

SWOT

report

Volume VIII

The State of the World's Sea Turtles

persuasion

THE CASE FOR SAVING SEA TURTLES

INSIDE

HOW TO FUND YOUR CONSERVATION PROJECT | NEW METHODS TO SOLVE SEA TURTLE MYSTERIES
CONNECTING THE DOTS FOR TURTLE CONSERVATION | AND MORE ...



THIS PAGE: A green turtle glides past scuba divers near Cancun, Mexico. © LUIS JAVIER SANBOVAL FRONT COVER: As part of an awareness campaign organized by the International Fund for Animal Welfare (IFAW), 200 life-sized cardboard sea turtles were installed at Bournemouth beach, U.K., in May 2009. The campaign was organized to raise awareness of the impact of the wildlife souvenir trade on sea turtles and other threatened species. © 2013 SAMANTHA COOK PHOTOGRAPHY





Editor's Note

Navigating the Conservation Obstacle Course

Like a hurdler running a race, conservationists need to maintain a clear vision of what lies ahead, an understanding of the barriers that litter our path, and a strategy for getting past them effectively to stay the course to the finish line.

We created the SWOT Program in 2004 in an effort to remove *just one* of the key barriers to effective conservation of sea turtles and their habitats—the absence of a current, comprehensive, global perspective of sea turtle distribution and status that would help to prioritize and focus global conservation actions. As SWOT heads into its 10th year, we are proud to be well on our way to clearing that first hurdle. Along the winding road toward our goal, we have encountered a multitude of other unforeseen obstacles that our SWOT Team—now 1,200 strong—has ably cleared; yet unsurprisingly, with each passing day new challenges emerge requiring our keen attention.

In this eighth volume of *SWOT Report* we have called upon SWOT team experts to share their wisdom about how to successfully leap some of the most common barriers that confront sea turtle conservationists everywhere. Herein we discuss the age-old challenges of fundraising; of understanding the movements of turtles when they elude our ability to directly observe them; and that most important challenge, persuading others to join and support our worthy cause, the topic of our special feature article.

Strangely, though the survival of the human species relies directly on a healthy planet Earth that includes sea turtles and their ocean habitats, governments, lawmakers, businesses, and people *still need persuading* that their behaviors must change in relation to nature. Persuasion can take myriad forms, from political lobbying to artistic stunts like the one depicted on our cover undertaken by the International Fund for Animal Welfare in Bournemouth, United Kingdom. Many helpful hints and strategies are found in these pages, and among them are references to “social responsibility,” “ethical obligation,” and my personal favorite, “passion.” Passion is the high-octane ingredient that keeps our global community fueled to wake up each day to confront the next obstacle along our conservation path.

So, be passionate and “be lively!”—as I learned from these young Indian conservationists at an event titled *Turtle's Health Is the Ocean's Wealth*. Like hurdlers, we will keep pushing forward, leaping the obstacles one by one, while keeping our strength and stamina intact until the finish line.



THIS PAGE: Children bearing placards at an event in Chennai, India, in January 2007 show their support for sea turtle conservation at an event titled *Turtles' Health Is the Ocean's Wealth*. © RODERIC B. MAST AT LEFT: A green turtle hatchling makes its way to sea on Santa Cruz Island, Galapagos Islands, Ecuador. © PETE OXFORD

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State of the World's Sea Turtles

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meet the turtles

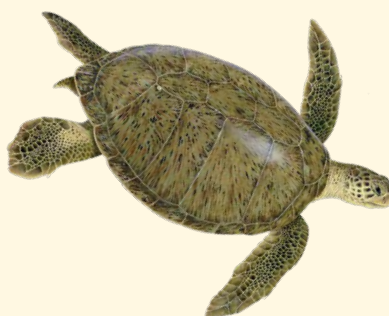
The seven sea turtle species that grace our oceans belong to a unique evolutionary lineage that dates back at least 110 million years. Sea turtles fall into two main subgroups: the unique family *Dermochelyidae*, which consists of a single species, the leatherback; and the family *Cheloniidae*, which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



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



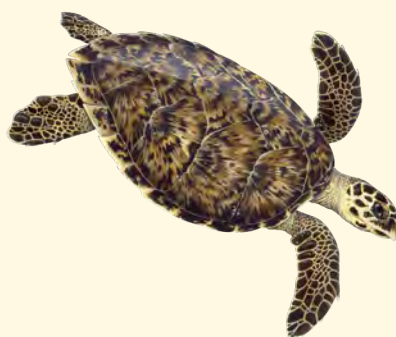
Kemp's ridley (*Lepidochelys kempii*)
IUCN Red List status: Critically Endangered



