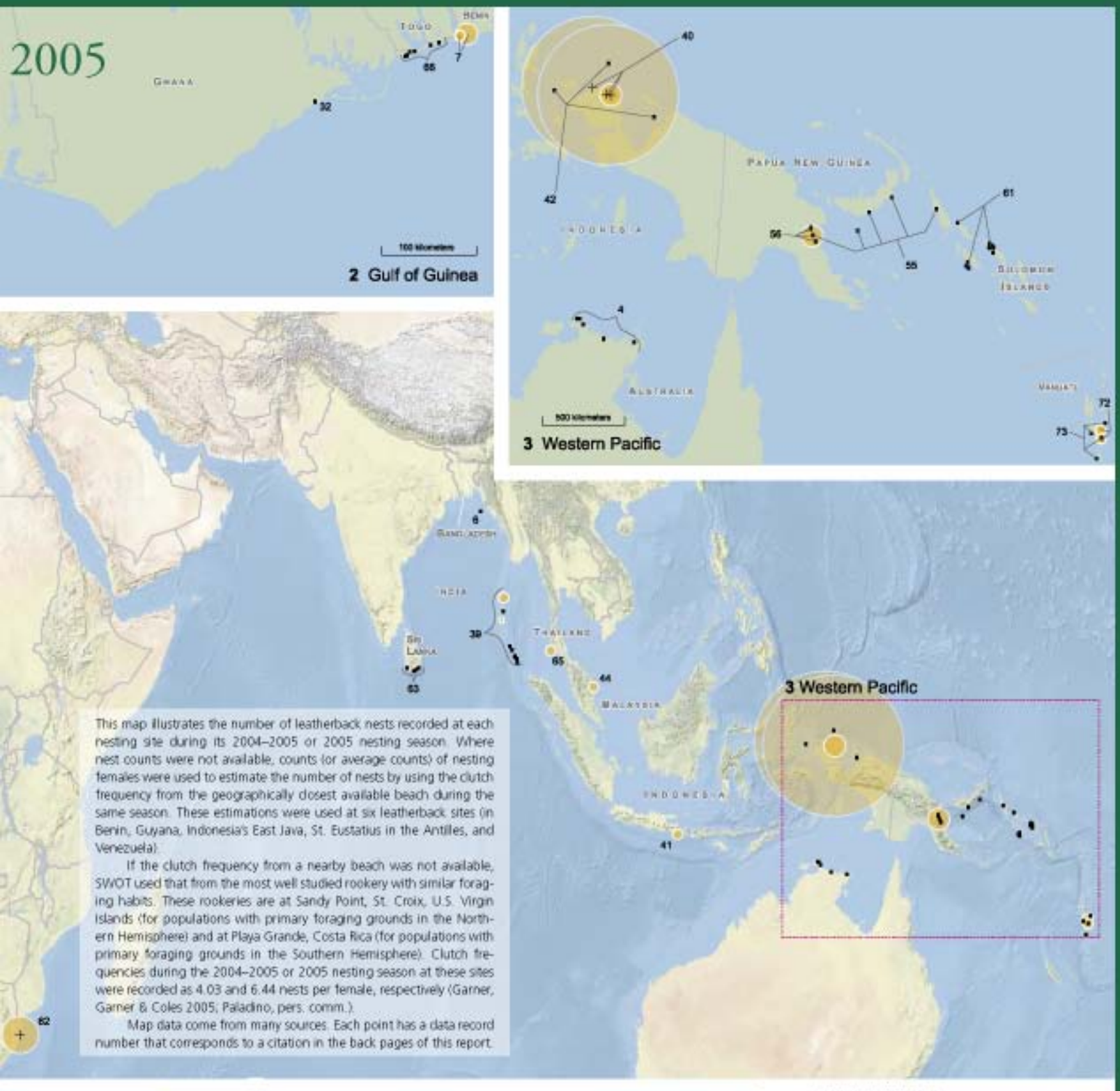
Worldwide Loggerhead Nesting Sites 2005



Projection: Eckert IV, central meridian 30° east

Data: The SWOT Team see pages 42-46; VMap0, National Geospatial Intelligence Agency; Natural Earth, Tom Patterson, US National Park Service

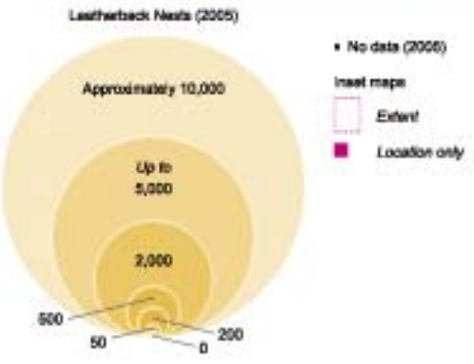




This map illustrates the number of leatherback nests recorded at each nesting site during its 2004–2005 or 2005 nesting season. Where nest counts were not available, counts (or average counts) of nesting females were used to estimate the number of nests by using the clutch frequency from the geographically closest available beach during the same season. These estimations were used at six leatherback sites (in Benin, Guyana, Indonesia's East Java, St. Eustatius in the Antilles, and Venezuela).

If the clutch frequency from a nearby beach was not available, SWOT used that from the most well studied rookery with similar foraging habits. These rookeries are at Sandy Point, St. Croix, U.S. Virgin Islands (for populations with primary foraging grounds in the Northern Hemisphere) and at Playa Grande, Costa Rica (for populations with primary foraging grounds in the Southern Hemisphere). Clutch frequencies during the 2004–2005 or 2005 nesting season at these sites were recorded as 4.03 and 6.44 nests per female, respectively (Garner, Garner & Coles 2005; Paladino, pers. comm.).

Map data come from many sources. Each point has a data record number that corresponds to a citation in the back pages of this report.

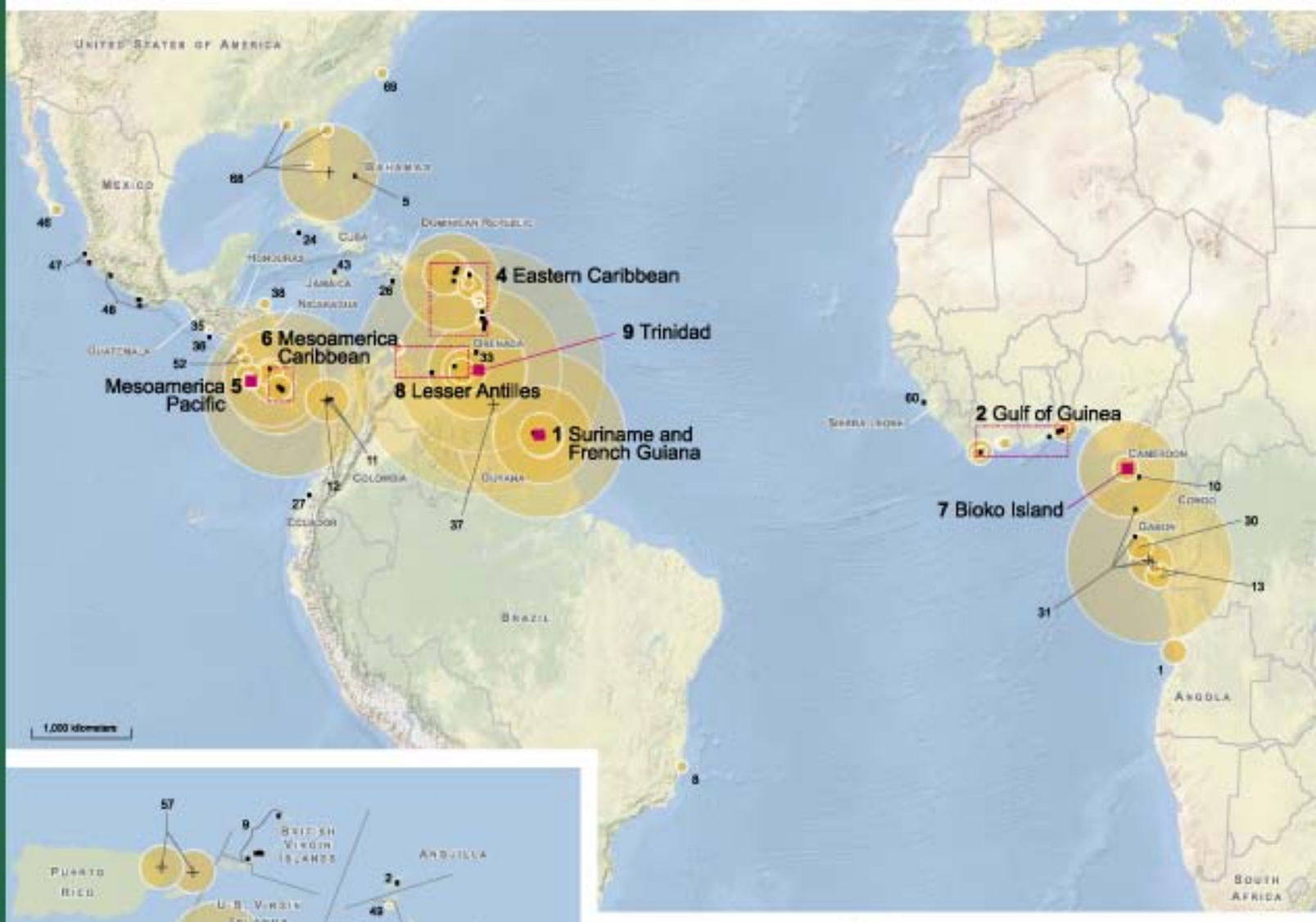


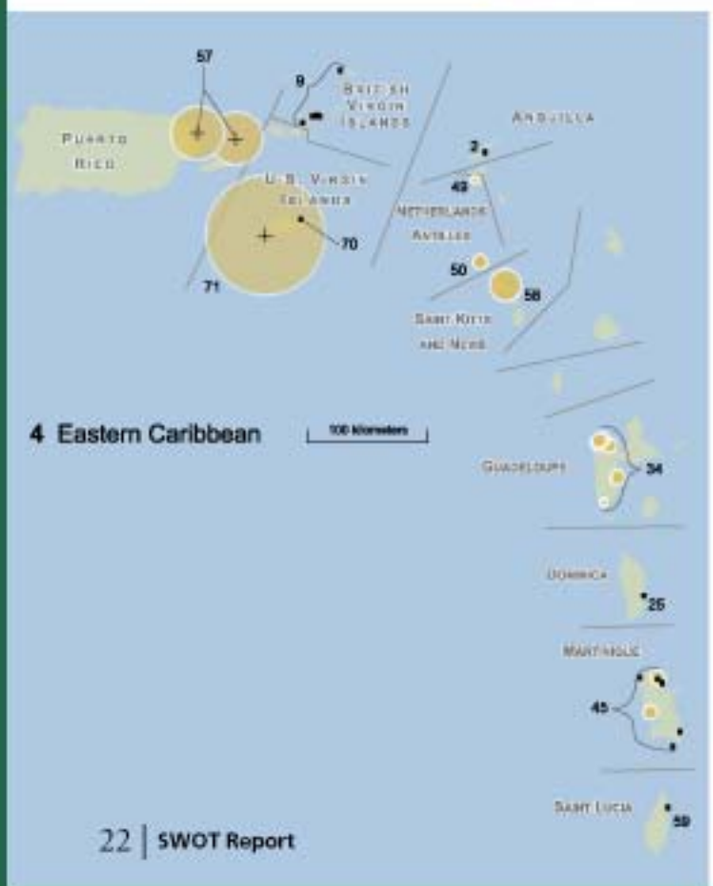
Projection: Eckert IV

Data: The SWOT Team *see pages 47-48*
VMap0, National Geospatial Intelligence Agency
Natural Earth, Tom Patterson, US National Park Service

Worldwide Leatherback Nesting Sites

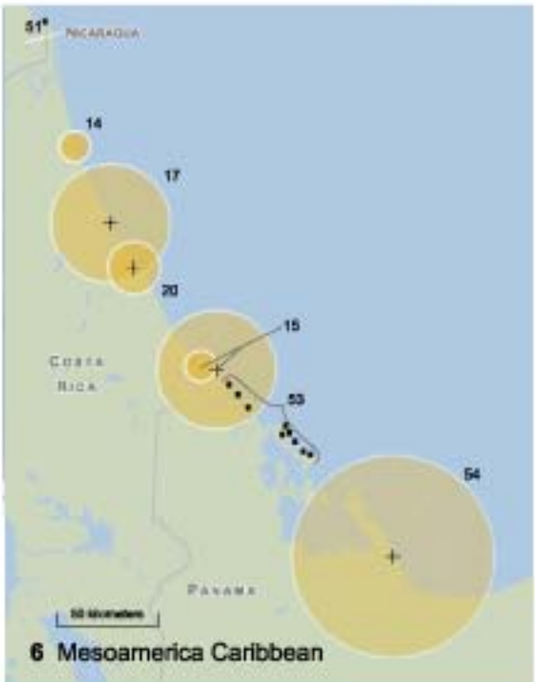
1 Suriname and French Guiana



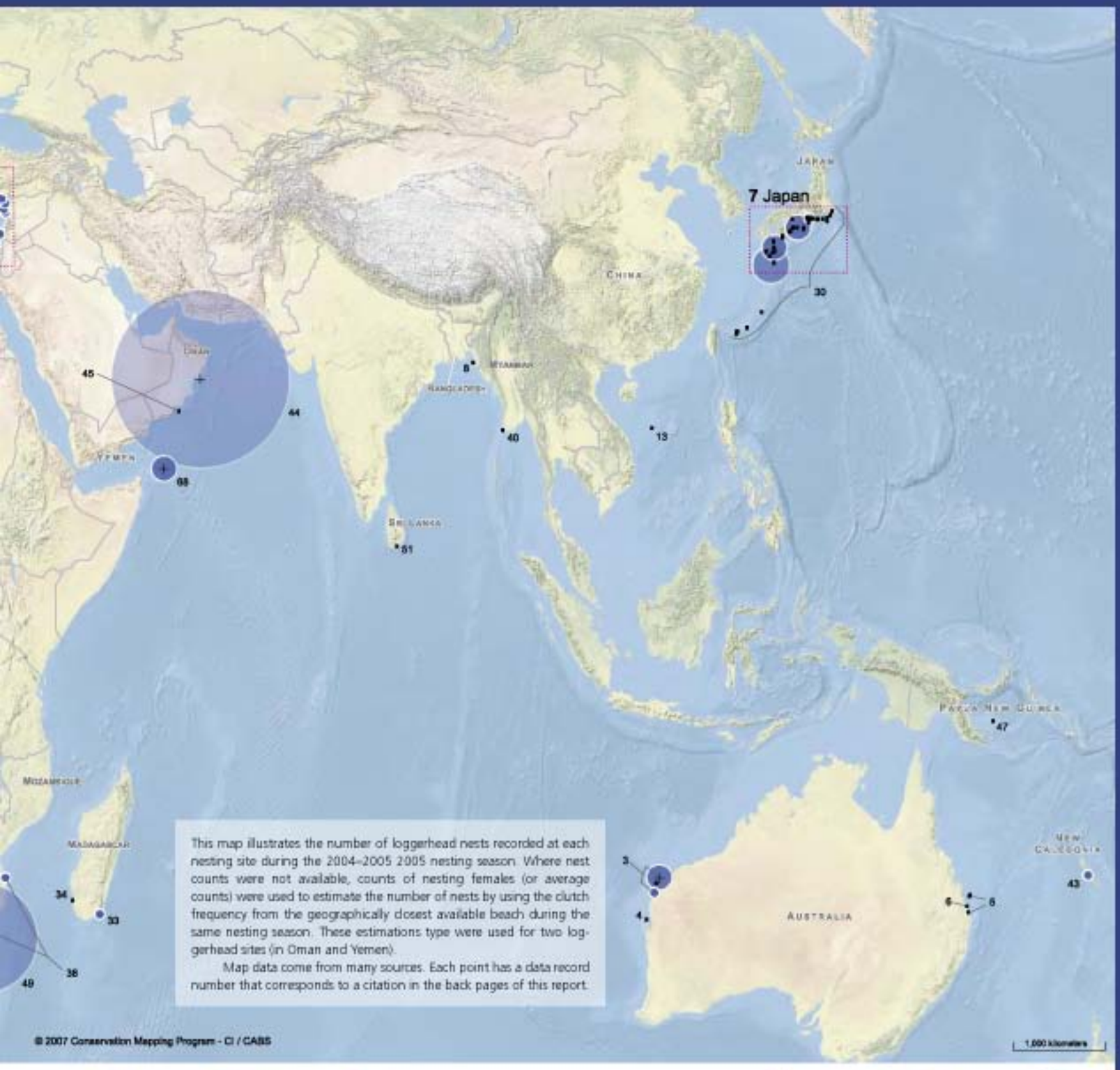


4 Eastern Caribbean

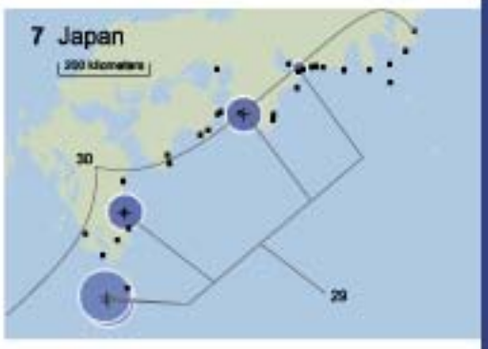
5 Mesoamerica Pacific

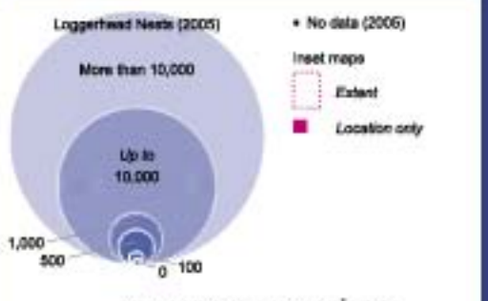


6 Mesoamerica Caribbean


7 Japan
Japan
China
Oman
Yemen
Myanmar
Bangladesh
Sri Lanka
Papua New Guinea
Mozambique
Madagascar
Australia
New Caledonia
45
44
68
8
40
13
30
51
47
3
4
6
6
43
34
33
38
49
This map illustrates the number of loggerhead nests recorded at each nesting site during the 2004–2005 2005 nesting season. Where nest counts were not available, counts of nesting females (or average counts) were used to estimate the number of nests by using the clutch frequency from the geographically closest available beach during the same nesting season. These estimations type were used for two loggerhead sites (in Oman and Yemen).
Map data come from many sources. Each point has a data record number that corresponds to a citation in the back pages of this report.
© 2007 Conservation Mapping Program - CI / CABS
1,000 kilometers


Turkey
Greece
Syria
Cyprus
Lebanon
Israel
Egypt
54
24
59
56
58
55
57
18
19
52
21
20
31
26
22
150 kilometers
6 Mediterranean


7 Japan
200 kilometers
30
29


Loggerhead Nests (2005)
More than 10,000
Up to 10,000
1,000
500
0
100
• No data (2006)
Inset maps
Extent
Location only

A Long-Term Trend of Sea Turtle Success in Brazil

A loggerhead in Brazilian coastal waters. © TAMAR-IBAMA

Loggerheads have long been exploited in Brazil. Before 1980, nearly all loggerhead eggs laid along the Brazilian coast were poached, and most nesting females were taken for meat. This situation has vastly improved since the implementation of Projeto TAMAR-IBAMA, the Brazilian National Sea Turtle Conservation Program.

TAMAR's staff at each of its 22 stations maintains daily programs of beach monitoring during the austral summer nesting season. They are supported by an extensive, community-based beach monitoring program of local fishers, who are employed, trained, and supervised by TAMAR research program staff. Generating ecologically sound, socio-economic alternatives for the local population, TAMAR activities create approximately 1,300 direct jobs each year—such as t-shirt manufacturing, craft-making, paper recycling, and eco-tourism opportunities.

TAMAR's monitoring program began in 1982 at the major sea turtle nesting beach at Praia do Forte in the state of Bahia, which has one of the highest loggerhead nesting density in Brazil. The national turtle monitoring network expanded progressively over several years. By 1988, it included all nesting beaches across nine Brazilian states, including the loggerhead nesting states of Rio de Janeiro, Espírito Santo, Bahia, and Sergipe, covering more than 1,100 kilometers (683.5 miles) of the Brazilian mainland and island coastlines.

By 1998, temporal and geographic data on nesting turtles were being gathered from 22 distinct sites—10 contiguous beaches in Bahia covering 93 kilometers (57.8 miles) and 12 contiguous beaches in Espírito Santo covering 162 kilometers (100.7 miles). Together, these sites account for more than 75 percent of loggerhead nesting in Brazil. Long-term trends for loggerheads have been derived using data from these 22 sites over a 16-year period leading up to the 2004–2005 season.

Following the cessation of direct take of turtles and their eggs in the 1980s, there has been a substantial long-term increase in nesting abundance of the once-depleted southern Atlantic loggerhead stock (see figure at right).

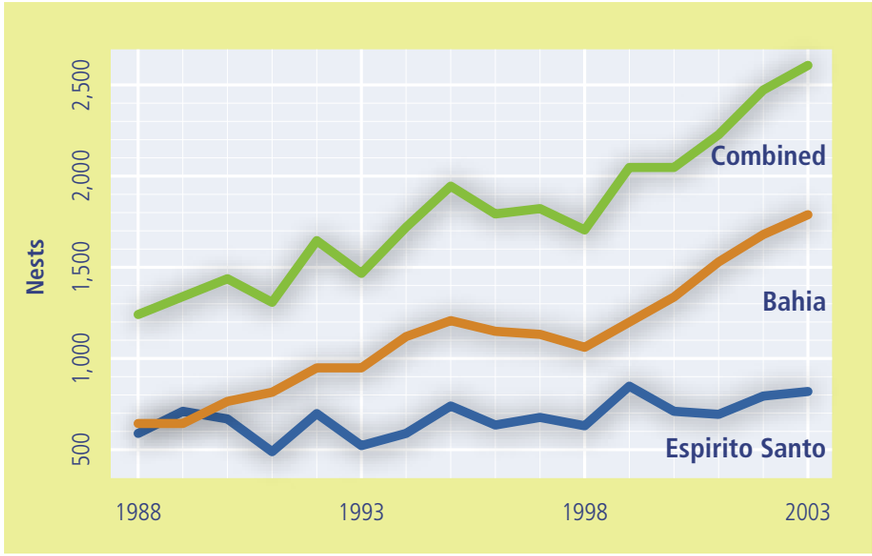
National conservation efforts have contributed significantly to the improved status of the Brazilian loggerhead stock, but emerging threats such as incidental capture in coastal and pelagic fisheries could limit

ABOVE: Projeto TAMAR scientists record the length of a loggerhead's shell. © TAMAR-IBAMA BELOW: A loggerhead turtle returns to the sea after nesting. © TAMAR-IBAMA

further recovery. In response to this threat, a national plan to reduce incidental capture was started in 2001, researching mitigation measures that can be implemented in the primary fisheries that affect sea turtles.

Long-term datasets illustrate that the Brazilian nesting population is one of the largest remaining loggerhead nesting populations in the world. Continued protection of the Brazilian loggerhead stock is of paramount importance for the global conservation of this species.

Neca Marcovaldi *is the national technical coordinator for Projeto TAMAR-IBAMA and president of the Pró-TAMAR Foundation.* ***Luciano Soares*** *is the assistant for Projeto TAMAR-IBAMA's National Technical Coordination.* ***Milani Chaloupka*** *is the director of Ecological Modelling Services P/L in Australia and a vice chair of the IUCN Marine Turtle Specialist Group.*



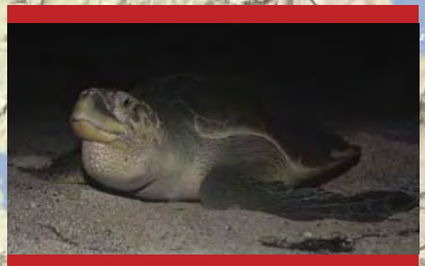
Annual number of loggerhead nests recorded in the states of Bahia and Espírito Santo (individually and combined), 1988–2003. CHARTS AND DATA COURTESY OF MARCOVALDI AND CHALOPUKA

Sea Turtles in the Middle East

Green turtle hatchlings leave the beaches at Ra's Baridi on Saudi Arabia's Red Sea coast. The only major green turtle nesting site along this coast, it is threatened by a cement factory built directly on the nesting beach.

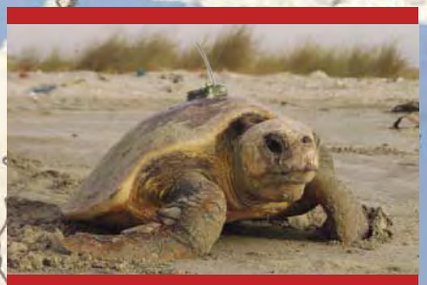
A green turtle nests on Saudi Arabia's Karan Island in the Arabian Gulf. More than 1,000 turtles nest on this small 2-kilometer (1.24-mile) island each season. With mice as the only natural predators of their eggs, turtle populations have flourished, but an increase in foreign fishers on the islands has brought the threat of poaching.

A hawksbill turtle swims among the corals of Sudan's Suakin Archipelago. Hawksbills often nest on remote islands in low densities, helping them to avoid predation.



An olive Ridley nests close to Asseb, Eritrea, in 2005. This was the first record of an olive Ridley nesting in the Red Sea.

Following a long nesting outing on one of Qatar's beaches, this hawksbill retires to the sea. Most hawksbills in the Arabian Gulf lay between one and three clutches in a nesting season. Industrial development from the oil and natural gas industry threatens most nesting habitats for turtles in the region.



After being fitted with a satellite transmitter, this loggerhead turtle leaves Masirah Island in Oman. Tracking studies such as these help scientists determine the location of feeding grounds and understand the global nature of sea turtles.

A green turtle swims near the Socotra Islands of Yemen. Although the turtles are not known to nest on the islands, they are frequent visitors to the local waters.

Among the Middle East's many fascinating inhabitants are the thousands of sea turtles that roam the region's waters, feeding on a plethora of marine delicacies and arriving each year, with unfailing regularity, to nest on the region's shores. The Arabian Peninsula dominates the region: its beaches are washed by the Red Sea to the west; the Gulf of Aden and the Arabian Seas to the south and east, respectively; and the Arabian (Persian) Gulf in the northeast. Each of these marine bodies hosts a kaleidoscope of unique fauna—including globally important sea turtle populations—and each population has its own conservation challenges.

Hawksbill turtles inhabit coral reefs, where they feed on sponges and other invertebrates. In the Middle East, they nest predominantly along the coasts of Iran and Qatar—where they are believed to number in the hundreds—and on the offshore islands of Oman, Saudi Arabia, and the United Arab Emirates. Smaller numbers nest in Egypt, Eritrea, Sudan, and Yemen.

Herbivorous green turtles forage in shallow water seagrass pastures, which are found in restricted tracts along the Red Sea coast, along the southern coast of Oman, and throughout the southeast regions of the Arabian Gulf. These foraging zones are among the most important for the species in the northwest Indian Ocean, supporting nesting populations that number in the thousands. In Oman alone, more than 4,000 green turtles nest each year. On the Saudi Arabian islands of Jana and Karan, some 1,000 come ashore to lay eggs. Hundreds more nest along the Red Sea and Gulf of Aden coasts of Saudi Arabia and Yemen.

Small populations of olive Ridleys also nest in Eritrea and Oman, and a number of leatherback turtles can be found foraging in the Red Sea and along the southern Arabian Gulf coasts.

The true jewel in the crown, however, is the loggerhead turtle population nesting at Masirah Island—an 85-kilometer (52.8-mile) stretch of land 10 kilometers (6.2 miles) off the southern coast of Oman. There, at this bastion of the Middle Eastern sea turtle empire, an estimated 30,000 loggerhead nests are laid each season. Loggerheads nest in smaller numbers in Yemen and possibly in Egypt, although no other major nesting aggregations are known.

For now, because direct exploitation has been historically low and because many Middle Eastern countries have fisheries policies that indirectly benefit turtles, the region continues to be a stronghold for the various turtle species. Their populations show little sign of decline, despite the increased human-induced pressures since the 20th-century discovery of petroleum reserves. Perhaps the greatest question for Middle Eastern turtles now is how and if they will survive the expanding footprint of continual human population growth and the accompanying industrial and commercial development that is already significantly polluting and diminishing the turtles' habitats.

Nicolas Pilcher *and* ***Jeff Miller*** *have worked with marine turtles in the Middle East region since the mid-1980s. Along with colleagues Ali Al Kiyumi, Salim As Saady, Abdulaziz Al Jabri, Nasser Al Muraikhi, Anas Sambas, Mustafa Al Merghani, Ahmed Al Mansi, Mohammed Saad, Asghar Mubaraki, Saif Al Ghais, Fuad Nassib Saeed, Mohamed Smail Mohamed, Tabeth Abdellah Khamis, Malek Ahmed AbdelAziz, M. Abdulkarim, Abdulkarim Farrah, Jamal H. Bamanie, Johannes Tecklemariam, Sammy Mahmud, and Steffan Howe, as well as many volunteers, they have visited nearly every major nesting site and helped to develop conservation practices on many of them.*

Curbing the Balinese Sea Turtle Trade

"Ketut, there are 300 rioters outside, demanding to see you. They're threatening to burn down the office."

It was February 21, 2001, eight o'clock in the morning, in my home village on the island of Bali. I had my coffee in one hand and my cell phone in the other. This was not something I had expected to hear on the other end of the line. Then again, I had never expected to find my photograph on "Wanted: Dead or Alive" signs scattered around the coasts of my native island, nor had I expected to receive death threats at my home. All I had ever expected was to do my job—to protect the coastal waters of my homeland and the species within them.

Sea turtles are an important part of my personal, religious, and cultural heritage. In the Hindu traditions of Bali, sea turtles are honored. It is said that Earth rests on the back of an elephant that stands atop a turtle. Morality tells me it is wrong to kill these animals. Science tells me that the sea turtle poaching occurring around most of Indonesia's shores is fully unsustainable. Between 1975 and 1995 alone, there was a nearly 90 percent drop in nesting populations in Indonesia, and the last nesting observed on any Bali beach had been in 1970.

By the 1980s, Bali boasted the largest sea turtle trade in Indonesia, and the Bali markets were an internationally infamous nexus for the killing of thousands of sea turtles from around the region.

In 1990, a law was passed in Bali that limited the capture of green turtles to an annual maximum of 5,000 animals. The meat of these turtles was to be used only for cultural activities such as traditional wedding ceremonies. The green turtle quota was never enforced, however, and turtle species other than the green were not even recognized by the 1990 law.

Several months before the riot facing me that morning, determined to make a change, my colleagues and I had begun working with the Balinese government, Hindu religious leaders, and the Bali government's tourism association to discuss the potential impact on Bali's tourism industry if the sea turtle trade were not stopped. The trade was contradictory to the Balinese reverence of the turtle as a holy creature, I contended, and the green turtle quota was clearly and continually being exceeded. Most important, the turtle trade on our island did not only affect populations in Bali; most of the turtles were coming from other areas of Indonesia. Because of the lack of effective monitoring to enforce a quota, I advocated an absolute ban on sea turtle hunting around Bali.

The sea turtles were kept in pens before being slaughtered and sold. Tanjung Benoa, Bali, 1991. © JEFF CANIN / HATCHLING PRODUCTIONS

Numerous discussions and mounting support from the local government and religious leaders, led Governor Dewa Made Berata to issue a new law in 2000, banning all sea turtle trade on Bali. In early February of 2001, committed to enforcing the new policy, police officers went to the seven coastal holding pens from which most sea turtles were sold, tore down the enclosures, released the turtles back to sea, and sent the turtle traders to court.

That morning in February, I knew who the rioters outside of my office were. They were the sea turtle hunters and vendors whose trade had been

Ketut Putra tags an olive Ridley in Alas Purwo National Park, Indonesia, before releasing it to the ocean. © AMALIA FIRMAN / CONSERVATION INTERNATIONAL

abolished by the new policy. They were out of work, they were angry, and they were armed.

I called the governor's office to seek protection. Staff members sent a car with four armed policemen to drive me to my office and escort me safely through the rioters into the building. The rioters sent five leaders inside to speak with me. They conveyed one message: "Because of you, we can no longer hunt and sell sea turtles. Because of you, we have no jobs."

I was quick to defend that the new sea turtle trade ban was not my policy but the Balinese government's. "My role is not to create policy," I tried to explain. "I am only a scientist. I provide information about sea turtles, but I do not make the laws. The facts show that sea turtles are disappearing, and the government created a policy to protect them. If you have a problem with this policy, then you should speak to the policymakers—not to me!"

And off we went—to speak to the policymakers. Out from my office and through the center of town, I led 300 rioters straight to the front door of the governor's office. The governor's assistant agreed to meet immediately with 10 representatives from the crowd.

He defended the policy and the arguments I had posed many times before. Fifty percent of Bali's economy depends on tourism, he explained, whereas the sea turtle trade provides income to very few people and is offensive to tourists who visit our island. "We will not change the policy," he said, "but we will work with you to find new livelihoods outside of the turtle trade."

Although they were not fully satisfied when they left the vice governor's office, the sea turtle hunters and vendors did achieve an important milestone that day by beginning a dialogue with the government. From that point forward, they worked with the government on alternative livelihood solutions within Bali's tourism industry. The solutions are not flawless, but we continue to make headway. Former turtle poachers are now successful boat makers for tourism enterprises. Previous vendors of turtle satay now serve pork, duck, and fish instead.

Balinese police officers and local community members work together to enforce sea turtle protection. Here they release a turtle that has been illegally captured, 2004. PHOTO COURTESY OF NGURAH MAHARDIKA

Prior to 2001, more than 30,000 green turtles were captured from Indonesian waters and sold in Bali each year. Today, fewer than 500 turtles are captured. As a result, populations in Indonesian turtle rookeries have a better chance to recover.

Those few hundred turtles that are still captured are traded on a black market that continues to diminish, because Balinese officials still strongly enforce the turtle trade ban. I have faith that they will continue to do so, because they understand the need for conservation, see its economic benefits, and have a common belief in the sanctity of the sea turtles of Bali.

Ketut Putra *is currently the marine director of Conservation International–Indonesia and still calls Bali "home." During the events of this article he was the director of WWF-Indonesia's marine program, based in the Bali office.* ***Lisa M. Bailey*** *is the marine communications manager at Conservation International in Washington, D.C. This is Ketut's story; Lisa helped him chronicle it for* SWOT Report.

U.S. Marine Turtle Conservation Act:

A Multinational Fund for Multinational Species

Well known for her commitment to sea turtle conservation education, Ila Loetscher is seen here discussing the plight of the Kemp's Ridley sea turtle in the Gulf of Mexico. © EVELYN SIZEMORE / SEA TURTLE, INC.

Ila Loetscher and a Kemp's Ridley sea turtle. © EVELYN SIZEMORE / SEA TURTLE, INC.

The Marine Turtle Conservation Act (MTCA) is the newest of several U.S. funds to support the conservation of multinational species overseas. The initiative to create the MTCA was spearheaded by The Ocean Conservancy and WWF and supported by numerous conservation groups and members of the international sea turtle community. Along the way, the bill attracted several congressional supporters, including one unexpected but important advocate.

In 2003, on the day that the MTCA was introduced to the U.S. Senate for consideration, Senator James Inhofe of Oklahoma surprised senators and the conservation community alike when he provided a primer on sea turtle biology and regaled the packed hearing room with tales of a young man who had worked in Texas alongside the legendary Ila Loetscher, "the Turtle Lady of South Padre Island." Together, they had protected endangered Kemp's Ridley nests, watched over hatchlings heading out to sea, and cared for incapacitated turtles. Just as Ila's legacy lives on in thousands of other people she inspired, that particular young man remembered her message of conservation when he became a powerful U.S. Senator. Shortly after Senator Inhofe's memorable hearing, the Senate passed the MTCA. In 2004, it was passed by the House and signed into law by President George W. Bush.

The MTCA and the other multinational conservation funds—for African and Asian elephants, great apes, rhinoceroses, and tigers—are administered by the U.S. Fish and Wildlife Service (USFWS). Although the program is relatively small, the funding it provides is critical for imperiled wildlife and leverages significant additional support, including money, material, and human resources. For fiscal year 2005, the MTCA received US$100,000 in start-up funds. The following year, the United States provided US$5.6 million for the four mammal funds and US$700,000 for marine turtles. As funds are appropriated annually, the conservation community mounts a major lobbying effort each year to ensure that these contributions continue.

Since its establishment, the MTCA has awarded $711,704 in grants to 32 projects around the world to address the most pressing threats faced by sea turtles. The focus of the USFWS is to support nesting beach projects for the most globally significant nesting populations, such as loggerheads in Oman, leatherbacks in the Pacific and West Africa, hawksbills in the Caribbean and Indian Oceans, and *arribada* olive Ridley nesting populations. Additionally, the USFWS strives to support good capacity-building opportunities and the relatively new international bodies such as the Inter-American Sea Turtle Convention and the Indian Ocean Southeast Asian Marine Turtle Agreement, as well as community-based social and economic conservation projects.

Marydele Donnelly *is the international policy director for Caribbean Conservation Corporation.* ***Earl Possardt*** *is the U.S. Fish and Wildlife Service's international sea turtle specialist.*

Controversial Conservation at Zakynthos

Greece hosts approximately 60 percent of all loggerheads nests in the Mediterranean. Forty-two percent of these are laid across a 5.5-kilometer stretch of six beaches along Laganas Bay on the island of Zakynthos. This is the largest known nesting density in the Mediterranean.

Despite diverse attempts to protect the bay since 1984, coastal development continues to increase, largely due to local resistance, mass-tourism development, and non-implementation of local, national, and European Commission (EC) environmental legislation. In the absence of enforcement of local and national urban planning, small-scale illegal buildings, walls, and roads have increasingly encroached on Zakynthos' once-pristine nesting beach of Daphni.

In 2000, the EC filed a case against Greece at the European Court of Justice for non-implementation of EC legislation that requires the establishment of a system of strict protection for sea turtles. This legal move became a catalyst for the formation of the National Marine Park of Zakynthos (NMPZ)—a major breakthrough in resolving the situation. Lack of financial support from the government led to the park's closure between December 2004 and June 2005, incurring a final written warning from the EC threatening multimillion-Euro fines.

The park's management agency was reestablished toward the end of the 2005 nesting season under a new managing president who received full government support. During the 2006 nesting season, most beaches were properly guarded and cleared of rubbish, and information services such as educational signage were improved.

These positive changes, however, have been overshadowed by the NMPZ president's decision to instigate and supervise the construction of further roads and development on Daphni nesting beach. Such illegal activity sets a dangerous precedent for conservation of other protected areas in Greece. Unless immediate steps are taken to establish long-term management objectives and to uphold existing national and international legislation, the future of this critical nesting area remains in jeopardy.

***Lily Venizelos**, president, and **Prue Robinson**, international communications officer, work for MEDASSET, the Mediterranean Association to Save the Sea Turtles.*

LEFT: Sea turtle tracks on an umbrella-lined tourist beach in the National Marine Park of Zakynthos. © ARCHELON
BELOW: Eastern end of Laganas Bay. Umbrellas and chairs left in the sand overnight can become obstacles that deter sea turtles from nesting. © ARCHELON

Zanzibar Cleans Up with Ban on Plastic Bags

In July 2006, Zanzibar's government passed bold legislation to outlaw the importation and use of plastic bags, which have noticeably polluted the marine and terrestrial environment of the archipelago in recent years. Bags made of raffia palm have been suggested as an alternative. The ban is intended to aid preservation of the natural environment and to improve tourism, the islands' top revenue-generator. Violators of the ban will be punished with a US$2,000 fine, up to six months in prison, or both. Given that pollution, especially plastic bags, is one of the most dangerous hazards to sea turtles worldwide according to the IUCN Marine Turtle Specialist Group, Zanzibar's bold new legislation marks a positive trend for sea turtles.