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



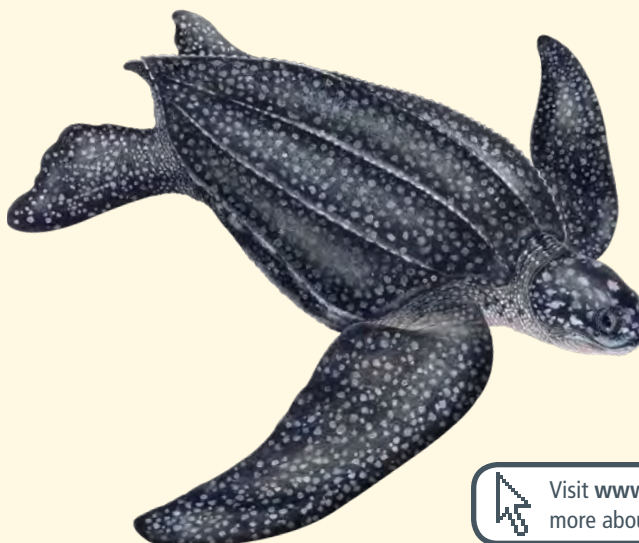
Loggerhead (*Caretta caretta*)
IUCN Red List status: Endangered



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



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



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

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



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



PERSUASION

☞ The Case for Saving Sea Turtles ☛

By BLAIR WITHERINGTON

Sea turtles have survived without us. We've had almost no input in shaping their principal adaptive traits. Without regard to humans, sea turtles grow large to deter predation; are attracted to light as sea-seeking hatchlings; and have nesting distributions on sandy beaches that, over millennia, have shifted with the rising seas.

A crowd of spectators looks on as a rehabilitated loggerhead turtle returns to sea in Isle of Palms, SC, U.S.A. Such events provide opportunities to involve the public in sea turtle conservation. © RICHARD ELLIS / GETTY IMAGES





For millions of years, we did not matter to sea turtles. But recently, our little group of large-skulled land mammals with opposable thumbs has become hard to ignore. We are efficient and undeterred predators and supreme competitors who are messy with our waste, and the unintended consequences of our actions have reached a planetary scale. As such, we have caused our planet's sea turtles to decline. Yet we also work to conserve them. We are a schizophrenic group, we humans, simultaneously presenting environmental problems and solutions, but with an obliviousness to each.

What sea turtles need, if we are to keep them around, is a change in our behavior—not of just a few of us, but of a lot of us. But how can a group that seems to be at cross-purposes achieve such a change?

The answer is persuasion. Persuasion is the process of changing attitudes or behaviors by communicating information, reason, or emotion. It is an essential skill in many endeavors, and it is instrumental to conservation.

Humans are social animals. Our attitudes and behaviors are guided by others in our societies through the competition of selfish interests, taboos, tacit rules, formal law, policing, and the degree to which we submit to governance. What follows is an examination of how these controls on human behavior can change through persuasive efforts. The contributors have divided their discussions of persuasion among key elements of our societies that provide behavioral guidance—*scientists, industrialists, lawmakers, policy-makers, and the public* at large.

Sea Turtle Conservation Persuasion— The Weapons of Woo

Persuasion may be an art, but there is ample scientific evidence to describe how it works. In his book, *Influence: The Psychology of Persuasion*, psychologist Dr. Robert Cialdini outlined six key elements to effective influence. With subtle modifications for a conservation message, they are as follows:

URGENCY. Imminent risk of losing a resource (population, species, biological phenomenon) provides an important persuasive point. This “limited-time only” message often promotes action, as long as it is not mistakenly construed as “it’s probably already too late.”

RECIPROCITY. Help someone and they will return the favor. This is especially true in the political realm where the strangest of bedfellows can be conservation friends at opportune moments.

COMMITMENT. People who commit to what they feel is right will often honor their commitment. Formally solidifying a handshake agreement with an official recognition makes the commitment even harder to disavow.

PEER PRESSURE. People do things they know others are doing. Petitions with lots of signatures gain more signatures faster, and conservation initiatives with committed friends acquire new friends more quickly.

AUTHORITY. Figures of authority are influential key contacts to persuade. Usually, these are leaders of varied political stature but also include sports heroes and entertainment personalities.

LIKABILITY. Liable people are more persuasive. Positive, pleasant people enjoy a longer audience and are harder to say no to.