Sea turtles may mistake plastic bags as jellyfish, a favorite food, causing them to drown. © TRAVIS STALEY

The Net Gain of Working with Fishers to Reduce Bycatch

Entanglement in Trinidad's coastal gillnet fisheries is the largest single source of mortality to leatherback sea turtles in the country, killing more turtles than all other factors combined and threatening to unravel several years of proactive conservation and management. As many as 3,000 entanglements are estimated to occur each year, and that as much as 35 percent of these result in the death of the turtle. The crisis places a severe strain on the ability of fishers to operate economically, as nets damaged by sea turtles retain very little fish.

Because it supports the second largest known nesting aggregation in the world, the Republic of Trinidad and Tobago plays a crucial role in the global survival of this species. To facilitate stakeholder-driven solutions to the crisis, the Wider Caribbean Sea Turtle Conservation Network (WIDECAST) and the Fisheries Division (Ministry of Agriculture, Land, and Marine Resources) hosted a national consultation in February 2005. Fishers from all affected communities, local and national non-governmental organizations (NGOs), national management agencies, the Ministry of Foreign Affairs, and a handful of international fishing and conservation experts participated.

The goal of the three-day workshop was to devise a series of potential solutions that fishers and natural resource managers could field-test and evaluate. To this end, twin objectives were proposed: fishers must be better off economically as a result of any proposed solution to the bycatch crisis; and the incidental capture and mortality of leatherback sea turtles in coastal fisheries must cease. By workshop's end, the participants concluded that no single solution would suffice for all areas. A series of bycatch reduction experiments was proposed, with the eventual objective that one or more of the reduction methods would be adopted. The participants agreed that fishers should take part in the testing and development of each new method.

Workshop recommendations included evaluating new bait types—artificial, dead, and non-traditional—to promote hook-and-line fishing as a replacement for nets; use of new technologies or gear modifications, such as power take-up reels or alternate net materials; fish aggregating devices; modifications in net fishing methods, such as adjusting net depth; means to repel turtles from nets, such as the use of sonic pingers; use of shark silhouettes on nets; and new regulatory regimes to seasonally ban net fishing up to 8 kilometers offshore of major nesting beaches.

Endangered sea turtles live or die at the hands of people who encounter them every day. Solutions to serious conservation challenges rely on stakeholder participation and the art of consensus. The fishers of Trinidad—in an ongoing dialogue with their government and NGOs—are actively engaged in solving one of the most significant bycatch challenges in the world, and they are well on their way to achieving this goal.

Scott Eckert *is a research scientist at Duke University and director of science for the Wider Caribbean Sea Turtle Conservation Network (WIDECAST). WIDECAST, a consortium of experts in more than 40 Caribbean nations, is a Partner Organization of the UNEP Caribbean Environment Programme.*

Gillnet fishers in Trinidad and Tobago.

Life Carries on for Turtles in War-Torn Lebanon

When Israeli and Hezbollah fighters went to war on July 12, 2006, the loggerhead nesting season in south Lebanon at Mansouri and Koliala beaches was in full swing. We had no plans to leave the beach, where we have conducted a monitoring program since 2000 with the help of the Mediterranean Association to Save the Sea Turtles (MEDASSET). So, when Hezbollah fighters appeared on the shore, we asked them to leave, lest they attract an Israeli attack. They agreed—albeit perplexed about what two middle-aged Lebanese women staying in a war zone to look after sea turtles might be thinking. We put out white flags during hasty daily forays to monitor the dozens of nests, but as the Israeli bombing intensified, we moved from the Orange House, our bed and breakfast inn, to a nearby hut for safety.

The turtles paid no heed to the strife, but our own plight became starker, with no electricity and constant explosions. When an Israeli air strike aimed at a Hezbollah rocket crew destroyed our neighbor's house, we knew we had to leave.

With anguish in our hearts, we left water and food out for our two dogs and cat, and we let our goats out of their pen; like the turtle hatchlings, they would have to fend for themselves. For once we had to put our own survival ahead of the turtles, and on the 16th day of the war, we fled to Beirut.

Three weeks later, a truce came into force, and we returned to find two rooms of our house damaged by Israeli bombs, the goats gone, and one dog missing, although he eventually turned up. Disturbances in the sand told us that more turtles had nested in our absence, but we could not locate the eggs or protect all the nests with wire mesh. Some, including the last green turtle clutch of the season, fell victim to new predators—foxes driven from their normal habitat in the hills by the fighting.

Somehow the beach escaped direct pollution from the 10,000–15,000 tons of fuel oil that spilled into the sea from a power plant hit by bombing at Jiyyeh to the north. Despite the war, we reckon around 5,000 hatchlings from 70 loggerheads and 9 green turtle nests made it to the sea this year from the 1.4-kilometer (one-mile) beach we monitor—and that we hope one day will become a state-protected nature reserve.

Some of those hatchlings will be back.

Mona Khalil *has protected this nesting beach since the year 2000. She and her business partner, Habiba Syed, operate Mona's family home, the Orange House, as a bed and breakfast to help fund their sea turtle conservation activities.*

TOP LEFT: Barbed wire: a military checkpoint in Lebanon. © ISTOCKPHOTO.COM TOP RIGHT: Tank: An Israeli military tank. © RAPHAEL LEVY BOTTOM RIGHT: Mona Khalil continued her research on the nesting beach despite the war in her country. PHOTO COURTESY OF MONA KHALIL.

How Tourism, Tourists, and Coastal Residents Can Be Stewards of Sea Turtles

Many of the quiet, sandy beaches at which turtles have nested for millennia are some of today's most popular vacation destinations around the globe. Coastal development near sea turtle habitats can be a detriment to the turtles' ancient nesting grounds and the waters in which they live. Improperly managed, tourism destinations can degrade beaches and alter the natural environment on which turtles and other wildlife depend for survival. Thoughtful tourism development and management practices, however, can benefit marine life and bring a whole new level of enrichment to guests.

Best Practices for Coastal Developers and Tourism Operators

Local residents help to release rehabilitated Kemp's Ridley sea turtles into Nantucket Sound off Cape Cod, U.S.A. PHOTO COURTESY OF NOAA.

1. **Don't Build on the Beach.** Constructing at least 100 meters inland from the high tide line will protect sea turtles *and* built structures. Native vegetation and natural topography (such as dunes) stabilize the beach, reduce erosion, create suitable microclimates for nests, and help shield the beach from artificial light.
2. **Adjust Lighting Schemes.** Lights near nesting beaches can disrupt nesting behavior and disorient hatchlings as they emerge from the nest, sometimes deterring them from their passage to the sea. Obey lighting ordinances, tint windows, provide window treatments, lower and shield sea-facing lights, and replace high-intensity light bulbs with lowest wattage, low-pressure, sodium vapor lighting where possible.
3. **Keep Beaches Clear.** Obstacles can deter sea turtles from the beach. Stack beach chairs and umbrellas at dusk, and remove litter; beach cleaning should be limited to hand tools that penetrate less than two inches into the sand.
4. **Secure the Trash.** Predators, including roaming dogs, are often attracted to trash. Keeping garbage cans securely covered will help keep them away and prevent trash from blowing onto the beach and into the sea.
5. **Prevent Pollution.** Modern sewage treatment methods and proper use of housekeeping, maintenance, and landscaping chemicals ensure a clean and healthy environment for sea turtles.
6. **Spread the Word.** Make your guests aware of your efforts. Provide materials to educate your guests about sea turtle conservation. Visit www.widecast.org and www.SeaTurtleStatus.org for outreach tools.

The responsibility to protect sea turtles also belongs to tourists and residents in areas where sea turtles roam. You can do your part by following some simple guidelines.

Turtle-Friendly Practices for Tourists and Residents

1. **Turn Out the Lights.** Turn off unnecessary lights, and close your drapes. Plug in nightlights when needed. When walking the beach, make minimal use of flashlights, and never shine light directly at turtles.
2. **Leave Nothing Behind.** Collect all items when leaving the beach. Litter can deter nesting females and is often mistaken for food.
3. **Say "No" to Turtle Products.** The sale of sea turtle parts and products—such as tortoiseshell trinkets and turtle leather—is generally illegal. Carrying these products across national borders is prohibited.
4. **Control Your Pets.** Animals, especially dogs, pose threats to eggs and hatchlings. Keep your pet on a leash at all times.
5. **Drive on the Road, Not on the Beach.** Even in permitted areas, driving on the beach can crush incubating eggs, and tire tracks on the sand trap hatchlings as they make their way from nest to sea.
6. **Stand Back.** Do not touch, harass, or flash-photograph sea turtles if you see them. Remain quiet, watch from a distance, and enjoy the opportunity to witness a living dinosaur in its natural environment.

Beach driving destroys the beach's natural topography and threatens sea turtles, sea birds, and other coastal life. © LUCY KEMP / MARINE PHOTOBANK

Karen Eckert *is a research scientist at Duke University and executive director of the Wider Caribbean Sea Turtle Conservation Network (WIDECAST). WIDECAST, a consortium of experts in more than 40 Caribbean nations, is a Partner Organization of the UNEP Caribbean Environment Programme.*

A Friend, Indeed

Mr. Leatherback is an adventurous world traveler. He is friendly, huggable, and photogenic. He is a parade-quality, life-sized leatherback sea turtle.

In the past year, he has visited the 26th Sea Turtle Symposium in Crete, Greece; the pyramids of Giza in Egypt; the Space Needle in Seattle; the Colosseum in Rome; the United States Capitol; and New York City's Statue of Liberty. He has witnessed the eruption of Old Faithful, felt small beside the Golden Gate Bridge, watched water drain clockwise and counterclockwise at the equator line in Ecuador, stood knee-deep in Andean fields of grass, and even enjoyed his 15 minutes of fame beneath the Hollywood sign. He has also raised money at fundraising events and even spent a week educating children at the Gumbo Limbo Nature Center in Boca Raton, Florida. All of these events have been captured on film.

Through his travels and his internet savvy, Mr. Leatherback has gathered more than 2,800 friends through his MySpace profile (www.myspace.com/mrleatherback), with more friends finding him each day. These friends ask Mr. Leatherback for advice on which seafood to eat, how to help save sea turtles, where sea turtles are found, and more. They also post supportive comments, spread the news to their friends, and vow to stop using plastic bags.

Through his MySpace page and his personal travels, Mr. Leatherback aims to educate the world about the drastic plight of the amazing leatherback sea turtle—a Critically Endangered species. Rather than the "doom and gloom" of so many news stories and conservation messages, Mr. Leatherback's message is always fun, entertaining, and optimistic. His belief is that *individuals* have the power to change the course for sea turtles by making simple changes in their lives. And such is the goal of his efforts: to create changes in human behavior that have positive impacts for the leatherback and for other marine life by befriending, educating, and empowering people around the world.

Join Mr. Leatherback in his quest by becoming his friend at www.myspace.com/mrleatherback. After all, a friend in need is a friend, indeed—and Mr. Leatherback needs *you*.

One Small Bag for Tourists Brings Big Benefit

Villagers in Tanoliu, Vanuatu, celebrate the launch of Wan Smolbag's new sea turtle education project. © WAN SMOLBAG

Educational signs help tourists and local community members understand the importance of sea turtle conservation. © WAN SMOLBAG

How do you inspire people to protect sea turtles? In Vanuatu, just try asking them if they want to do so.

Wan Smolbag, a community theater group, has been bringing topical issues to the people of Vanuatu since 1989 in a medium that is accessible to everyone regardless of their age, language, or education. All the tools the group needs for its work are kept in "one small bag"—hence its name in the local dialect—and the Wan Smolbag troupe has successfully used those tools in participatory drama to educate the public on issues such as good governance, health, and the environment.

In response to the 1995 Year of the Sea Turtle, Wan Smolbag researched, created, and toured with the drama *I'm a Turtle*. At the end of each performance, members of the group asked the communities if they wanted to help protect sea turtles. The result was the formation of a nationwide network of turtle monitors, the Vanua-Tai, who began to educate their communities about sea turtle conservation and institute bans on harvest.

Eleven years later, the 200-plus-member network is still going strong. One member of that network is showing that, together with the turtles, the local community benefits as well. Donald has been educating ni-Vanuatu, the people of his country, about sea turtles for years, but he felt there was also a need to educate the visiting tourists. The challenge was gaining access to those tourists. In early 2006, however, a grant from the Australian High Commission enabled Donald to build a small turtle education project in the village of Tanoliu.

In the past, tourists would pass Tanoliu on their way to other destinations along the island road; now, Tanoliu monthly receives some 50 vehicles full of visitors, who stop to learn about the project. If you visit on a day when a cruise ship is in port, chances are you'll see Donald surrounded by a crowd of tourists as he tells them about the lifecycle of the sea turtle, the cultural significance of turtles in Vanuatu society, and how his community is helping to protect the turtles for its children.

Best of all, the community is seeing a tangible benefit from the project. The tourists make donations to the project, a portion of which goes directly back to the community. They also shop at the craft stalls across from the education project, preventing many of the village women from needing to travel to the capital to sell their goods.

What does the future hold for the project? Guided canoe and snorkeling trips to the turtle foraging grounds are in the immediate plans. Donald is also considering whether tourists could sponsor the protection of turtles through a conservation adoption program. Perhaps he'll just need to ask them if they want to do so.

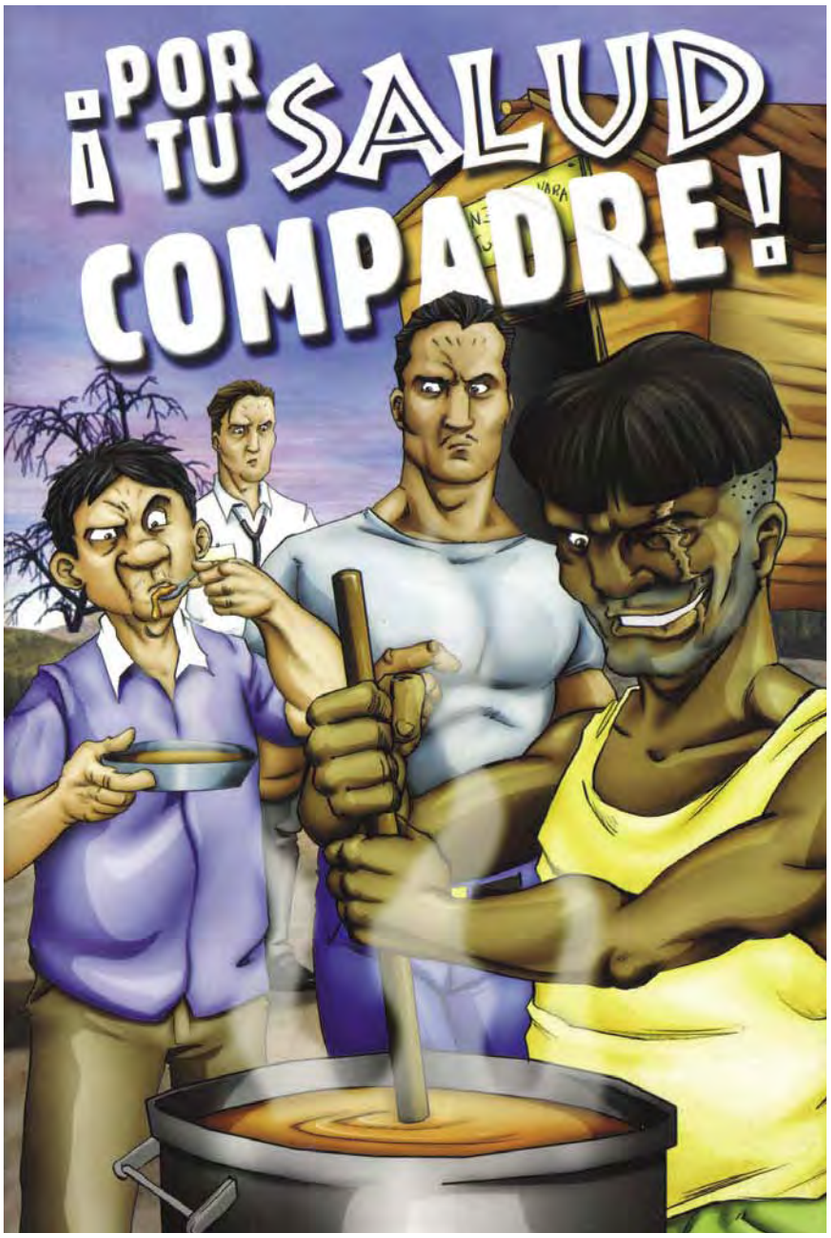
George Petro *is the coordinator of the Vanua-Tai Resource Monitors Program at Wan Smolbag.* ***Michelle Fletcher*** *is a CUSO cooperant to the Vanua-Tai Resource Monitors Program at Wan Smolbag.*

Making the Connection:
Human Health and Sea Turtle Consumption

People in many parts of the world consume sea turtle meat, organs, and eggs. In some communities, sea turtle is a traditional seafood item that is thought to cure a number of ailments such as anemia, asthma, and respiratory problems. Sea turtle eggs are also in high demand in some Latin American cities, where the eggs are thought to be an aphrodisiac. In other areas, sea turtles are caught—purposefully or incidentally—and consumed by local fishers.

Despite its popularity in some regions, sea turtle may cause negative health effects when consumed by humans. Because of their longevity and migratory behavior, sea turtles can harbor elevated levels of environmental contaminants, such as polychlorinated biphenyls (PCBs), mercury, and cadmium.

As recent research and awareness campaigns in several countries have illustrated, humans are often exposed to mercury through consumption of some seafood. Varying levels of environmental contaminants have been found in sea turtles, depending on the region, species, and tissue type (for example, fatty tissue or liver tissue). The levels of mercury and cadmium, in particular, are typically higher than international food safety standards and could result in toxic effects such as neurotoxicity, kidney disease, and liver cancer and developmental effects in fetuses and children. In addition to environmental contaminants, bacteria such as Mycobacterium, Vibrio, Salmonella, and *E. coli* can be found in sea turtle meat and eggs. Evidence shows that tainted sea turtle meat and eggs have caused diarrhea, vomiting, and dehydration in people who do not cook them thoroughly before eating. Various parasites have also been found in sea turtles and in people who consumed contaminated sea turtle, although the health effects of ingesting these parasites are unknown.



"To Your Health": This comic book is one in a series developed by Grupo Tortuguero and Defenders of Wildlife to bring attention to various issues related to sea turtles and ocean conservation, in a style akin to popular graphic novels read in coastal communities throughout Mexico. In this comic the link between human health, ocean health, and wildlife health is established.

Most severe, there are documented cases of poisoning and death following sea turtle consumption. Although it is not fully understood how these turtles became poisonous, the toxins likely originated from the prey consumed by the turtle.

Despite the substantial scientific evidence of the potential for negative human health effects from consuming sea turtle meat and eggs, until recently little work had been conducted to educate communities that may be affected or the public health workers in those communities.

In Mexico, several organizations are now collaborating with public health professionals to make available information about the connection between sea turtle consumption and human health. Recent surveys conducted in coastal communities indicate that turtle consumption is common, though illegal, and that many doctors treat patients for turtle-related medical concerns. Medical professionals indicate that basic information on sea turtle health could be useful to them as they treat patients.

As studies continue, it is important to share our understanding of the relationship between ecosystems, wildlife, and human health in a way that is accessible and accurate.

Jesse Marsh *is a senior fisheries research analyst for the Monterey Bay Aquarium's Seafood Watch program. She has had a special interest in sea turtles since 1999, when she first saw a turtle hatch in Akumal, Mexico. As senior scientist at The Ocean Conservancy and a research associate at the California Academy of Sciences,* ***Wallace J. Nichols*** *(www.wallacejnichols.org) works with a number of organizations to further marine conservation efforts. He has studied Pacific sea turtles for 15 years.*

SWOT Report in Action

When *SWOT Report, Volume I* was published in early 2006, the SWOT Team quickly realized that its job had only begun. The task was upon the team to get *SWOT Report* into the hands of those people around the world who can make a difference—positive or negative—in sea turtle conservation. This broad audience includes scientists, conservationists, journalists, fishers, policymakers, coastal community members, and consumers at large.

To help SWOT's conservation partners spread the word about the state of the world's sea turtles, the SWOT Team launched its first annual Outreach Grants competition. Each of the five projects selected was granted US$1,000 to carry out a proposed outreach project using *SWOT Report* to raise awareness and inspire action to benefit sea turtle conservation in their area of the world. The five recipients of the first *SWOT Report* Outreach Grants competition were the following.

Conservation Society of Sierra Leone

Using the *SWOT Report* Outreach Grant funds, Edward Aruna at the Conservation Society of Sierra Leone designed an education and sensitization workshop around *SWOT Report*, using it as a curriculum to look at the worldwide status of sea turtles and Sierra Leone's place within that global view. Among the 55 attendees were university professors and students, police, secondary school teachers, officials from the ministry of tourism and ministry of environment, non-governmental organization representatives, coastal community members, harbor masters, and journalists who covered the story in the next day's news. Presentations based on specific articles from *SWOT Report* helped participants examine conservation activities in other areas of the world and review the current state of sea turtle conservation in Sierra Leone. Before ending the workshop, the participants resolved to become a network of people who will continue to spread the word about sea turtle conservation in Sierra Leone and to support conservation activities in the future.

Fifty-five participants attended the workshop in Sierra Leone. © EDWARD ARUNA / CONSERVATION SOCIETY OF SIERRA LEONE

Banggi Environmental Awareness Centre

The Banggi Environmental Awareness Centre, established by WWF-Malaysia in 2003, is located in the proposed Tun Mustapha Park in the Kudat-Banggi region of Sabah, a one million-hectare marine park supporting large populations of green and hawksbill turtles. WWF-Malaysia staff coordinated a series of awareness events during the fasting month of Ramadan to promote sea turtle protection within the park. Each evening's event consisted of a presentation based on *SWOT Report* content, followed by activities such as constructing sea turtle models from recycled materials, cleaning up the beach, and children creating and performing a play based on local sea turtle folklore. WWF-Malaysia and Sabah Parks plan to visit 60 villages over the next six months to build support for the Tun Mustapha Park and to maintain the enthusiasm generated during the month of awareness activities.

Children create a leatherback turtle out of recycled materials as they learn about the significance of this animal. © WWF-MALAYSIA

Guyana Marine Turtle Conservation Society

Recognizing the importance of education at the community level, the Guyana Marine Turtle Conservation Society (GMTCS) used *SWOT Report* content to develop "Save Our Natural Heritage" sea turtle posters to increase awareness amongst coastal fisheries responsible for sea turtle bycatch. GMTCS Project Coordinator Michelle Kalamandeen visited communities throughout Guyana and worked with media to raise awareness using *SWOT Report* and the posters. On November 16, 2006, the campaign was presented during the Biodiversity Seminar held at Centre for the Study of Biological Diversity, University of Guyana, attended by staff and students from the University, representatives from the Environmental Protection Agency–Guyana, non-governmental organization staff, coastal community members, and one member of Parliament. With the support of the Ministry of Fisheries, GMTCS is continuing the campaign by conducting community workshops on sea turtle conservation and training fisherman in sea turtle–friendly fishing techniques.

Youths in Guyana's Waramuri community learn to appreciate the importance of sea turtles along their coastlines and around the world. © MICHELLE KALAMANDEEN / GUYANA MARINE TURTLE CONSERVATION SOCIETY

MarineLife Alliance

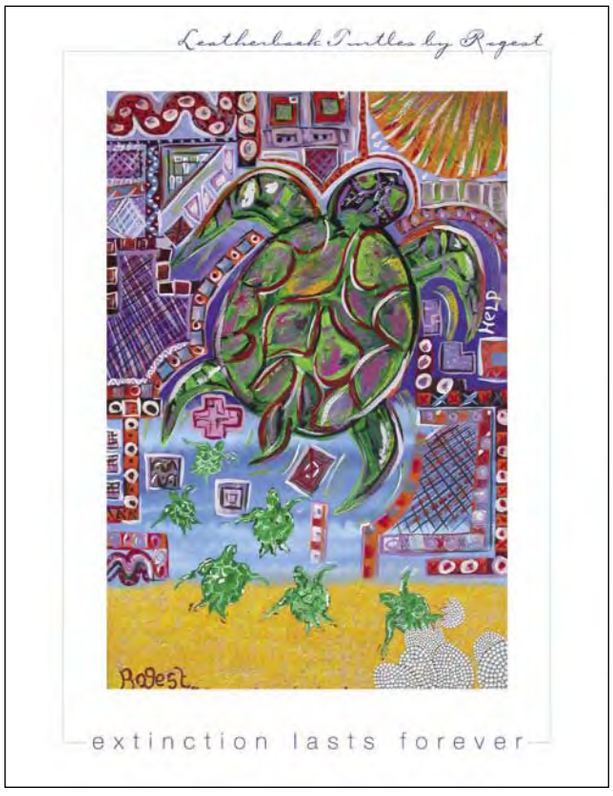
The sea turtle awareness campaign initiated by MarineLife Alliance in Bangladesh encourages sea turtle conservation around Cox's Bazar, the tourism capital of the country and the nexus of 120 kilometers of threatened sea turtle nesting beach. Thus far, coordinated by Zahirul Islam at MarineLife Alliance, school awareness programs have been implemented in two schools in Cox's Bazar, with more than 50 students in each school studying the biological and ecological roles of sea turtles and the importance of conserving turtles. Brochures and posters derived from information in *SWOT Report* are provided to teachers in the schools to facilitate continued sea turtle education. Future plans for the campaign include sea turtle awareness festivals to be held in Cox's Bazar and on nearby St. Martin Island, at which informational displays and large-print *SWOT Report*–based publications will be distributed.

Members of the Cox's Bazar community gather to discuss how to conserve the sea turtles that nest on their beaches. © MARINELIFE ALLIANCE

Universiti Malaysia Terengganu

Universiti Malaysia Terengganu's Turtle Research and Rehabilitation Group, popularly known as SEATRU, conducts a marine turtle conservation program in Chagar Hutang on Redang Island, a primary nesting beach for green turtles in peninsular Malaysia's state of Terengganu and popular tourist locale. To increase the understanding and appreciation of local sea turtle populations, Eng-Heng Chan and Pelf-Nyok Chen of SEATRU used *SWOT Report* content, along with local information, to develop 19 educational posters. During the beach's seasonal closure from October to April, the posters are being used in a traveling exhibition; after April 2007, the posters will be permanently housed in the new Chagar Hutang Turtle Gallery, which is expected to be a popular attraction for students, tourists, SCUBA divers, and journalists who visit the island.

This longhouse now houses the Turtle Gallery with exhibits designed from *SWOT Report, Vol. I* to showcase sea turtles, their global and local population status, and threats to their survival. © KUSTEM



The Art of Conservation

"I travel all over the world, and people just love sea turtles," says environmentalist and artist Ron G. Steven, also known as Rogest, who focuses his great talent on the creatures of the ocean and on raising awareness for their conservation. Ron derives his inspiration from years of experience as a SCUBA instructor. He transforms memories from his thousands of dives into colorful, Aboriginal-style dot paintings that have been used to promote environmental causes across many countries. Truly dedicated to the conservation of the ocean and its inhabitants, he offers free use of his artwork to environmental groups.

Currently, Ron is working in the Cayman Islands to develop a turtle release program with a local dive operator that would allow interested people to adopt sea turtles for release. A promotional packet given to each patron will include Rogest artwork, as well as other materials about the adopted turtle. In a recent Cayman Islands outreach effort, Ron led a workshop for children on the art of painting sea creatures. The children's works were sold at auction to local businesses to raise money for the Cayman Islands' sea turtle tracking program. Ron encourages those he meets to "think locally and act locally." For more information, visit www.rogest.com.

SWOT Data Contributors

Definitions of Terms

Nests: A count of the number of nests laid by loggerhead females during the monitoring period. Not all nests contain eggs.

Nesting females: A count of observed nesting female loggerheads during the monitoring period.

Crawl: A female loggerhead's emergence onto the beach to nest. These counts may or may not include false crawls.

False crawl: An emergence onto the beach by a female loggerhead that does not result in a nest.

Estimated nests: An estimate of the number of loggerhead nests laid in a season. Methods of estimation vary.

Monitoring effort: The level of effort used to monitor nesting on a given beach.

Year: The year in which a given nesting season ended (e.g., data collected between late 2004 and early 2005 are listed as year 2005).

Loggerhead Data Citations

Guidelines for Data Use and Citation

The loggerhead nesting data below correspond directly to this report's feature map (pp. 24–25), organized alphabetically by country and beach name. Every record with a point on the map is numbered to correspond with that point. These data have come from a wide variety of sources and, in many cases, have not been previously published. Data may be used freely, but *must be cited* to the original source as indicated in the "Data Source" field of each record. Only original data are reported here—not the converted values that were used to create the feature map. For more information on data conversions, see the article on pp. 20–21.

In the records below, nesting data is reported from the last complete nesting season in 2005 from all available beaches. For those beaches from which recent data were not available, the most recently available data are reported.

Important Note about Loggerhead Data

Great effort has gone into providing sufficient information with each data record to allow the quality and source of the record to be fairly evaluated. While every attempt has been made to ensure the accuracy of these data, absolute accuracy cannot be guaranteed. Information on monitoring effort and its relativity to the nesting season are reported where available in order to allow for a more complete evaluation of the data.

ANGOLA

Data Record 1

Data Source: Brian, C. 2007. Loggerhead nesting in Angola: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beach: Rio Longa (approx. 200km South of Luanda)
Year: 2005 **Count:** 210 nests **Beach Length:** 6.5 km
Monitoring Effort: Daily morning and night patrols covering the entire beach between October 10, 2004 and February 28, 2005. Nesting season is mid October to late February, with its peak in November and December.
SWOT Contact: Conrad Brian

ARUBA

Data Record 2

Data Source: Van der Wal, E., and R. Van der Wal, Turtugaruba. 2007. Loggerhead nesting in Aruba: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beach: Fishermen's Hut (west coast)
Year: 2005 **Count:** 16 nests, 64 crawls **Beach Length:** 850 m
Monitoring Effort: Daily morning patrols covering the entire beach between April 21 and September 18, 2005. Nesting season is late April to late July, with its peak in May and June.
SWOT Contact: Edith Van der Wal (Turtugaruba)

AUSTRALIA

Data Record 3

Data Source: 1) Richards, A., Mau, R., Macgregor, K., and S. Bedford. 2005. *Ningaloo Turtle Program, Western Australia: Annual Report 2005.* 2) Mau, R., Bedford. S., and A. Richards, Ningaloo Turtle Program. 2007. Loggerhead nesting in Western Australia: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).

Nesting Beach: Bateman's Bay, Coral Bay Division, Western Australia
Year: 2005 **Count:** 39 nests

Nesting Beach: Bungelup, Western Australia
Beach Length: 5 km
Comments: Nesting data from 2005 were not available. In 2006, 659 loggerhead nests were recorded in Bungelup.

Nesting Beach: Northwest Cape, Western Australia
Year: 2005 **Count:** 150–200 nests **Beach Length:** 18km
Comments: In 2005, between 150 and 200 nests were recorded in the Northwest Cape, Ningaloo, Western Australia. Exact nest counts were not available.
SWOT Contacts: Roland Mau and Tamra Chapman

Data Record 4

Data Source: Government of Western Australia, Department of Environment and Conservation. Marine Turtles in Western Australia. http://www.calm.wa.gov.au/science/turtles.html. Accessed October 2006.
Nesting Beaches: Shark Bay and Dirk Hartog Island
Comments: Nesting data from 2005 were not available. Shark Bay and Dirk Hartog Island host some of the largest nesting populations of loggerheads in Western Australia.

Data Record 5

Data Source: 1) Gyuris, E., and C. J. Limpus. 1988. The loggerhead turtle, Caretta caretta, in Queensland: Population Breeding Structure. *Australian Wildlife Research* 15:197–209. 2) Limpus, C. 2007. Loggerhead nesting in eastern Australia: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Heron Island (and other islands in the Capricornia Section of the southern Great Barrier Reef), and the Woongarra Coast (Mon Repos and five other small beaches along the mainland near Bundaberg)
Comments: Nesting data from the 2004–2005 nesting season were not available, although these beaches are known to host loggerhead nesting. In 2005–2006, 320 nesting loggerheads were documented on the Woongarra Coast (includes Mon Repos and five smaller beaches), and 21 nesting loggerheads were documented at Heron Island, a minor loggerhead rookery (C. Limpus, pers. comm.).
SWOT Contact: Col Limpus

Data Record 6

Data Source: McLachlan, N., McLachlan, B., McLachlan, J., and B. McLachlan, Wreck Rock Turtle Monitoring Project. 2006. *Queensland Turtle Conservation Project, Wreck Rock Study 2005–2006*. Conservation and technical data report, vol. 2006, no. 6. Queensland: Environmental Protection Agency.
Nesting Beach: Wreck Rock Beach, Queensland
Beach Length: 22 km
Comments: Nesting data from the 2004–2005 nesting season were not available, although Wreck Rock beach is considered one of the top five breeding sites for loggerheads in eastern Australia. In 2005–2006, 62 nesting loggerheads, 120 nests, and 170 crawls were recorded on Wreck Rock Beach during nightly patrols from November 27, 2005, to February 1, 2006 (McLachlan et al. 2006). The number of nesting loggerheads recorded during the same period in 2004–2005 was slightly fewer.

BAHAMAS

Data Record 7

Data Source: 1) Addison, D. 2007. Loggerhead nesting in Cay Sal Bank, Bahamas: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007). 2) Bolten, A. 2007. Loggerhead nesting in the Bahamas: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Cay Sal Bank beaches
Comments: Nesting data from 2005 were not available. The last nesting surveys in Cay Sal Bank were completed in 1995 and 1996. This area is reported to support more loggerhead nesting than elsewhere in the Bahamas.
SWOT Contacts: David Addison and Alan Bolten

BANGLADESH

Data Record 8

Data Source: Islam, M. Z. 2006. Loggerhead nesting in Bangladesh: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Comments: Bangladesh does not host an annual nesting population of loggerheads. However, nests are occasionally recorded in very limited numbers.
SWOT Contact: M. Zahirul Islam

BELIZE

Data Record 9

Data Source: Majil, I., Bacalar Chico Marine Reserve and National Park. 2007. Loggerhead nesting in Belize. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Rocky Point and Robles Point, Ambergris Caye
Year: 2005 **Count:** 35 nests **Beach Length:** 4 km
Monitoring Effort: Daily beach patrols covering the entire beach between May 15 and September 15, 2005. Nesting season is May to August, with its peak in June and July
SWOT Contact: Isaias Majil

BRAZIL

Data Record 10

Data Source: Projeto TAMAR-IBAMA. 2007. Loggerhead nesting in Brazil. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).

Nesting Beaches: Quissama, Farol, Atafona, and São Francisco do Itabapoana, Rio de Janeiro State
Year: 2005 **Count:** 915 nests **Beach Length:** 120 km

Nesting Beaches: Anchieta, Comboios, Povoação, Pontal do Ipiranga, Guriri, and Itaunas, Espirito Santo State
Year: 2005 **Count:** 1,065 nests **Beach Length:** 200 km

Nesting Beaches: Arembepe, Praia do Forte, Costa do Sauipe, and Sitio do Conde, Bahía State
Year: 2005 **Count:** 3,011 nests **Beach Length:** 213 km

Nesting Beaches: Abaís, Pirambu, and Ponta dos Mangues, Sergipe State
Year: 2005 **Count:** 294 nests **Beach Length:** 125 km
Monitoring Effort: Nightly and daily patrols covering the entirety of these beaches between September 1, 2004, and March 31, 2005. Nesting season is early September to late March, with its peak in November and December.
SWOT Contacts: Maria A. Marcovaldi, Alexsandro Santos, João Carlos Thomé, Luciano Soares, and Paulo Barata

CAPE VERDE

Data Record 11

Data Source: Lopez Jurado, L. F., Sanz, P., and E. Abella. 2007. Loggerhead nesting on Boa Vista, República de Cabo Verde. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Laiedo Texeira, Calheta, Ervatao, Ponta Cosme, Joao Barrosa I, and Joao Barrosa II
Year: 2005 **Count:** 5,396 nests, 15,280 crawls, and 3,121 nesting females **Beach Length:** 9 km
Monitoring Effort: Nightly and daily patrols covering the entirety of these beaches, except on remote beaches, from June 14 to November 13, 2005. Nesting season is June to November, with its peak in August and September
SWOT Contacts: Luis F. Lopez Jurado, Paula Sanz, and Elena Abella

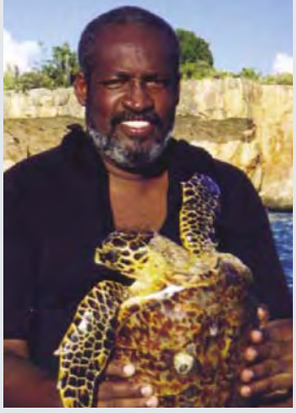
CAYMAN ISLANDS

Data Record 12

Data Source: 1) Bell, C. D., Solomon, J. L., Blumenthal, J. M., Austin, T. J., Ebanks-Petrie, G., Broderick, A. C., and B. J. Godley. Forthcoming. Monitoring and conservation of critically reduced marine turtle nesting populations: Lessons from the Cayman Islands. *Animal Conservation.* 2) Solomon, J. L., Blumenthal, J. B., Austin, T. J., Ebanks-Petrie, G., Broderick, A. C., and B. J. Godley. 2006. Insights into the nesting population of marine turtles in the Cayman Islands. In *Book of Abstracts: Twenty-Sixth Annual Symposium on Sea Turtle Biology and Conservation*, compilers M. Frick, A. Panagopoulou, A. F. Rees, and K. Williams, 323–324. Athens: International Sea Turtle Society.

Nesting Beach: Grand Cayman
Year: 2005 **Count:** 18 nests

Nesting Beach: Little Cayman
Year: 2005 **Count:** 1 nest **Beach Length:** 56 km combined length
Monitoring Effort: Morning track surveys covering the entire beach twice weekly at each beach between May and August. Nesting season is early May to early August, with its peak in June and July.
SWOT Contacts: Joni Solomon and Janice Blumenthal



COURTESY OF FÉLIX MONCADA

"I have worked with sea turtles for more than 20 years. Protecting the turtles in Cuba is important not only because of their inherent place in the overall biodiversity of the Cuban Archipelago, but because they are intricately tied into the traditions of coastal communities in my country. In part by reforming fishing practices to be more turtle-friendly, we now have stable populations of sea turtles in Cuba, with evidence of an increase in hawksbills."

*—**Félix Moncada**, Marine Biologist, Fisheries Research Center, Ministry of Fisheries, Cuba*

CHINA

Data Record 13

Data Source: 1) Cheng, I-J. 1997. Studies on Chinese sea turtles. *Sichuan Journal of Zoology* 15(suppl):27–50. 2) Cheng, I-J. 2007. Loggerhead nesting in Xisha Archipelago, South China Sea: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Dong, Jinquing, Qilanyu and Zhongjian Islands, Xisha Archipelago, South China Sea
Comments: There is no monitoring on these beaches due to their location within a military-controlled region. However, loggerheads are known to nest here in unknown numbers (Cheng, pers. comm.).
SWOT Contact: I-Jiunn Cheng

COLOMBIA

Data Record 14

Data Source: 1) Amorocho, D. 2003. Monitoring nesting loggerheads (Caretta caretta) in the central Caribbean coast of Colombia. *Marine Turtle Newsletter* 101:8–13. 2) Amorocho, D. 2007. Loggerhead nesting in Colombia: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Mendihuaca, Guachaca, Buritaca, and Don Diego, Magdalena Department
Beach Length: 18 km
Comments: Nesting data from 2005 were not available. The last available data are from 2001, when 17 loggerhead nests were recorded on these beaches.
SWOT Contact: Diego Amorocho

Data Record 15

Data Source: 1) de Luque Fernandez, A. C., Lopez Barrera, E. A., Rosada Leon, A. C., and N. I. Vera Jimenez. 2003. Determinación de las condiciones de anidamiento en las playas focales del sector de arrecifes (PNNT) e implementación de sistemas de incubación para huevos de tortugas marinas. Seminario de Investigación (Proyecto II), Universidad Jorge Tadeo Lozano, Facultad de Biología Marina. Santa Marta, Colombia. 2) Moreno, A. 2002. Contribución al conocimiento de las tortugas marinas en el Parque Nacional Natural Tayrona, durante los meses de junio-julio de 2002. Informe de Pasantia. UAESPNN. Santa Marta, Colombia. 3) Rincón, P., Rivera, D., Rodriguez, C. J., and P. Tello. 2001. Establecimiento y caracterización de puntos focales de anidamiento de tortugas marinas en los sectores de cañaveral y arrecifes en el Parque Nacional Natural Tayrona. Seminario de Investigación (Proyecto II). Universidad Jorge Tadeo Lozano. Facultad de Biología Marina. Santa Marta, Colombia.