SCIENTISTS

Focusing on the Most Critical Questions in Sea Turtle Conservation

By LARRY B. CROWDER

“Don’t tell me the moon is shining; show me the glint of light on broken glass.”

—ANTON CHEKOV

Scientists are bred to be independent, critical thinkers who assess the data and make their own conclusions. But scientists also tend to be swept up in trends driven by new concepts, new methodologies, funding opportunities, or charismatic leaders. Conventional wisdoms predominate until irrefutable evidence leads to a tipping point and new conventional (and potentially equally wrong) wisdoms arise. Our “independent thinking” waxes and wanes, but our strong wills remain.

For these reasons, scientists are often resistant to changing their hard-won conclusions, positions, or approaches. One cannot force these changes; persuasion occurs as the issues are illuminated and skeptics are shown the evidence.

AT RIGHT: A pair of green turtles is released by researchers in Curaçao, Netherlands Antilles.
© NATURE / UIG



Early in my career, most sea turtle biologists concentrated their work on the nesting stage and on embryos and hatchlings. Once hatchlings skittered off into the sea, they entered the “lost years,” only to turn up back on the same beach years or decades later. Until people began to be concerned about dead stranded turtles on the beach, we rarely looked to the sea to understand or conserve sea turtles. Debby Crouse’s (1987) population model for loggerheads showed two unconventional (and perhaps unpalatable) results: (1) even miraculously successful conservation on nesting beaches could only prolong time to extinction, and (2) significant reduction in bycatch mortality would be required for species recovery. When this result was published, Crouse heard no response from her fellow sea turtle scientists for a couple of years. It really wasn’t until publication of the National Research Council’s book titled *Decline of the Sea Turtles: Causes and Prevention* (1990) that her ideas began to go viral. Since then, her paper has been cited over 400 times; it is taught in population biology and conservation courses. As a participant in that research, I have to say I had no idea that it would help lever changes in national and international policy, or that it would be taught in conservation curricula. But I did have a hunch that sea turtle biologists would take a while to adopt these challenging results.

Scientists, like other humans, are creatures of habit. We do what we enjoy and what we feel comfortable doing. And when someone is pushing us out of our comfort zone, we resist. *Telling* us that we should change does little. But *showing* us a new result, method, or insight gradually erodes conventional thinking and comfortable approaches. Those who are founding members of the International Sea Turtle Society (ISTS) recall when the early meetings were several days of “on my beach” talks. These included viewing amazing natural history and hearing stories of people performing heroic efforts to acquire the data, often in remote, challenging locations. But things have changed.

As conservation researchers,
we need to constantly ask ourselves,
“Is the work I am doing addressing
the most critically important issues
in sea turtle conservation?”

The ISTS meetings now include a wide variety of research and management talks covering the entire life history of sea turtles and employing the most powerful new techniques from genetics, physiology, satellite tagging, remote sensing, spatial analyses, and population dynamics, as well as deep dives into the social sciences. Sea turtle conservation’s principal meeting has evolved from a predominantly inside conversation to an open sharing of compelling evidence. This evidence is essential to scientific persuasion.

As conservation researchers, we need to constantly ask ourselves, “Is the work I am doing addressing the most critically important issues in sea turtle conservation?” This question seldom allows the comfort of status quo. Scientists who take it seriously often recast their research to address the tough issues, such as how to age sea turtles, how to measure juvenile survival at sea, how to rank threats across life stages, how to understand the geography of distinct populations, or how to understand and promote more sustainable activities in coastal communities. Our commitment to the conservation of protected species leaves us little room to maneuver—we have an ethical obligation to set comfort, pride, and peer pressure aside to tackle research that matters.

INDUSTRIALISTS

Convincing Businesspeople That Conservation Is in Their Best Interests

By KELLIE PENDOLEY

The 1962 publication of Rachel Carson’s *Silent Spring* heralded a new era for both industry and the environmental movement. The book brought the impact of human pollution to the attention of the public for the first time. The next 30 years saw relationships between all sectors of big business and “greenies” become increasingly confrontational and distrustful. Since then, though, the gradual absorption of environmental graduates into the day-to-day operations of business has allowed the slow evolution of cooperation and a sometimes reluctant acceptance of environmental concerns as a core part of business activities.

Environmental science was first established as a major in 1965 at Middlebury College in Vermont, and, since that time, universities globally have been training the professionals needed to guide

businesses in reducing their environmental footprint on the world. Large multinational corporations with high public profiles were the first to embrace these new concepts. However, the integration of environmental processes into all levels of business is still not 100 percent complete even in the wealthy industrialized countries, and it is a low priority in the rest of the world.