Nesting Beach: Castilletes, Magdalena Department
Comments: Nesting data from 2005 were not available. The most recent available data are from 2003, when 4 loggerhead tracks were recorded.

Nesting Beach: La Gumarra, Magdalena Department
Comments: Nesting data from 2005 were not available. The most recent available data are from 2003, when 1 loggerhead track was recorded.

Nesting Beach: Cañaveral, Magdalena Department
Comments: Nesting data from 2005 were not available. The most recent available data are from 2002, when 4 nesting females were recorded.

Nesting Beach: San Felipe, Magdalena Department
Comments: Nesting data from 2005 were not available. The most recent available data are from 2002, when 2 tracks were recorded.

Nesting Beach: Arrecifes, Magdalena Department
Comments: Nesting data from 2005 were not available. The most recent available data are from 2002, when 2 nesting females were recorded.

Nesting Beach: Boca del Saco, Magdalena Department
Comments: Nesting data from 2005 were not available. The most recent available data are from 2001, when 5 nesting females were recorded.
SWOT Contact: Alvaro Andrés Moreno-Munar

CUBA

Data Record 16

Data Source: Moncada, F., Nodarse, G., Medina, Y., Escobar, E., Rodríguez, C., Rodríguez, A. M., and E. Morales. 2006. *Annual Report on Hawksbill Turtle (Eretmochelys imbricata) research in Cuba (February 2005–February 2006)*. Cuba: Marine Turtle Project, Fisheries Research Center.
Nesting Beaches: Cayo Sijú, Cayo Real, and Juan García, Cayos de San Felipe
Year: 2005 **Count:** 111 nests **Beach Length:** 5 km
Monitoring Effort: Two patrols covering the entirety of these beaches between May 31 and August 31, 2005

Nesting Beach: Playa El Guanal
Year: 2005 **Count:** 10 nests **Beach Length:** 8 km
Monitoring Effort: Nightly and daily patrols covering the entire beach from May 1 to August 31, 2005

Nesting Beach: Cayo Largo
Year: 2005 **Count:** 55 nests **Beach Length:** 15 km

Nesting Beach: Cayo Rosario
Year: 2005 **Count:** 11 nests **Beach Length:** 8 km

Nesting Beach: Cayo Campo
Year: 2005 **Count:** 8 nests **Beach Length:** 5 km
Monitoring Effort: Two patrols covering the entirety of these beaches were conducted between May 1 and August 31, 2005, at Cayo Largo, Cayo Rosario, and Cayo Campo. Nesting season for all of the above beaches in Cuba is April to August, with its peak in May and June
SWOT Contact: Félix Moncada

Data Record 17

Data Source: Ibarra, M. E., Díaz Fernández, R., Azanza, J., Díaz, R., and G. Espinosa. 2005. Informe Final 8va Temporada de Trabajo. Proyecto universitario para el estudio y conservación de las tortugas marinas en Cuba. Centro de Investigaciones Marinas. Cuba: Universidad de la Habana.
Nesting Beaches: Beaches of the Guahanacabibes Peninsula
Year: 2005 **Count:** 10 nests **Beach Length:** 5 km
Monitoring Effort: Nightly and daily patrols covering the entire beach from May 20 to September 15, 2005, with some sites patrolled only once or twice per week.
SWOT Contact: Julia Azanza

CYPRUS

Data Record 18

Data Source: Fuller, W. J., Broderick, A. C., Godley, B. J., and J. Walker. 2005. Marine Turtle Conservation Project Northern Cyprus 2005—Annual Report.
Nesting Beaches: West coast beaches, surrounding Akdeniz, Northern Cyprus
Year: 2005 **Count:** 73 nests

Nesting Beaches: East coast beaches, surrounding Famagusta, Northern Cyprus
Year: 2005 **Count:** 49 nests

Nesting Beaches: North coast beaches, surrounding Esentepe, Northern Cyprus
Year: 2005 **Count:** 112 nests
Monitoring Effort: Patrols every 2 to 3 days covering the entirety of these beaches from late May to early August. Nesting season is late May to early August, with its peak in June and July
SWOT Contacts: Wayne Fuller and Annette Broderick

Data Record 19

Data Source: Hadjichristophorou, M., and A. Demetropoulos. 2007. Cyprus Turtle Conservation Project Report, Department of Fisheries and Marine Research. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beach: Lara/Toxeftra Turtle Reserve, Paphos District
Year: 2005 **Count:** 128 nests **Beach Length:** 5 km

Nesting Beach: Chrysochou Bay, Paphos District
Year: 2005 **Count:** 204 nests **Beach Length:** 11 km
Monitoring Effort: Daily and nightly patrols in most locations from May 20 to October 15, 2005. Some areas of Chrysochou Bay were monitored only weekly during certain periods of the season. Nesting season is late May to mid August, with peak nesting in June and July
SWOT Contacts: Myroula Hadjichristophorou and Andreas Demetropoulos

Data Record 20

Data Source: Mclean, S., Turtlewatch Akrotiri. 2007. Western British Sovereign Base Area, Turtlewatch Akrotiri Report. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Akrotiri beaches, Western British Sovereign Base Area
Year: 2005 **Count:** 10 nests
SWOT Contact: Ian Trengove

Data Record 21

Data Source: Allen, M., Turtlewatch Episkopi. 2007. Western British Sovereign Base Area, Turtlewatch Episkopi Report. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Episkopi beaches within the British Sovereign Base Area
Year: 2005 **Count:** 5 nests
Monitoring Effort: Daily patrols covering the entire beach between May 20 and October 15, 2005. Nesting season is late May to mid August, with its peak in June and July.
SWOT Contact: Marie Allen

EGYPT

Data Record 22

Data Source: Clarke, M., Campbell, A. C., Simms, C., and W. S. Hameid. 2002. Observations on the Ecology of Marine Turtles Nesting on the Mediterranean Coast of Egypt. In *Proceedings of the Twentieth Annual Symposium on Sea Turtle Biology and Conservation: NOAA Technical Memorandum NMFS-SEFSC-477*, compilers Mosier, A., Foley, A., and B. Brost, 257–258. Miami: National Marine Fisheries Service.
Nesting Beaches: Beaches between Rhafa and Port Said, Mediterranean coast
Beach Length: 220 km
Comments: Nesting data from 2005 were not available. The last available data are from 1999, when 27 nests and 61 tracks were recorded during surveys on 200.7 km of a total 220 km.

FRANCE

Data Record 23

Data Source: Delaguerre, M., and C. Cesarini. 2004. Confirmed nesting of the loggerhead turtle in Corsica. *Marine Turtle Newsletter* 104:12.
Nesting Beach: Palombaggia beach, Corsica
Comments: A single loggerhead nest was documented in 2002 on Palombaggia beach in southeastern Corsica. Although some have speculated that Corsica once hosted a nesting population, this is the only documented nest.
SWOT Contact: Michel Delaguerre

GREECE

Data Record 24

Data Source: 1) Margaritoulis, D., Rees, A., and K. Grimanis. 2005. Monitoring work and conservation efforts for the loggerhead sea turtle nesting population in Laganas Bay, Zakynthos Island, Greece, during 2005. Unpublished report. Athens: ARCHELON, the Sea Turtle Protection Society of Greece. 2) Margaritoulis, D., and A. Rees, ARCHELON. 2007. Loggerhead nesting in Greece. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beach: Laganas Bay, Zakynthos Island
Year: 2005 **Count:** 833 nests **Beach Length:** 5.5 km
Monitoring Effort: Daily patrols covering the entire beach from May 15 to October 15, 2005.

Nesting Beach: Kyparissia Bay, Western Peloponnesus
Year: 2005 **Count:** 385 nests **Beach Length:** 9.5 km
Monitoring Effort: Daily patrols covering the entire beach from May 30 to October 9, 2005.

Nesting Beach: Rethymnon, Crete
Year: 2005 **Count:** 166 nests **Beach Length:** 10.8 km
Monitoring Effort: Daily patrols covering the entire beach from May 30 to October 14, 2005.
Comments: Nesting season for all of the above beaches is late May to mid August, with its peak in late June to early July.
SWOT Contact: Dimitris Margaritoulis

HONDURAS

Data Record 25

Data Source: Flores, N. J. 2005. Estado de la situación de conservación comunitaria de tortugas marinas en la Reserva de Biosfera de Río Plátano: Una experiencia de gestión colectiva en la comunidad de Plaplaya, Municipio de Juan Francisco Bulnes, "Walumugu": 1995–2005. Unpublished report.
Nesting Beach: Playa de Plaplaya, Departamento de Gracias a Dios
Year: 2005 **Count:** 2 nests **Beach Length:** 12 km
Monitoring Effort: Nightly patrols covering the entire beach from April 15 to August 30, 2005. Nesting season is late April to early July, with its peak in late June and early July.
SWOT Contacts: Norman Javier Flores and Carlos Molinero

INDIA

Data Source: Tripathy, B. 2005. Status of the loggerhead turtle in India. *Current Science* 88(4):535–536.
Comments: According to Tripathy (2005), loggerheads do not nest along the Indian coast, despite claims to the contrary.

COURTESY OF I-JIUNN CHENG (SHOWN AT LEFT)

"The sea turtle is important not only for biodiversity and ocean conservation, but for cultural reasons. In Chinese tradition, the turtle is very significant. The word for turtle, "kon-ku," has both positive and negative meanings. For example, the word for turtle, "kon-ku," can be used as an insult to people in positions of power after they have passed away; it can also indicate bad luck in gambling or contests. However, it also represents longevity and gods, and many people make offerings to the turtle during the annual festival for peace and prosperity."

*—**I-Jiunn Cheng**, Professor, Institute of Marine Biology, National Taiwan Ocean University, Taiwan*

COURTESY OF ALICE COSTA

"I say that patience always wins over time. There are a number of conservation initiatives around the world, but they will only have an effect on the global populations of marine turtles if we work together. Even within my country, there are many marine turtle projects, but there is no coordination among government institutions, NGOs, and the private sector. With time and perseverance, *SWOT Report* is one of the tools that will help to harmonize conservation programs at a global scale."

*—**Alice Costa**, Marine Program Officer, WWF–Mozambique Coordination Office*

ISRAEL

Data Record 26

Data Source: Levy, Y. 2007. Sea turtle nesting activity along the Mediterranean shores of Israel. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Beaches of the Mediterranean coast
Year: 2005 **Count:** 57 nests **Beach Length:** 190 km
Monitoring Effort: Daily morning patrols covering 85% of the nesting beaches from May 15 to August 15, 2005. Nesting season is late May to early August, with its peak in June and July
SWOT Contact: Yaniv Levy

ITALY

Data Record 27

Data Source: Bentivegna, F., Treglia, G., and S. Hochscheid. 2005. The first report of a loggerhead turtle Caretta caretta nesting on the central Tyrrhenian coast (western Mediterranean). *JMBA2–Biodiversity Records*. Published online: http://www.mba.ac.uk/jmba/pdf/5143.pdf.
Nesting Beach: Baia Dominiti beach, Sessa Aurunca
Comments: Nesting data from 2005 were not available. The last available data are from 2002, when a tourist reported a single nest on July 11.
SWOT Contact: Flegra Bentivegna

Data Record 28

Data Source: 1) Galia, F., Freggi, D., d'Angelo, S., and M. Lo Valvo. 2006. An unusual nest activity along southern Sicilian Coasts: A hope for sea turtle survival? In *Book of Abstracts: Twenty-Sixth Annual Symposium on Sea Turtle Biology and Conservation*, compilers M. Frick, A. Panagopoulou, A. F. Rees, and K. Williams, 295–296. Athens: International Sea Turtle Society. 2) Mingozzi, T., Cambie, G., Crispino, F., Mico, N., and S. Urso. 2006. Loggerhead turtle, Caretta caretta, in Italy: A reappraisal of nesting activity within the national scenario. In Frick, Panagopoulou, Rees, and Williams, 2006, 308. 3) Nannarelli, S., De Lucia, A., Dominici, A., and S. Piovano. 2006. Nesting activity of the loggerhead sea turtle Caretta caretta on the Pocket Beach of Linosa Island. In Frick, Panagopoulou, Rees, and Williams, 2006, 309. 4) Mingozzi, T. 2007. Loggerhead nesting in Italy: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Ionic Coast beaches, Calabria
Year: 2005 **Count:** 13 nests **Beach Length:** 52 km

Nesting Beach: Riace Marina beach, Calabria
Year: 2005 **Count:** 1 nest
Monitoring Effort: There is no monitoring here; this nest was found by chance.

Nesting Beach: Costa dei Gelsomini, Calabria
Year: 2005 **Count:** 12 nests **Beach Length:** 31.28 km
Monitoring Effort: Morning patrols covering the entire beach 2 to 3 times per week from June 1 to July 31, 2005. Nesting season is early June to late August, with its peak in late June to late July.

Nesting Beach: Giallonardo beach, Realmonte, Sicily
Year: 2005 **Count:** 2 nests **Beach Length:** 1.6 km
Monitoring Effort: There is no monitoring here; these nests were found by chance.

Nesting Beach: Pozzolana di Ponente beach, Linosa, Sicily
Year: 2005 **Count:** 1 nest **Beach Length:** 100 m
Monitoring Effort: Nightly patrols covering the entire beach from June 1 to September 30, 2005. Peak nesting season is late June to late July.
SWOT Contact: Antonio T. Mingozi

JAPAN

Data Record 29

Data Source: Matsuzawa, Y. 2005. Nesting beach management of eggs and pre-emergent hatchlings of North Pacific loggerhead sea turtles in Japan. In Kinan, I., ed. 2005. *Proceedings of the Second Western Pacific Sea Turtle Cooperative Research and Management Workshop. Volume II: North Pacific Loggerhead Sea Turtles. March 2–3, 2005, Honolulu, HI.* Honolulu, HI, USA: Western Pacific Regional Fishery Management Council.
Nesting Beach: Inakahama beach, Yakushima Island
Year: 2005 **Count:** 941 nests

Nesting Beach: Maehama beach, Yakushima Island
Year: 2005 **Count:** 817 nests

Nesting Beach: Myojinyama-Oida beach, Miyazaki
Year: 2005 **Count:** 183 nests

Nesting Beach: Minabe-Senri beach, Wakayama prefecture
Year: 2005 **Count:** 121 nests

Nesting Beach: Hii-Horikiri beach, Atsumi, Aichi prefecture
Year: 2005 **Count:** 29 nests

Data Record 30

Data Source: Kamezaki, N., Matsuzawa, Y., Abe, O., Asakawa, H., Fujii, T., Goto, K., Hagino, S., Hayami, M., Ishii, M., Iwamoto, T., Kamata, T., Kato, H., Kodama, J., Kondo, Y., Miyawaki, I. Mizobuchi, K., Nakamura, Y., Nakashima, Y., Naruse, H., Omuta, K., Samejima, M., Suganuma, H., Takeshita, H., Tanaka, T., Toji, T., Uematsu, M., Yamamoto, A., Yamato, T., and I. Wakabayashi. 2003. Loggerhead turtles nesting in Japan. In Bolten, A. B., and B. E. Witherington, eds. 2003. *Loggerhead Sea Turtles.* Washington: Smithsonian Books.
Nesting Beaches: Nishinohama, Ibaruma, Osaki, Gusukube, Itoman, Nagahama, Fukiage, Nagasakibana, Shibushi, Nichinan, Miyazaki, Nobeoka, Ohgi, Shimonokae, Okata, Sagasioya, Moto, Kainan, Hiwasa, Kamouda, Minabe Iwashiro, Shingu, Kiho, Kumano, Shima Peninsula, Chita Peninsula, Atsumi, Akabane, Toyohashi, Kosai, Hamamatsu, Omaezaki, Sagara, Nijima Island, Izu Peninsula, Izuoshima Island, Boso Peninsula, Kujukuri, and Akashi beaches
Comments: Nesting data from each beach in 2005 were not available, although loggerheads nest on many beaches in the southern Japanese archipelago. According to Y. Matsuzawa, Sea Turtle Association of Japan (pers. comm.) there were a total of 9,171 loggerhead nesting emergences recorded on 300 Japanese beaches in 2005. These emergences lead to 5,167 loggerhead nests on 252 beaches. These figures include the five nest counts above from Matsuzawa (2005).
SWOT Contact: Yoshi Matsuzawa, Sea Turtle Association of Japan

LEBANON

Data Record 31

Data Source: Cross, H., Rizk, C., Khalil, M., and L. Venizelos. 2005. *Marine Turtle Conservation in the Mediterranean: Population Status and Conservation Activities on Sea Turtle Nesting Beaches in South Lebanon, 2005.* Available: http://www.medasset.org/pdf/Lebanon_Report_2005.pdf
Nesting Beaches: El Monsouri and El Koliala beaches, South Lebanon
Year: 2005 **Count:** 51 nests **Beach Length:** 1.4 km
Monitoring Effort: Daily patrols in the early morning between May and September. Nesting season is late May to September, with its peak in July.

Nesting Beaches: Tyre Coast Nature Reserve (TCNR), El Aabbassiye
Year: 2005 **Count:** 10 nests **Beach Length:** 3.97 km
Monitoring Effort: Daily patrols in the early morning between June and September. Nesting season is June to September with its peak in July.
SWOT Contacts: Monica Aureggi, Mona Khalil, and Lily Venizelos

LIBYA

Data Record 32

Data Source: Hamza, A., and H. Elghmati. 2005. *Conservation of marine turtles nesting at three sites West of Sirte, Libya.* The Environment General Authority EGA, Marine Biology Research Center MBRC and the Regional Activity Centre for Specially Protected Areas UNEP-MAP RAC/SPA. Technical Report.
Nesting Beaches: Al Ghbeba, Gulf of Sirte Province
Year: 2005 **Count:** 50 nests **Beach Length:** 5.67 km

Nesting Beaches: Al Thalateen, Gulf of Sirte Province
Year: 2005 **Count:** 47 nests **Beach Length:** 3.56 km
Monitoring Effort: Daily beach patrols during the nesting season (late May to early August, with its peak in June and July).

Nesting Beaches: Forteith, Gulf of Sirte Province
Year: 2005 **Count:** 41 nests **Beach Length:** 5.72 km
Monitoring Effort: Weekly beach patrols during the nesting season (late May to early August, with its peak in June and July).
SWOT Contact: Abdulmaula Hamza

MADAGASCAR

Data Record 33

Data Source: 1) Gladstone, N., Andriantahina, F., and B. Soafiavy. 2003. *Azafady Project Fanomena Final Report.* Unpublished manuscript. 2) Gladstone, N., Andriantahina, F., and B. Soafiavy. 2002. *Marine Turtle Conservation and Research in Southeast Madagascar: Report on Activities and Findings in the 2001–2002 Nesting Season.* Azafady Project Fanomena. 3) Gladsone, N. 2007. Loggerhead nesting in Madagascar: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Beaches between Fort-Dauphin and Manantenina
Beach Length: 80 km
Comments: Nesting data from 2005 were not available. Loggerhead nesting occurs north of Fort Dauphin, on the southeast coast of Madagascar, where estimates based on previous studies are that there are less than 100 nests per year.
SWOT Contacts: Nancy Gladstone

Data Record 34

Data Source: Frontier-Madagascar. 2003. *Artisanal and traditional turtle resource utilisation in South West Madagascar. Frontier-Madagascar Environmental Research Report 2.* Society for Environmental Exploration, UK, and the Institute of Marine Sciences, University of Toliara, Madagascar.
Nesting Beaches: Beaches around Besambay and Maromena
Comments: Nesting data from 2005 were not available. Villagers and fishermen from Besambay and Maromena have reported limited loggerhead nesting in the area between October and December, and nests around Maromena are raided for eggs each year.

MAURITANIA

Data Record 35

Data Source: Arvy, C., Dia, A. T., Colas, F., and J. Fretey. 2000. Records of Caretta caretta in Mauritania. *Marine Turtle Newsletter* 88:8.
Nesting Beaches: Levrier Bay and Tânît Bay
Comments: Nesting data from 2005 were not available. The most recent available records of loggerhead nesting are from 1996 and 1997 in Levrier Bay and Tânît Bay, respectively.

MEXICO

Data Record 36

Data Source: Flora, Fauna y Cultura de México, A.C. 2006. *Reporte del Programa de Protección y Conservación de Tortugas Marinas en el Litoral Central del Estado de Quintana Roo Temporada 2005.* (63pp.)
Nesting Beaches: Beaches of Quintana Roo, Mexico

Beach: Aventuras-Dif
Year: 2005 **Count:** 177 nests **Beach Length:** 1.5 km

Beach: Cahpechen
Year: 2005 **Count:** 198 nests **Beach Length:** 5 km

Beach: Chemuyil
Year: 2005 **Count:** 73 nests **Beach Length:** 200 m

Beach: Kanzul
Year: 2005 **Count:** 120 nests **Beach Length:** 4 km

Beach: Paamul
Year: 2005 **Count:** 28 nests **Beach Length:** 2.5 km

Beach: Punta Cadena
Year: 2005 **Count:** 37 nests **Beach Length:** 300 m

Beach: Punta Venado
Year: 2005 **Count:** 28 nests **Beach Length:** 4.5 km

Beach: San Juan
Year: 2005 **Count:** 20 nests **Beach Length:** 5.5 km

Beach: Tankah
Year: 2005 **Count:** 27 nests **Beach Length:** 3 km

Beach: Xcacel
Year: 2005 **Count:** 180 nests **Beach Length:** 2.5 km

Beach: Xelha
Year: 2005 **Count:** 68 nests **Beach Length:** 300 m

Beach: Yu-Yum
Year: 2005 **Count:** 5 nests **Beach Length:** 2 km

Monitoring Effort: From May 1 to October 31, 2005, nightly patrols were conducted at Aventuras-Dif, Chemuyil, Xcacel, Xelha, Kanzul, and Cahpechen, and diurnal beach inspection was conducted every 15 days at Punta Venado, Paamul, Punta Cadena, Tankah, Yu-Yum, and San Juan. Nesting season is end of April to mid August, with its peak in June and July.
SWOT Contacts: Iñaky Iturbe Darkistade, Alejandro Arenas Martínez, and Roberto Herrera Pavón

MONTSERRAT

Data Record 37

Data Source: Godley, B. J., Broderick, A. C., Campbell, L. M., Ranger, S., and P. B. Richardson. 2004. *An Assessment of the Status and Exploitation of Marine Turtles in Montserrat.* In: *An Assessment of the Status and Exploitation of Marine Turtles in the UK Overseas Territories in the Wider Caribbean,* 155–179. Final Project Report for the Department of Environment, Food and Rural Affairs and the Foreign and Commonwealth Office.
Comments: Nesting data from 2005 were not available, although loggerheads are known to nest occasionally on the beaches of Montserrat.

MOZAMBIQUE

Data Record 38

Data Source: 1) Videira, E. J. S., and C. M. M. Louro. Forthcoming. *Análise da monitoria de ninhos e marcação de tartarugas marinhas no Parque Nacional do Arquipélago do Bazaruto, Moçambique.* 2) WWF. 2005. *Marine Turtle Conservation Activities in Mozambique, August 2004 to June 2005.* Maputo, Mozambique. 3) Costa, A. 2007. Loggerhead nesting in Mozambique: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Bazaruto National Park, Inhambane
Year: 2005 **Count:** 6 nests **Beach Length:** 40 km
Monitoring Effort: Morning patrols from October 2, 2004, to March 15, 2005. Nesting season is early October to early April, with its peak in November and December.

Nesting Beaches: Ponta Chemucane and Milibangalala Beach, Maputo Special Reserve
Year: 2005 **Count:** 109 nests **Beach Length:** 29 km
Monitoring Effort: Nightly patrols from October 2, 2004, to March 4, 2005. Nesting season is early October to early April, with its peak in November and December.
SWOT Contacts: Alice Costa and Eduardo Videira

Data Record 39

Data Source: 1) Macia, A. 2006. *Transboundary networks of marine protected areas in East Africa (Transmap), Periodic activity report.* Work package 4: Special taxa, Year 1: 70–72. 2) van der Elst, R. 2007. Loggerhead nesting in Inhaca, Mozambique: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beach: Inhaca, Maputo

Year: 2005 **Count:** 9 nests
SWOT Contact: Rudy van der Elst

MYANMAR

Data Record 40

Data Source: Thorbjarnarson, J. B., Platt, S. G., and S. T. Khain. 2000. Sea turtles in Myanmar: Past and present. *Marine Turtle Newsletter* 80:10–11.
Comments: Nesting data from 2005 were not available. The Myanmar Fisheries Department estimates that approximately 60 loggerhead nests are laid in Myanmar each year.

NAMIBIA

Data Record 41

Data Source: Ehrhart, L. E., Bagley, D. A., and W. E. Redfoot. 2003. Loggerhead turtles in the Atlantic Ocean: Geographic distribution, abundance, and population status. In Bolten, A. B., and B. E. Witherington, eds. 2003. *Loggerhead Sea Turtles.* Washington: Smithsonian Books.
Comments: Nesting data from 2005 were not available, although minor loggerhead nesting has been recorded along Namibia's Skeleton Coast.

NETHERLANDS ANTILLES

Data Record 42

Data Source: Sea Turtle Conservation Bonaire. 2007. Loggerhead nesting in Bonaire: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beach: Klein Bonaire, Bonaire
Year: 2005 **Count:** 13 nests **Beach Length:** 2 km

Nesting Beach: Fisherman's Hut, Bonaire
Year: 2005 **Count:** 5 nests **Beach Length:** 800 m
Monitoring Effort: Daily patrols during the nesting season (mid April to late August, with its peak from June to August).
SWOT Contact: Mabel Nava

NEW CALEDONIA

Data Record 43

Data Source: Limpus, C. J., Boyle, M., and T. Sunderland. 2005. New Caledonian loggerhead turtle population assessment: 2005 pilot study. In Kinan, I., ed. 2005. *Proceedings of the Second Western Pacific Sea Turtle Cooperative Research and Management Workshop. Volume II: North Pacific Loggerhead Sea Turtles. March 2–3, 2005, Honolulu, HI.* Honolulu, HI, USA: Western Pacific Regional Fishery Management Council.

Nesting Beach: La Plage de la Roche Percée, Bourail District
Year: 2005 **Count:** 43 nests **Beach Length:** 3 km

Nesting Beach: La Plage de la Baie des Tortues, Bourail District
Year: 2005 **Count:** 2 nests **Beach Length:** 300 m
Comments: Data were collected during a two-week tagging census from January 6 to 20, 2005. All accessible beaches near the village of Roche Percée were surveyed during daylight, and La Plage de la Roche Percée was surveyed nightly. La Plage de la Baie des Tortues was regularly visited during the day. Based on their census, Limpus, Boyle, and Sunderland (2005) estimate that approximately 60–70 loggerheads nested at these sites during the entire 2004–2005 nesting season.

OMAN

Data Record 44

Data Source: 1) Pilcher, N. 2007. Loggerhead nesting on Masirah Island, Oman: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007). 2) Baldwin, R., Hughes, G. R., and R. I. T. Prince. Loggerhead turtles in the Indian Ocean. In Bolten, A. B., and B. E. Witherington, eds. 2003. *Loggerhead Sea Turtles.* Washington: Smithsonian Books.
Nesting Beach: Masirah Island
Comments: Nesting data from 2005 were not available. Current estimates are that approximately 30,000 loggerheads nest on Masirah Island each year, making this one of the most important loggerhead nesting areas in the world.
SWOT Contact: Nicolas Pilcher and Ali Al-Kiyumi

Data Record 45

Data Source: Baldwin, R., Hughes, G. R., and R. I. T. Prince. 2003. Loggerhead turtles in the Indian Ocean. In Bolten and Witherington 2003, 218–232.
Nesting Beaches: Al Halaniyat Islands, and mainland Omani beaches South of Masirah Island and North of Khor Khafort
Comments: Nesting data from 2005 were not available, although loggerhead nesting has been documented on the Al Halaniyat Islands and on mainland Oman in areas South of Masirah Island and North of Khor Khafort (near the border with Yemen).

PANAMA

Data Record 46

Data Source: Caribbean Conservation Corporation. 2007. Loggerhead nesting in Chiriquí, Panama. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Playa Chiriquí, Comarca Ngobe-Bugle
Beach Length: 24 km
Comments: Nesting data from 2005 were not available. In 2004, 2 nests were recorded near Rio Chiriquí between January 2 and December 27.
SWOT Contact: David Godfrey

PAPUA NEW GUINEA

Data Record 47

Data Source: National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998. *Recovery Plan for U.S. Pacific Populations of the Loggerhead Turtle (Caretta caretta).* Silver Spring, MD: National Marine Fisheries Service.
Nesting Beaches: Trobriand Islands
Comments: There is no monitoring on these islands, but loggerhead mating and nesting has been reported by villagers.

SIERRA LEONE

Data Record 48

Data Source: Aruna, E. 2007. Loggerhead nesting in Sierra Leone: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Lumley Beach, western Sierra Leone
Beach Length: 4.9 km
Comments: There is no monitoring on this beach, but fishermen have reported loggerhead nests in the area.
SWOT Contact: Edward Aruna

SOUTH AFRICA

Data Record 49

Data Source: Nel, R., and R. Wright, Ezemvelo KwaZulu-Natal. 2007. Loggerhead nesting in South Africa. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Beaches from Mabibi to Kosi Lake, KzaZulu-Natal
Year: 2005 **Count:** 1,728 nests, 2,351 crawls, and 238 nesting females **Beach Length:** 200 km
Monitoring Effort: Nightly and daily beach patrols from October 15, 2004, to March 15, 2005, on the 60 km index area where most of nesting is concentrated. Nesting season is mid October to mid March, with its peak in mid November to late December
SWOT Contact: Ronel Nel and Cloverley Lawrence

SPAIN

Data Record 50

Data Source: Tomas, J., Mons, J. L., Martin, J. J., Bellido, J. J., and J. J. Castillo. 2003. First nesting activity of the loggerhead sea turtle, Caretta caretta, in the Spanish Mediterranean coast. In *Proceedings of the Twenty-Second Annual Symposium on Sea Turtle Biology and Conservation: NOAA Technical Memorandum NMFS-SEFSC-503,* compiler J. Seminoff, 166–167. Miami: National Marine Fisheries Service.
Nesting Beaches: Palomares, Vera, Almeria
Comments: Loggerheads rarely nest on the Spanish Mediterranean coast. The last documented nest was discovered in Palomares on July 27, 2001.

SRI LANKA

Data Record 51

Data Source: The Turtle Conservation Project. Turtle nesting beaches in Sri Lanka. http://www.tcpsrilanka.org/download/Map.pdf.
Nesting Beaches: Beaches of southern Sri Lanka
Comments: Nesting data from 2005 were not available, although loggerhead nesting is known to occur in southern Sri Lanka, including Induruwa, Kosgoda, Unawatuna, Tangalle, Rekawa, Kahandamodara, Kalametiya, and Bundala.

SYRIA

Data Record 52

Data Source: Saad, A., Ali, A., and A. Darwish. 2006. Marine turtle nesting survey, Syria 2005. In *Book of Abstracts: Twenty-Sixth Annual Symposium on Sea Turtle Biology and Conservation,* compilers M. Frick, A. Panagopoulou, A. F. Rees, and K. Williams, 320. Athens: International Sea Turtle Society.

Nesting Beach: Banias beach
Year: 2005 **Count:** 2 nests **Beach Length:** 2 km

Nesting Beach: Lattakia beach
Year: 2005 **Count:** 1 nest **Beach Length:** 13 km
Monitoring Effort: A four-month survey was conducted from June 1 to September 30, 2005

TUNISIA

Data Record 53

Data Source: Jribi, I., Bradai, M. N., and A. Bouain. 2006. Loggerhead turtle nesting activity in Kuriat Islands, Tunisia: Assessment of nine years monitoring. *Marine Turtle Newsletter* 112:12–13.
Nesting Beaches: Kuria Kbira and Kuria Sgira, Kuriat Islands
Year: 2005 **Count:** 11 nests **Beach Length:** 1.5 km
Monitoring Effort: Nightly and daily patrols from July 10 to September 2, 2005
SWOT Contacts: Imed Jribi and Bradai Mednejmeddine

TURKEY

Data Record 54

Data Source: Taskavak, E., Türkozan, O., Kiremit, F., Turkecan, O., Guclu, O., Akcinar, C., Yilmaz, C., and D. Tuncay. 2006. A review of 2005 marine turtle nesting season on five beaches (Dalyan, Fethiye, Patara, Belek, Goksu Delta) ın Turkey. In *Book of Abstracts: Twenty-Sixth Annual Symposium on Sea Turtle Biology and Conservation,* compilers M. Frick, A. Panagopoulou, A. F. Rees, and K. Williams, 328. Athens: International Sea Turtle Society.

Nesting Beach: Patara Beach, Antalya Province
Year: 2005 **Count:** 83 nests **Beach Length:** 14 km

Nesting Beach: Belek Beach, Antalya Province
Year: 2005 **Count:** 433 nests **Beach Length:** 7.2 km

Nesting Beach: Goksu Delta, Mersin Province
Year: 2005 **Count:** 151 nests **Beach Length:** 25.6 km
Monitoring Effort: Daily patrols from June 1 to September 15, 2005.

Nesting Beach: Dalyan Beach, Mugla Province
Year: 2005 **Count:** 213 nests **Beach Length:** 4.7 km

Nesting Beach: Fethiye Beach, Mugla Province
Year: 2005 **Count:** 80 nests **Beach Length:** 8 km
Monitoring Effort: Nightly and daily patrols from June 1 to September 15, 2005. Nesting season is mid May to mid August, with its peak in June and July.
SWOT Contact: Oguz Türkozan

Data Record 55

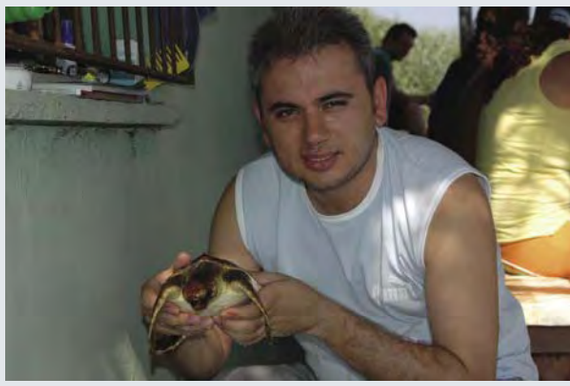
Data Source: Canbolat, A. F., BTC Crude Oil Pipeline Project, Turkey Environmental Department, Sea Turtle Expedition Project STEP. 2005. Unpublished report.
Nesting Beaches: Yumurtalık-Sugözü beaches, Adana Province
Year: 2005 **Count:** 7 nests **Beach Length:** 3.7 km
Monitoring Effort: Daily patrols and 10 nightly patrols from June 1 to September 15, 2005. Nesting season is mid May to mid August, with its peak in June and July.
SWOT Contact: Ali Fuat Canbolat

Data Record 56

Data Source: Kutle, B., Kuzuturk, E., Altınkaya, H., Sahin, I., Demir, M., Itaatli, H., Ilgaz, M., Ilgaz, S., Yörükoglu, R., Sahin, M., and H. Koyluoglu. 2006. Cıralı: An example from community-based conservation of marine turtles. In *Book of Abstracts: Twenty-Sixth Annual Symposium on Sea Turtle Biology and Conservation,* compilers M. Frick, A. Panagopoulou, A. F. Rees, and K. Williams, 142. Athens: International Sea Turtle Society.
Nesting Beach: Çıralı, Antalya Province
Year: 2005 **Count:** 54 nests **Beach Length:** 2.5 km
Monitoring Effort: Daily patrols from June 1 to September 15, 2005. Nesting season is mid May to mid August, with its peak in June and July.
SWOT Contact: Bayram Kütle

Data Record 57

Data Source: Yalçın-Özdilek, S., and B. Sönmez. 2007. Loggerhead nesting in Samandag, Hatay, Turkey: Personal communication. In



COURTESY OF OGUZ TURKOZAN

"I believe in international collaboration for the conservation of migratory species such as sea turtles. It is the responsibility of scientists, conservationists, educators, and policymakers who work to conserve sea turtles to cooperate and exchange information internationally. Sea turtles are not only local animals, and we must not only think locally."

*—**Oguz Turkozan**, Associate Professor, Adnan Menderes University, Turkey*

SWOT Report—State of the World's Sea Turtles, vol. 2 (2007).
Nesting Beach: Samandag, Hatay
Year: 2005 **Count:** 15 nests **Beach Length:** 15 km
Monitoring Effort: The majority of the area was patrolled daily from June 1 to September 15, 2005, while the area around Meydan (approx. 4.5 km) was surveyed only twice. Nesting season is June to August, with its peak in July.
SWOT Contacts: Sükran Yalçın-Özdilek and Bektas Sonmez

Data Record 58

Data Source: Ergene, S., Aymak, C., and A. H. Uçar. 2006. Nesting activity of the marine turtle (Chelonia mydas and Caretta caretta) during 2005 in Alata, Mersin-Türkiye. In *Book of Abstracts: Twenty-Sixth Annual Symposium on Sea Turtle Biology and Conservation,* compilers M. Frick, A. Panagopoulou, A. F. Rees, and K. Williams, 293. Athens: International Sea Turtle Society.
Nesting Beach: Alata, Mersin Province
Year: 2005 **Count:** 26 nests **Beach Length:** 3 km
Monitoring Effort: Nightly and daily patrols from June 1 to September 15, 2005. Nesting season is mid May to mid August, with its peak in June and July.
SWOT Contact: Serap Ergene

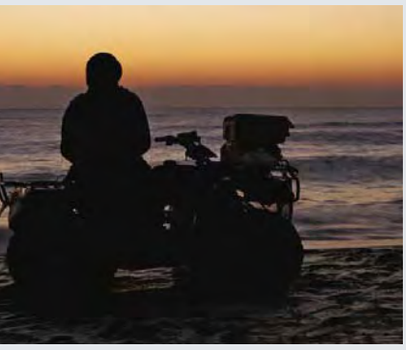
Data Record 59

Data Source: Erzin, T., Kıraç, A., and Y. Kaska. 2006. The spatial distribution of loggerhead sea turtles nests and their temperature and sex ratio variations on Dalaman Beach, Turkey. In *Book of Abstracts: Twenty-Sixth Annual Symposium on Sea Turtle Biology and Conservation,* compilers M. Frick, A. Panagopoulou, A. F. Rees, and K. Williams, 293. Athens: International Sea Turtle Society.
Nesting Beach: Dalaman Beach, Mugla Province
Year: 2005 **Count:** 63 nests **Beach Length:** 10 km
Monitoring Effort: Nightly and daily patrols from June 1 to September 15, 2005. Nesting season is mid May to mid August, with its peak in June and July.
SWOT Contact: Yakup Kaska

UNITED STATES OF AMERICA

Data Record 60

Data Source: Reynolds, M., Share the Beach. 2007. Loggerhead



COURTESY OF CHRIS JOHNSON

"Juno Beach is very a special place for loggerhead turtles. Each summer, they deposit as many as 6,500 nests along a 9-kilometer section of beach. One night, I encountered more than 130 nesting turtles along my survey area. As the sun rose that next morning, I found myself wondering if the loggerheads will continue to visit Florida's beaches each year. The threats these turtles face in the open ocean and on the nesting beach increase year after year. We can't lose faith, though. By thinking beyond Juno Beach and collaborating with other conservationists around the world to gain a global perspective of marine turtles and the threats they face, we can help ensure their survival and recovery."