Environmental practitioners fulfill a difficult role, balancing on the fence between the typically urgent and commercially driven requirements of the industries they work in, the politically driven conditions of regulators, and the emotive extremism of the nongovernmental organizations and other activist groups they may feel aligned with or must respond to. Persuasion begins by educating the people

who make up a business unit. This education is paramount and can take many forms, ranging from forceful implementation of environmental protection by regulation or public demonstration, to a more subtle process of cultural and corporate policy change brought about through working within a business.

Environmental practitioners who are working on change from within learn that it takes time and patience. Typically, making big changes in a business can require three to five years. That change comes from building good working relationships with business managers, planners, and engineers to gain their trust and respect, and from creating a shared vision with the business management and executives. When working within a business, one should recognize that many proposals cannot be stopped. Instead, the most productive conservation results often come from steering business activities toward reducing their potential environmental impacts as much as possible—As Low as Reasonably Practicable, or ALARP—rather than blocking the activities altogether. ALARP is about as quantitative as we can be when dealing with industry.

For example, although science has recognized the impact of light on turtle hatchlings since Hooker's 1905 paper on the subject, it wasn't until the 1980s that Western Australia's industry and regulators caught up and first began to address the management of lighting from industrial developments close to marine turtle rookeries. In the 25 years since, strict management of all aspects of facility lighting and flares has become an integral part of doing business on sites close to turtle rookeries in Western Australia.

This integration is straightforward for those businesses that possess a strong corporate culture of environmental protection, such as Chevron in Western Australia, which has been operating on oilfields on Barrow Island, a Class A Nature Reserve, since 1965. For companies without a strong environmental culture, however, the integration can be more challenging. Regulations on light management require legal compliance for the most environmentally sensitive projects, while other projects can refer to the environmental good practices provided by the Western Australian government's "Environmental Assessment Guideline for Protecting Marine Turtles from Light Impacts" (2010).

Some of the associated benefits from this type of business activity have been the availability of money and resources to identify and study regional turtle rookeries and to develop new technologies to study turtles—funds and materials that might not otherwise have been available. For example, in Western Australia novel digital photographic equipment and software that can capture and quantify light in a biologically meaningful and repeatable way have been developed. In addition, an aerial photographic survey technique is being refined that will allow the

capture and analysis of high-resolution photographic transects that can identify species from tracks left on the beaches.

Business-based environmental practitioners have few weapons at their disposal, have little power, and often work in isolation. Our role within business is to advise on project design, construction, and operations; participate in risk assessments; provide evidence to prove why an action should not proceed; comply with health and safety restrictions around every aspect of fieldwork; and encourage, cajole, inspire, persuade, reason, argue, and above all educate everyone from the junior in the mail room to the managing director in the board room as to why environmental consciousness is the responsibility of everyone, every day, everywhere.

Education and persuasion begins with a human approach. We ensure that everyone understands their responsibility for the natural environment, and we urge that they personally embrace the idea that the natural environment is *theirs*; it is their backyard and its loss will be a loss for *their* children and grandchildren. Not everyone is motivated by this approach, and, for those who are not, we need to be more pragmatic. We show them how noncompliance with environmental standards could halt a project; cost money in fines, lost time, missed deadlines, and broken contracts; and result in very public impacts on their corporate reputation as a *socially responsible operator* and a good *global citizen*, terms that were coined 50 years ago when *Silent Spring* was first published and are now part of our daily lexicon.

Persuasion begins by educating the people who make up a business unit. This education is paramount and can take many forms ...



Field assistants test the orientation of hatchling flatback turtles in the presence of lights typically used by industry and in urban areas. The data from the study, which was conducted on Barrow Island, Australia, were used to establish a baseline to inform the Chevron Gorgon gas project. © KELLIE PENDOLEY



National Oceanic and Atmospheric Administration (NOAA) administrator Dr. Jane Lubchenco (right) and Barbara Schroeder of the National Marine Fisheries Service (left) release rehabilitated Kemp's ridleys following the 2010 Deepwater Horizon oil spill. Bringing policymakers into the field to observe and interact with sea turtles can result in lasting impressions. © NOAA

LAWMAKERS

The Art of Legislative Persuasion

By GARY APPELSON

Florida is in a unique position when it comes to protecting sea turtles. The state's beaches host almost all of the leatherback, loggerhead, and green sea turtle nesting in North America. Turtles of different age classes also use the nearshore reefs, seagrass beds, and estuaries for foraging and refuge. At the same time, over 60 percent of Florida's almost 19 million residents live within five miles of the beach; over 75 percent of Florida's 62 million annual tourists visit the beach; and most of the state's turtle nesting beaches are lined with homes, hotels, and businesses. In this context, sea turtle protection often pivots on lawmakers' decisions about beach and shoreline use and protection.