*—**Chris Johnson**, Biologist, Marinelife Center of Juno Beach, Florida, U.S.A.*

nesting in Alabama. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Alabama Gulf Coast beaches, Alabama
Year: 2005 **Count:** 36 nests **Beach Length:** 75.3 km
Monitoring Effort: Daily patrols from May 1 to August 31, 2005. Nesting season is mid May to late August, with its peak in mid June to mid July.
SWOT Contacts: Mike Reynolds and Jereme Phillips

Data Record 61
Data Source: 1) Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Marine Turtle Program. Loggerhead Nesting in Florida. http://research.myfwc.com/features/view_article.asp?id=11812. 2) Brost, B. 2007. Loggerhead nesting in Florida: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).

NORTHEAST FLORIDA BEACHES

Nesting Beaches: Duval County, Florida
Year: 2005 **Count:** 67 nests **Beach Length:** 23.8 km

Nesting Beaches: Flagler County, Florida
Year: 2005 **Count:** 212 nests **Beach Length:** 30 km

Nesting Beaches: Nassau County, Florida
Year: 2005 **Count:** 89 nests **Beach Length:** 20 km

Nesting Beaches: St. Johns County, Florida
Year: 2005 **Count:** 208 nests **Beach Length:** 68.7 km

Nesting Beaches: Volusia County, Florida
Year: 2005 **Count:** 1,375 nests **Beach Length:** 80.5 km

SOUTHEAST FLORIDA BEACHES

Nesting Beaches: Brevard County, Florida
Year: 2005 **Count:** 19,339 nests **Beach Length:** 115.2 km

Nesting Beaches: Broward County, Florida
Year: 2005 **Count:** 1,819 nests **Beach Length:** 38.6 km

Nesting Beaches: Indian River County, Florida
Year: 2005 **Count:** 3,781 nests **Beach Length:** 36.9 km

Nesting Beaches: Martin County, Florida
Year: 2005 **Count:** 5,822 nests **Beach Length:** 35.3 km

Nesting Beaches: Miami-Dade County, Florida
Year: 2005 **Count:** 301 nests **Beach Length:** 37.9 km

Nesting Beaches: Palm Beach County, Florida
Year: 2005 **Count:** 10,791 nests **Beach Length:** 63.5 km

Nesting Beaches: St. Lucie County, Florida
Year: 2005 **Count:** 4,073 nests **Beach Length:** 34.5 km

SOUTHWEST FLORIDA BEACHES

Nesting Beaches: Charlotte County, Florida
Year: 2005 **Count:** 494 nests **Beach Length:** 22 km

Nesting Beaches: Collier County, Florida
Year: 2005 **Count:** 408 nests **Beach Length:** 55.2 km

Nesting Beaches: Hillsborough County, Florida
Year: 2005 **Count:** 31 nests **Beach Length:** 5.1 km

Nesting Beaches: Lee County, Florida
Year: 2005 **Count:** 503 nests **Beach Length:** 66.4 km

Nesting Beaches: Manatee County, Florida
Year: 2005 **Count:** 173 nests **Beach Length:** 21.7 km

Nesting Beaches: Monroe County, Florida
Year: 2005 **Count:** 77 nests **Beach Length:** 44.4 km

Nesting Beaches: Pinellas County, Florida
Year: 2005 **Count:** 156 nests **Beach Length:** 62 km

Nesting Beaches: Sarasota County, Florida
Year: 2005 **Count:** 2,130 nests **Beach Length:** 55.8 km

NORTHWEST FLORIDA BEACHES

Nesting Beaches: Bay County, Florida
Year: 2005 **Count:** 110 nests **Beach Length:** 80.2 km

Nesting Beaches: Escambia County, Florida
Year: 2005 **Count:** 23 nests **Beach Length:** 60.4 km

Nesting Beaches: Franklin County, Florida
Year: 2005 **Count:** 214 nests **Beach Length:** 89 km

Nesting Beaches: Gulf County, Florida
Year: 2005 **Count:** 228 nests **Beach Length:** 50.6 km

Nesting Beaches: Okaloosa County, Florida
Year: 2005 **Count:** 15 nests **Beach Length:** 38.3 km

Nesting Beaches: Santa Rosa County, Florida
Year: 2005 **Count:** 3 nests **Beach Length:** 11.2 km

Nesting Beaches: Walton County, Florida
Year: 2005 **Count:** 27 nests **Beach Length:** 47.5 km

Comments: Data are presented by county, as they are reported by the Florida Fish and Wildlife Conservation Commission. However, they represent the efforts of dozens of individual projects and researchers, many of whom provided direct support and input to this report. They are acknowledged as part of the SWOT Team in the back of this publication.
SWOT Contact: Beth Brost

Data Record 62
Data Source: Dodd, M., and A. Mackinnon. 2005. *Loggerhead Turtle Nesting in Georgia, 2005.* Brunswick, Georgia: Georgia Department of Natural Resources.
Nesting Beaches: Tybee Island, Georgia
Year: 2005 **Count:** 4 nests **Beach Length:** 7 km

Nesting Beaches: Blackbeard Island, Georgia
Year: 2005 **Count:** 197 nests **Beach Length:** 14.4 km

Nesting Beaches: Cumberland Island, Georgia
Year: 2005 **Count:** 232 nests **Beach Length:** 28.4 km

Nesting Beaches: Jekyll Island, Georgia
Year: 2005 **Count:** 118 nests **Beach Length:** 14.7 km

Nesting Beaches: Little Cumberland Island, Georgia
Year: 2005 **Count:** 21 nests **Beach Length:** 4.9 km

Nesting Beaches: Little St. Simon's Island, Georgia
Year: 2005 **Count:** 35 nests **Beach Length:** 10.9 km

Nesting Beaches: Little Tybee Island and Myrtle Island, Georgia
Year: 2005 **Count:** 6 nests **Beach Length:** 2.6 km

Nesting Beaches: Ossabaw Island, Georgia
Year: 2005 **Count:** 213 nests **Beach Length:** 17.7 km

Nesting Beaches: Sapelo Island, Georgia
Year: 2005 **Count:** 103 nests **Beach Length:** 9.9 km

Nesting Beaches: Sea Island, Georgia
Year: 2005 **Count:** 51 nests **Beach Length:** 8.7 km

Nesting Beaches: St. Catherine's Island, Georgia
Year: 2005 **Count:** 113 nests **Beach Length:** 20.1 km

Nesting Beaches: St. Simon's Island, Georgia
Year: 2005 **Count:** 2 nests **Beach Length:** 4.1 km

Nesting Beaches: Wassaw Island, Georgia
Year: 2005 **Count:** 104 nests **Beach Length:** 10.8 km

Monitoring Effort: Standardized daily surveys were conducted from May 1 to August 31, 2005, on all of the above beaches in Georgia, USA.
SWOT Contact: Mark Dodd

Data Record 63
Data Source: Godfrey, M., North Carolina Wildlife Resources Commission. 2007. Loggerhead nesting in North Carolina: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: North Carolina beaches
Year: 2005 **Count:** 647 nests **Beach Length:** Approx. 500 km
Monitoring Effort: Beaches were monitored via regular morning patrols and some night patrols from May through September, 2005. Nesting season is April to September, with its peak in June and July
SWOT Contact: Matthew Godfrey

Data Record 64
Data Source: 1) Griffin, D, South Carolina Department of Natural Resources. 2007. Loggerhead nesting in South Carolina: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007). 2) Hopkins-Murphy, S. R., Murphy, T. M., Hope, C. P., Coker, J. W., and M. E. Hoyle. 1999. *Population trends and nesting distribution of the loggerhead turtle (Caretta caretta) in South Carolina, 1980-1997. Final completion report to the U.S. Fish and Wildlife.*
Nesting Beaches: South Carolina beaches
Year: 2005 **Count:** 4,078 estimated nests **Beach Length:** 240 km
Monitoring Effort: Beaches along the coast of South Carolina were monitored during 12 aerial survey flights between June 1 and July 1, 2005. The data gathered during these surveys were used to estimate the total number of nests in 2005 using the estimation method from Hopkins-Murphy, et al. (1999).
SWOT Contact: DuBose Griffin

Data Record 65
Data Source: Shaver, D. 2007. Loggerhead nesting in Texas: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Bolivar Peninsula, Mustang Island, and North Padre Island, Texas
Year: 2005 **Count:** 3 nests
Comments: Between 1 and 5 loggerhead nests have been recorded on the Texas coast each year for the last decade. 77% of loggerhead nests in Texas have been recorded at Padre Island National Seashore on North Padre Island.
SWOT Contact: Donna Shaver

UNITED STATES VIRGIN ISLANDS

Data Record 66
Data Source: Buck Island Sea Turtle Research Program, National Park Service. 2007. Loggerhead nesting at Buck Island Reef National Monument, St. Croix, U.S. Virgin Islands. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Buck Island Reef National Monument, St. Croix
Year: 2005 **Count:** 0 nests **Beach Length:** 1.5 km
Comments: No loggerhead nesting events were observed in 2005 during full monitoring coverage. A single nesting female was documented each year in 2003 and 2004.
SWOT Contact: Zandy Hillis-Starr

VENEZUELA

Data Record 67
Data Source: Guada, H. 2007. Loggerhead nesting in Venezuela: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Caribbean coast of Venezuela
Comments: Nesting data from 2005 were not available, although loggerheads are known to nest along much of the coast of Venezuela.
SWOT Contact: Hedelvy Guada

YEMEN

Data Record 68
Data Source: Naseeb, F., and P. Scholte, Socotra Conservation and Development Programme. 2007. Loggerhead nesting on Socotra Island, Yemen. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
Nesting Beaches: Abalhan Protected Area/Socotra Man and Biosphere Reserve, Hadramout Governorate, Socotra Island
Year: 2005 **Count:** 74 nesting females **Beach Length:** 50 km
Monitoring Effort: Nightly patrols with two teams from late May to late August. Nesting season is late May to late August, with its peak in mid July.
Comments: Socotra Island is the only location in Yemen with consistent monitoring. Only anecdotal data are available from other areas of Yemen.
SWOT Contacts: Paul Scholte and Fouad Naseeb

COURTESY OF PAUL SCHOLTE, TEAM LEADER (NOT PICTURED)

"One evening during our nightly beach survey, my colleague and I saw eight brawny men trying to pull a loggerhead into their nearby fishing boat. Knowing that the two of us could not physically stop the eight men, we hid behind a bush and made as much as noise as we could. To our surprise, they left the turtle and hurried away in the boat. I believe this is a metaphor for how conservation happens. We are a handful of people in the world striving to protect biodiversity, but even as a minority, we can make a difference!"

*—**Mohammed Kaed**, Marine Biologist, shown (third from right) with his team at Socotra Conservation and Development Programme, Yemen*

Leatherback Data Citations

The data citations and points of contact listed below correspond to the map of worldwide leatherback nesting sites on pages 22–23. Each data record is numbered to correspond with its respective point on the map.

Important Note about Leatherback Data

The SWOT database has expanded considerably over the past year and now includes nesting data for both loggerhead and leatherback turtles. In the future, this database will continue to expand to include data on all species. Because of the amount of space that would be necessary to print complete data citations for each species (as we have done with loggerheads), the full leatherback data citations—including beach information, nest counts, monitoring effort, and comments—are available only on the SWOT Web site at www.SeaTurtleStatus.org. As we move into the future and add new data layers, only the *SWOT Report's* feature species will receive full printed citations, while those for all other species will be available on the SWOT Web site.

ANGOLA

Data Record 1

Data Source: Brian, C. 2007. Leatherback nesting in Angola: Personal communication. In S*WOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Conrad Brian

ANGUILLA

Data Record 2

Data Source: Gumbs, J. 2006. Leatherback nesting in Anguilla: Personal communication. In S*WOT Report—State of the World's Sea Turtles*, vol. 1 (2006).
SWOT Contact: James Gumbs

ARUBA

Data Record 3

Data Source: Van der Wal, E., and R. Van der Wal, Turtugaruba (Aruban Foundation for Sea Turtle Protection and Conservation). 2007. Leatherback nesting in Aruba. In S*WOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Edith Van der Wal, Turtugaruba

AUSTRALIA

Data Record 4

Data Source: 1) Limpus, C. J., and R. Chatto. 2004. Marine turtles. In *Description of Key Species Groups in the Northern Planning Area.* Hobart, Australia: National Oceans Office. 2) Limpus, C. J. 2006. Leatherback nesting in Australia: Personal communication. In S*WOT Report—State of the World's Sea Turtles*, vol. 1 (2006).

BAHAMAS

Data Record 5

Data Source: De Ruyck, C. 2006. Leatherback nesting in the Bahamas. In S*WOT Report—State of the World's Sea Turtles*, vol. 1 (2006).

BANGLADESH

Data Record 6

Data Source: Islam, M. Z. 2007. Leatherback nesting in Bangladesh: Personal communication. In S*WOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: M. Zahirul Islam

BENIN

Data Record 7

Data Source: Nature Tropicale. 2006. Rapport d'activites n 0010/PTM/NT: Suivi ecologique et protection des tortues marines sur le littoral du Benin (2005–2006).
SWOT Contact: Joséa S. Dossou-Bodjrènou

BRAZIL

Data Record 8

Data Source: Projeto TAMAR-IBAMA. 2007. Leatherback nesting in Brazil. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contacts: João Carlos Thomé, Antonio de Padua, and Paulo Barata

BRITISH VIRGIN ISLANDS

Data Record 9

Data Source: Gore, S., Hastings, M., Pickering, A., and G. Frett. 2007. Leatherback nesting in the British Virgin Islands. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contacts: Shannon Gore, Mervin Hastings, Arlington Pickering, and Gaverson Frett

CAMEROON

Data Record 10

Data Source: Angoni, H. 2004. Suivi et Conservation des Tortues Marines Dans l'U.T.O. Campo - Ma'an. Rapport technique.

COLOMBIA

Data Record 11

Data Source: Instituto de Investigaciones Marinas y Costeras José Benito Vives de Andréis (INVEMAR), and Ministerio del Medio Ambiente (MMA). 2003. Distribución de playas de anidación actual y zonas de avistamiento en el caribe colombiano de las tortugas caguama (Caretta caretta), verde (Chelonia mydas), carey (Eretmochelys imbricata) y canal (Dermochelys coriacea). Proyecto tortugas marinas del caribe Colombiano.
SWOT Contact: Claudia Ceballos

Data Record 12

Data Source: Patiño Martínez, J., and L. Quiñones. 2007. Leatherback nesting in La Playona, Acandí, Colombia. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Juan Patiño Martínez

CONGO

Data Record 13

Data Source: Bal, G., and N. Breheret, Renatura. Rapport d'activité du programme d'étude et de sauvegarde des tortues marines au Congo: Saison 2004–2005. Unpublished report.
SWOT Contact: Alexandre Girard

COSTA RICA

Data Record 14

Data Source: Troëng, S., Harrison, E., Evans, D. R., de Haro, A., and E. Vargas. Forthcoming. Leatherback nesting trend and threats at Tortuguero, Costa Rica. Chelonian Conservation and Biology.
SWOT Contact: David Godfrey

Data Record 15

Data Source: 1) Chacón, D., and G. McFarlane. 2005. Anidación de la tortuga baula (Dermochelys coriacea) en Playa Negra/Puerto Vargas, Parque Nacional Cahuita, Talamanca, Costa Rica. Informe de Actividades, temporada 2005. Costa Rica: Asociación ANAI/WIDECAST. 2) Chacón, D., and J. Machado. 2005. Informe de anidación en Playa Gandoca, Talamanca, Costa Rica. Refugio Nacional de Vida Silvestre Gandoca Manzanillo. Costa Rica: Asociación ANAI/WIDECAST.
SWOT Contact: Didiher Chacón

Data Record 16

Data Source: Francia, G, Proyecto de Conservación Baulas del Pacífico de Junquillal (WWF). 2007. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Gabriel Francia

Data Record 17

Data Source: Abella-Guitérrez, I., and M. López-Conlon. 2006. Informe de la Anidación de Tortugas Marinas en la Reserva Pacuare Durante la Temporada 2005. Costa Rica: Reserva Pacuare, Limón.
SWOT Contacts: Iñaki Abella-Gutiérrez and Mónica López-Conlon

Data Record 18

Data Source: Gaos, A. R., Yañez, I. L., and R. M. Arauz. 2005. Sea Turtle Conservation and Research in Coastal Communities on the Pacific Coast of Costa Rica. Costa Rica: Programa Restauración de Tortugas Marinas (PRETOMA).
SWOT Contacts: Ingrid Yañez and Alexander Gaos

Data Record 19

Data Source: The Leatherback Trust. Las Baulas Conservation Project–Archive 2004–2005 Field Report. http://www.leatherback.org/pages/project/report/report0405.htm.
SWOT Contacts: Frank Paladino and James Spotila

Data Record 20

Data Source: Solano, R. 2007. Leatherback nesting in Playa Nuevo Pacuare, Costa Rica: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Roberto Solano

Data Record 21

Data Source: Piedra, R., and E. Vélez. 2005. Reporte de Actividades de Investigación y Protección de la Tortuga Baula (Dermochelys coriacea), Temporada de Anidación 2004–2005, Playa Langosta. Unpublished manuscript. Guanacaste, Costa Rica: Proyecto de Conservación en Tortugas Marinas–Tortuga Baula, Parque Nacional Marino Las Baulas.
SWOT Contacts: Rotney Piedra and Elizabeth Vélez

Data Record 22

Data Source: Quirós, W., and D. Chacón. 2005. Informe del Proyecto de Conservación e Investigación de la Tortuga Baula Dermochelys coriacea Dentro del Refugio Nacional de Vida Silvestre Ostional, Temporada 2004–2005. Playa Ostional, Guanacaste, Costa Rica.
SWOT Contact: Wagner Quirós

CÔTE D'IVOIRE

Data Record 23

Data Source: Gómez, J. 2007. Projet de conservation de tortues marines en Côte d'Ivoire. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: José Gómez Peñate

CUBA

Data Record 24

Data Source: Moncada, F. 2007. Leatherback nesting in Cuba: Personal communication. In *SWOT Report—State of the World's Sea Turtles*s, vol. 1 (2006).
SWOT Contact: Félix Moncada

DOMINICA

Data Record 25

Data Source: 1) Byrne, R., and K. Eckert. 2004. 2003 Annual Report: Rosalie Sea Turtle Initiative (RoSTI). Roseau, Dominica, West Indies: Prepared by WIDECAST for the Ministry of Agriculture and the Environment (Forestry, Wildlife and Parks Division). 2) Byrne, R. 2006. Leatherback nesting in Dominica. In *SWOT Report—State of the World's Sea Turtles*, vol. 1 (2006).

DOMINICAN REPUBLIC

Data Record 26

Data Source: 1) Dominici, G. 1996. Monitoreo de anidamiento de tortuga tinglar (Dermochelys coriacea) en playas del Parque Nacional Jaragua. In Memorias del Segundo Congreso de la Biodiversidad Caribeña. Santo Domingo, Republica Dominicana, January 14–16, 1996. 2) León, Y. 2006. Leatherback nesting in the Dominican Republic: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 1 (2006).

ECUADOR

Data Record 27

Data Source: Barragán, M. J. 2006. Leatherback nesting in Ecuador: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 1 (2006).
SWOT Contact: María José Barragán

EQUATORIAL GUINEA

Data Record 28

Data Source: Rader, H., Nsue Esono, S., Bradsby, J., Morra, W., and G. Hearn. 2007. Leatherback nesting in Bioko Island, Equatorial Guinea. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Gail W. Hearn

FRENCH GUIANA

Data Record 29

Data Source: Rivalan, P. 2004. La dynamique des populations de tortues luths de Guyane Français: Recherche des facteurs impliques et application a la mise en place de stratégies de conservation. Ph.D. diss., Université de Paris XI Orsay.

GABON

Data Record 30

Data Source: Verhage, B., Moundjim, E. B., and S. R. Livingstone. 2006. Four Years of Marine Turtle Monitoring in the Gamba Complex of Protected Areas, Gabon, Central Africa, 2002–2006.
SWOT Contact: Bas Verhage

Data Record 31

Data Source: Sounguet, G. P., Aventures Sans Frontières. 2007. Leatherback nesting in Gabon. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Guy-Philippe Sounguet

GHANA

Data Record 32

Data Source: Adjei, R., Boakye, G., and S. Adu. 2001. Organisational profile: Ghana Wildlife Society. Marine Turtle Newsletter 93: 11-12.

GRENADA

Data Record 33

Data Source: King, R. S., and C. B. Lloyd. 2006. Leatherback nesting in Grenada: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 1 (2006).

GUADELOUPE

Data Record 34

Data Source: Delcroix, E. 2007. Rapport d'activité gestion du réseau tortues marines de Guadeloupe 2005. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007)
SWOT Contact: Eric Delcroix

GUATEMALA

Data Record 35

Data Source: Muccio, C., ARCAS. 2007. Leatherback nesting in the Hawaii area of Guatemala. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Colum Muccio

Data Record 36

Data Source: Pérez, J., Gómez, R., Estrada, C., Bran, A., and C. Alfaro. 2006. Leatherback nesting in Guatemala: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 1 (2006).

GUYANA

Data Record 37

Data Source: Stewart, K., DeFreitas, R., Kalamandeen, M., and P. Pritchard. 2006. Aspects of Marine Turtle Nesting in Guyana, 2005. Technical Report. Guianas Forests and Environmental Conservation Project (GFECP), World Wildlife Fund and Guyana Marine Turtle Conservation Society (GMTCS).
SWOT Contacts: Michelle Kalamandeen, Peter C. H. Pritchard, and Dominique Saheed

HONDURAS

Data Record 38

Data Source: Flores E., N. J. 2005. Estado de la Situación de Conservación Comunitaria de Tortugas Marinas en la Reserva de Biosfera de Río Plátano. Una experiencia de Gestión Colectiva en la comunidad de Plaplaya, Municipio de Juan Francisco Bulnes, "Walumugu": 1995–2005. Unpublished report.
SWOT Contacts: Norman Javier Flores and Carlos Molinero

INDIA

Data Record 39

Data Source: 1) Andrews, H. V., Chandi, M., Vaughan, A., Aungthong, J., Aghue, S., Johnny, S., John, S., and S. Naveen. 2006. Marine turtle status and distribution in the Andaman and Nicobar Islands after the 2004 M 9 quake and tsunami. Indian Ocean Turtle Newsletter 4:3–11. 2) Andrews, H. V., Krishnan, S., and P. Biswas. 2002. Leatherback nesting in the Andaman & Nicobar Islands. Kachhapa 6:15–18. 3) Andrews, H. V., and A. Tripathy. 2004. Tracing the migrations of Indian marine turtles towards an integrated and collaborative conservation programme: Andaman and Nicobar Archipelago, India. An interim report to the Convention on the Conservation of Migratory Species of Wild Animals & United Nations Environment Programme. Tamil Nadu, India: Madras Crocodile Bank Trust. 4) Andrews, H. V., Krishnan, S., and P. Biswas. 2006. Distribution and status of marine turtles in the Andaman and Nicobar Islands. In Shanker, K., and B. C. Choudhury, eds. 2006. *Marine Turtles of the Indian Subcontinent.* Hyderabad, India: Universities Press.

INDONESIA

Data Record 40

Data Source: Hitipeuw, C., WWF-Indonesia. 2007. Leatherback nesting in Papua, Indonesia: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Tetha Hitipeuw

Data Record 41

Data Source: Putra, K. S. 2007. Leatherback nesting in Indonesia: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Ketut Sarjana Putra

Data Record 42

Data Source: 1) Kinan, I., ed. 2005. *Proceedings of the Second Western Pacific Sea Turtle Cooperative Research and Management Workshop. Volume I: West Pacific Leatherback and Southwest Pacific Hawksbill Sea Turtles.* May 1–21, 2004, Honolulu, HI. Honolulu, HI, USA: Western Pacific Regional Fishery Management Council. 2) Dutton, P. H., Hitipeuw, C., Zein, M., Petro, G., Pita, J., Rei, V., Ambio, L., Kisakao, K., Sengo, J., Bakarbessy, J., Mackay, K., Benson, S., Suganuma, H., Kinan, I., and C. Fahy. Forthcoming. Status and genetic structure of nesting stocks of leatherback turtles (Dermochelys coriacea) in the western Pacific. Chelonian Conservation and Biology.

JAMAICA

Data Record 43

Data Source: Donaldson, A., and R. Kerr. 2007. Leatherback nesting in Jamaica: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contacts: Andrea Donaldson and Rhema Kerr

MALAYSIA

Data Record 44

Data Source: Fisheries Department of Malaysia. 2006. Report on the Marine Turtle Management Program in Terengganu for 2005. Presentation. Meeting of the Turtle Sanctuary Advisory Council (Meeting No. 1/2006), August 12, 2006, State Secretariat's Office, Terengganu, Malaysia.
SWOT Contact: Eng-Heng Chan

MARTINIQUE

Data Record 45

Data Source: 1) Association KAWAN. 2007. Leatherback nesting in Martinique. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007). 2) ONCFS Martinique. 2007. Leatherback nesting in Martinique. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Claire Cayol

MEXICO

Data Record 46

Data Source: Amigos para la Conservación de Cabo Pulmo, Grupo Tortuguero de las Californias. 2007. Leatherback nesting in Baja California Sur, Mexico. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Eréndira Valle Padilla

Data Record 47

Data Source: Trejos, J. A., and E. Carretero. 2006. Leatherback nesting in Mexico. In *SWOT Report—State of the World's Sea Turtles*, vol. 1 (2006).

Data Record 48

Data Source: 1) Sarti, L., Eckert, S. A., Garcia, N., and A. R. Barragan. 1996. Decline of the world's largest nesting assemblage of leatherback turtles. Marine Turtle Newsletter 74:2–5. 2) Spotila, J. R., Dunham, A. E., Leslie, A. J., Steyermark, A. C., Plotkin, P. T., and F. V. Paladino. 1996. Worldwide population decline of Dermochelys coriacea: Are leatherback turtles going extinct? Chelonian Conservation and Biology 2(2):209–222.

NETHERLANDS ANTILLES

Data Record 49

Data Source: Vissenberg, D. 2007. Leatherback nesting in St. Maarten, Netherlands Antilles: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Dominique Vissenberg

Data Record 50

Data Source: Harrison, E. 2006. St. Eustatius Sea Turtle Conservation Programme Annual Report 2005. St. Eustatius National Parks Foundation.
SWOT Contacts: Emma Harrison and Nicole Esteban

NICARAGUA

Data Record 51

Data Source: 1) Chacón-Chaverrí, D. 2004. Synopsis of the leatherback turtle (Dermochelys coriacea). Document INF-16-04, Inter-American Convention for the Protection and Conservation of Sea Turtles. 2) Lagueux, C., and C. Campbell. 2006. Leatherback nesting in Nicaragua: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 1 (2006).

Data Record 52

Data Source: 1) Sampson, E. 2005. Proyecto Conservación de Tortugas Tora, Dermochelys coriacea, Reserva Natural Isla Juan Venado, Octubre 2004–Febrero 2005. Informe técnico de proyecto. Fauna & Flora International. 2) Urteaga, J. 2005. Conservación de Tortugas Tora, Dermochelys coriacea, en el Refugio de Vida Silvestre Río Escalante-Chacocente, Temporada 2004–05. Informe técnico de proyecto. Fauna & Flora International.
SWOT Contact: José Urteaga

PANAMA

Data Record 53

Data Source: 1) Troëng, S., Chacón, D., and B. Dick. 2004. Possible decline in leatherback turtle Dermochelys coriacea nesting along Caribbean Central America. *Oryx* 38(4):395–403. 2) Ordoñez, C. 2006. Leatherback nesting in Panama: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 1 (2006).

Data Record 54

Data Source: 1) Caribbean Conservation Corporation. 2007. Leatherback nesting in Chiriquí, Panama: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007). 2) Ordoñez, C., Troëng, S., Meylan, A., Meylan, P., and A. Ruiz. Forthcoming. Chiriquí Beach, Panama, the most important leatherback nesting beach in Central America. Chelonian Conservation and Biology.
SWOT Contact: David Godfrey

PAPUA NEW GUINEA

Data Record 55

Data Source: 1) Kinan, I., ed. 2005. *Proceedings of the Second Western Pacific Sea Turtle Cooperative Research and Management Workshop. Volume I: West Pacific Leatherback and Southwest Pacific Hawksbill Sea Turtles.* May 17–21, 2004, Honolulu, HI. Honolulu, HI, USA: Western Pacific Regional Fishery Management Council. 2) Dutton, P. H., Hitipeuw, C., Zein, M., Petro, G., Pita, J., Rei, V., Ambio, L., Kisakao, K., Sengo, J., Bakarbessy, J., Mackay, K., Benson, S., Suganuma, H., Kinan, I., and C. Fahy. Forthcoming. Status and genetic structure of nesting stocks of leatherback turtles (Dermochelys coriacea) in the western Pacific. Chelonian Conservation and Biology.

Data Record 56

Data Source: 1) Kisakao, K. 2005. Community Based Conservation and Monitoring of Leatherback Turtles at Kamiali Wildlife Management Area Performed by Kamiali Integrated Conservation Development Group. Final Report. Western Pacific Regional Fishery Management Council. 2) Pilcher, N. 2006. The 2005–2006 Leatherback Nesting Season Huon Coast, Papua New Guinea. Final Report. Western Pacific Regional Fishery Management Council.

PUERTO RICO

Data Record 57

Data Source: 1) Diez, C. E. Internal report. Proyecto de Tortugas Marinas en Culebra, 2005. Puerto Rico Natural Resources Department (DRNA). 2) Horta, H., et al. 2005. Internal report. Reporte de actividades de conservacion de tortugas marinas en el Noreste de Puerto Rico. Puerto Rico Natural Resources Department (DRNA).
SWOT Contacts: Carlos E. Diez and Hector Horta

SAINT KITTS

Data Record 58

Data Source: Stewart, K., St. Kitts Sea Turtle Monitoring Network. 2007. Leatherback nesting in St. Kitts: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Kimberly Stewart

SAINT LUCIA

Data Record 59

Data Source: 1) Pierre-Nathoniel, D. 2007. Leatherback nesting in St. Lucia: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007). 2) St. Lucia Department of Fisheries. 2006. Preliminary sea turtle figures for Grande Anse Beach, Saint Lucia. In *SWOT Report—State of the World's Sea Turtles*, vol. 1 (2006).
SWOT Contact: Dawn Pierre-Nathoniel

SIERRA LEONE

Data Record 60

Data Source: Aruna, E. 2007. Leatherback nesting in Sierra Leone: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007). SWOT Contact: Edward Aruna

SOLOMON ISLANDS

Data Record 61

Data Source: 1) Kinan, I., ed. 2005. *Proceedings of the Second Western Pacific Sea Turtle Cooperative Research and Management Workshop. Volume I: West Pacific Leatherback and Southwest Pacific Hawksbill Sea Turtles.* May 17–21, 2004, Honolulu, HI. Honolulu, HI, USA: Western Pacific Regional Fishery Management Council. 2) Dutton, P. H., Hitipeuw, C., Zein, M., Petro, G., Pita, J., Rei, V., Ambio, L., Kisakao, K., Sengo, J., Bakarbessy, J., Mackay, K., Benson, S., Suganuma, H., Kinan, I., and C. Fahy. Forthcoming. Status and genetic structure of nesting stocks of leatherback turtles (Dermochelys coriacea) in the western Pacific. Chelonian Conservation and Biology.

SOUTH AFRICA

Data Record 62

Data Source: Nel, R., and R. Wright, Ezemvelo KwaZulu-Natal. 2007. Leatherback nesting in South Africa. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contacts: Ronel Nel and Cloverley Lawrence

SRI LANKA

Data Record 63

Data Source: 1) Ekanayake, E. M. L., Kapurusinghe, T., Saman, M. M., and M. G. C. Premakumara. 2002a. Estimation of the number of leatherback (Dermochelys coriacea) nesting at the Godavaya turtle rookery in southern Sri Lanka during the nesting season in the year 2001. Kachhapa 6: 13–14. 2) Ekanayake E. M. L., Ranawana, K. B., Kapurusinghe, T., Premakumara, M. G. C., and M. M. Saman. 2002b. Marine turtle conservation in Rekawa turtle rookery In southern Sri Lanka. *Ceylon Journal of Science (Biological Science)* 30: 79–88. 3) The Turtle Conservation Project. Turtle nesting beaches in Sri Lanka. http://www.tcpsrilanka.org/download/Map.pdf

SURINAME

Data Record 64

Data Source: Hilterman, M. L., and E. Goverse. 2006. Annual Report on the 2005 Leatherback Turtle Research and Monitoring Project in Suriname. World Wildlife Fund–Guianas Forests and Environmental Conservation Project WWF-GFECP. Technical Report of the IUCN Netherlands Committee IUCNNL, Amsterdam, the Netherlands.
SWOT Contacts: Edo Goverse and Maartje Hilterman

THAILAND

Data Record 65

Data Source: Aureggi, M. 2007. Leatherback nesting in Thailand: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Monica Aureggi

TOGO

Data Record 66

Data Source: Segniagbeto, G. H. 2006. Leatherback nesting in Togo: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 1 (2006).
SWOT Contact: Gabriel H. Segniagbeto

TRINIDAD AND TOBAGO

Data Record 67

Data Source: 1) Chacón-Chaverrí, D. 2004. Synopsis of the leatherback turtle (Dermochelys coriacea). Document INF-16-04, Inter-American Convention for the Protection and Conservation of Sea Turtles. 2) Livingstone, S. R., and J. R. Downie, Unpublished data. 3) Livingstone, S. R. 2007. Leatherback nesting in Trinidad: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Suzanne Livingstone

UNITED STATES OF AMERICA

Data Record 68

Data Source: Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Marine Turtle Program. Leatherback Nesting in Florida. http://research.myfwc.com/features/view_article.asp?id=11812.
SWOT Contact: Beth Brost

Data Record 69

Data Source: Godfrey, M., North Carolina Wildlife Resources Commission. 2007. Leatherback nesting in North Carolina: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Matthew Godfrey

UNITED STATES VIRGIN ISLANDS

Data Record 70

Data Source: Buck Island Sea Turtle Research Program, National Park Service. 2007. Leatherback nesting at Buck Island Reef National Monument, St. Croix, U.S. Virgin Islands. In *SWOT Report—State of the World's Sea Turtles*, vol. 2 (2007).
SWOT Contact: Zandy Hillis-Starr

Data Record 71

Data Source: Garner, J. A., Garner S. A., and W. Coles. 2005. Tagging and Nesting Research on Leatherback Sea Turtles (Dermochelys coriacea) on Sandy Point, St. Croix, U.S. Virgin Islands, 2005. Annual Report to Fish and Wildlife Service.

VANUATU

Data Record 72

Data Source: Petro, G. 2006. Leatherback Nesting Beach Surveys in Vanuatu by the Vanua-Tai Resource Monitors Turtle Conservation Network. Report to NOAA.
SWOT Contact: George Petro

Data Record 73

Data Source: 1) Kinan, I., ed. 2005. *Proceedings of the Second Western Pacific Sea Turtle Cooperative Research and Management Workshop. Volume I: West Pacific Leatherback and Southwest Pacific Hawksbill Sea Turtles.* May 17–21, 2004, Honolulu, HI. Honolulu, HI, USA: Western Pacific Regional Fishery Management Council. 2) Petro, G., Hickey, F., and K. Mackay. 2005. Leatherback Turtles in Vanuatu. In Kinan, et al. 2005, 73–77.

VENEZUELA

Data Record 74

Data Source: PROVITA. 2006. Leatherback nesting in Venezuela. In *SWOT Report—State of the World's Sea Turtles*, vol. 1 (2006).
SWOT Contact: Alfredo Arteaga

Data Record 75

Data Source: 1) Guada, H. J., ed. 2004. Status of the Leatherback Turtle in Venezuela: National Analysis. CICTMAR-WIDECAST. 2) Rondón Médicci, M. A., Guada, H. J., Revuelta Abin, O., and A. Montilla. Results of the 2005 nesting season of the sea turtle research and conservation project in the Paria Peninsula, Sucre State, Venezuela. In *Book of Abstracts: Twenty-Sixth Annual Symposium on Sea Turtle Biology and Conservation,* compilers M. Frick, A. Panagopoulou, A. F. Rees, and K. Williams, 149. Athens: International Sea Turtle Society.
SWOT Contact: Hedelvy Guada

Data Record 76

Data Source: Hernández, R., Buitrago, J., and H. Guada. 2006. Leatherback nesting in Venezuela: Personal communication. In *SWOT Report—State of the World's Sea Turtles*, vol. 1 (2006).

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Thank you, SWOT Team, for all that you do…

In Memoriam

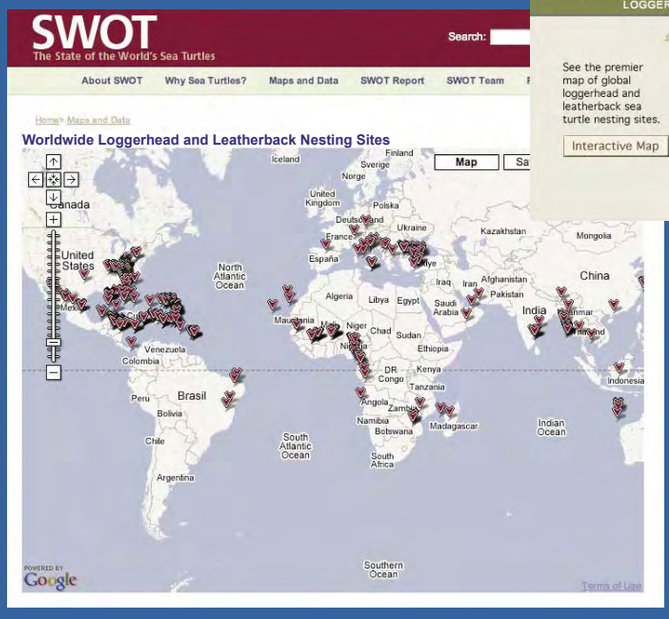
COURTESY OF KATHY BRICKER / THE OCEAN CONSERVANCY

Frances Velay (1914–2007). An engaged philanthropist deeply committed to the conservation of sea turtles, Frances Velay will be greatly missed. She was an ardent supporter of SWOT and numerous other sea turtle conservation causes through the Panaphil Foundation. She converted her love for turtles into action through her generous and heartfelt support.

Boyd Lyon (1969–2006). In August 2006, the turtle world lost one of its best and brightest rising stars, Boyd N. Lyon. It is truly inspiring how many lives Boyd touched through his sea turtle research in the few years he was a part of our community. A memorial fund has been established in Boyd's name to assist budding sea turtle scientists in their graduate research. For more information, please visit www.BoydLyonSeaTurtleFund.org.

COURTESY OF JEFFREY SEMINOFF

See the latest on the SWOT Web site…



www.SeaTurtleStatus.org

- Click through the all-new, **interactive State of the World's Sea Turtles map** with loggerhead and leatherback nesting information (powered by Google Maps).
- Easily access individual ***SWOT Report* articles.**
- Take a look at the new ***SWOT Report* Outreach Toolkit** for suggestions on using *SWOT Report* to inspire conservation action.
- Join the **SWOT Team** online!

State of the World's Sea Turtles
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