However, although much has been written on the topic of communicating with lawmakers about science or environmental issues, less has been conveyed about the many other variables that can complicate the decisionmaking process. The reality on the ground is that this communication process is not purely objective and value free. In fact, lawmakers are subject to emotions, ambition, value systems, political pressures, and competing demands from an endless array of other stakeholders and interest groups. Presenting an effective message above this din is tricky. Understanding the players and their unique playing field is essential for success. These five tips will help get you started.

Identify the appropriate decisionmakers

Know which level of government is responsible for addressing your concerns. Although state laws can have sweeping consequences, convincing state lawmakers to pass new conservation laws or change existing laws is very difficult and often expensive. However, regulatory agencies often *implement* the laws and ensure compliance with the consequent rules and policies. Thus, often a more productive approach is to educate and work with agency staff members rather than with lawmakers who are dealing with hundreds of issues. Getting to know the staff members and establishing working relationships are essential. And though elected officials come and go with each election cycle, agency staff members typically offer greater continuity and institutional and experiential memory that can be used to justify current conservation policies and the need for changes in policy.

Plan your timing

In the current era of economic hardship, austerity measures, and reduced budgets, governments are often focused on fostering job creation by reducing the regulatory burden on citizens and businesses. The political climate may not support additional conservation laws that require new rules and regulations. Thus, your ability to persuade may depend on waiting for the pendulum to swing to a better time.

Find your champions

Of course, implementing a new law, modifying current laws, or preventing proposed changes that could potentially weaken existing laws may be needed to achieve a conservation goal. In these situations, find your champions! Lawmakers often turn to other colleagues for

information, judgment, and intuition on specific matters. Finding supportive lawmakers who also lead other lawmakers requires research and time spent developing personal relationships, respect, and trust. Conservation advocates must educate their champions by providing science-based, credible information. Identifying collateral benefits can also be useful. Remember that lawmakers are being pulled and pushed by many stakeholders. Lawmakers are looking for balance in accommodating the needs of sea turtles and the millions of residents and tourists interacting with marine and coastal habitats. So, know all sides of the issues, and convey them to your supportive lawmakers.

Find common ground

There is truth to the adage that “politics makes for strange bedfellows.” Don’t automatically write off lawmakers with differing beliefs or values. Sea Turtle Conservancy is working with lawmakers who support unfettered free enterprise and private property rights and who believe in market-based pricing of wind and flood insurance. Together, these lawmakers and members of the conservation community support the removal of government insurance subsidies that promote high-risk and environmentally destructive coastal development.

Be passionate!

Many of us come to this work because we are passionate about protecting nature and the environment. Sometimes the mysteries of government and perceived inaccessibility of lawmakers are discouraging. Don’t be afraid to be passionate about your cause in your conversations and phone calls. This enthusiasm is persuasive. And, after all, sea turtles are an iconic species in need of every effort to protect them.

POLICYMAKERS

An Agency View of Conservation Action

By BARBARA SCHROEDER

How we use and conserve resources is ultimately determined by public policy. This policy is the principled guidance of government decisions. It is fine-tuned and acted upon by the administrative branches of our governments—the agencies. Policies have their foundation in law, but their implementation is shaped by input from many communities. In a flow chart, the public policy box would receive arrows from business, conservation, science, law, and the public.

Because of the variety of inputs to sea turtle conservation policy, these policies and their results seldom mirror the views of a single group. Policy is an amalgam, determined by competing forces of persuasion. Policy is informed by sound science, but it is also influenced by business advocates, conservation advocates, and the public at large. The most influential science comes from sea turtle research that has filled critical information gaps. Good science is persuasive in and of itself. But what that science means for sea turtle conservation is shaded

by individual interests, collective interests, and philosophy. Agencies must consider all of these external persuasive forces in the decision-making process. Given the complex nature of making or changing public policy, sea turtle conservation advocates should work strategically toward addressing the most pressing threats and advocating management actions necessary to resolve those threats.

Persuasion is also a force that applies within agencies. For those working at staff levels within the public sector—be it local, municipal, state, provincial, or federal government agencies—persuasion is a necessary element for getting things done for sea turtle conservation. Policymakers are often only indirectly familiar with the species we focus on; thus, bringing policymakers “closer to the action” can sometimes be effective in helping them understand more directly the species itself, the extent and impact of particular threats, and the solutions that are within their power to implement. This effort to educate can take several forms. Bringing policymakers into the field to

observe and interact with sea turtles firsthand can result in a lasting impression of the plight of the species and the need to address conservation problems. Holding periodic informative briefings at times other than when conservation decisions are on the line to highlight a particular species, primary threats, or conservation successes can result in more informed decisionmakers when the need for policy or rulemaking decisions arise.

Agency staff members should consider inviting an influential leader from outside the public arena to give a well-crafted talk pertinent to conservation issues of concern—scheduled when key policymakers can attend to expand their knowledge and garner their support. Critical to success is being well prepared, with clear and factual information supporting the need for action. In most agencies, policymakers are faced daily with many decisions on multiple fronts, so strategic thinking is important in crafting a case. What is the most important message? What are the most important facts to present? What misinformation is most important to refute with facts? To the

extent possible, anticipate questions and concerns and be prepared to respond to them effectively. Recognize and acknowledge that, in most cases, information is imperfect, yet our species are imperiled, and action is often urgent. Where the competing forces acting on policy decisions are strong, compromise is often required to move the conservation bar forward, even if not as expeditiously as hoped. A compromise may at least provide a starting point on which to build.

As a conservationist who works in the public sector, you should accept that sometimes, despite being well prepared with all the facts on your side, policy decisions might not go your way. These can be difficult outcomes to accept, especially given the endangered status of the species we work with. Learn as much as you can from the process and consider another way you might approach the issue. Working within the public policy arena provides an opportunity to shape conservation, and while success is often gained in incremental steps, dedicated efforts over the long term can, and in fact do, make a difference for sea turtle conservation.

THE PUBLIC

Advocacy to Support Policy, Take Action, Donate, and Speak Out

By RANDALL ARAUZ

The first step toward persuading the public to support a conservation policy and take action is to get them to pay attention to the issue that concerns your group. Certain issues allow for the presentation of shocking, attention-getting information, such as disturbing oil spill images and raw facts about chemical waste dumps. These are the wake-up calls that often foster immediate attention and emotional responses, begging the questions: “Why is this being

allowed to happen?” “Isn’t there anything we can do about it?” and “Aren’t there laws against this?”

To grab the public’s attention as they ask these questions, your group can begin by clearly exposing the issue and describing the actions needed to achieve change. Next, identify the target—the person responsible who can change the situation—as well as the condition or change that will mark the victory. The public has to feel needed and be convinced that their support *will* make a difference. Giving them the facts—the threat, the consequences, and the solutions you propose—in full-page ads in local and international newspapers is a good way to start, with attached form letters addressed to the target. There’s nothing like a few thousand letters to build a fire under a politician’s feet. Additional ways of generating attention are through social media such as Facebook and Twitter.

Have your facts prepared and make sure the science is correct, because your detractors will try to punch holes in your arguments. Prepare a summary on the issue that can be widely distributed—as a brochure or flyer and on a website—so that people can easily learn the facts surrounding the issue. Websites also can have “Donate” buttons so the public can support your efforts financially.

Make the issue a subject for broad public debate. Get your opinions published in the local, national, and international media. Get others to participate and to foster discussions. Continue to push to keep the issue in the public eye. Several tactics can be used to build popular support for a cause. These include publishing press releases regularly to give your activities a sense of continuity, holding press conferences to reach mainstream media, seeking coverage in local



Randall Arauz (left), director of PRETOMA, and Costa Rican President Laura Chinchilla (right) with a petition signed by 100 students of Blue Valley School, Escazú, Costa Rica. The petition, which addresses the issue of shark finning, was organized by Chinchilla’s teenage son in 2011. © PRETOMA



Activists from the organization ProFauna demonstrate in support of sea turtle and wild animal protection in Denpasar, Bali, Indonesia. © AP PHOTO / FIRDIA LISNAWATI

newspapers and on radio, and speaking to community groups. You also can publish online newsletters and use social media to get the word out and keep financial supporters informed of the activities conducted with their contributions.

Besides the public, constituencies can be built in other appropriate sectors of society. Having blocs of scientists backing up your position will help to shore up support among academic sectors and build support that can reach international meetings, such as symposia and congresses. Additional target constituencies include politicians, student groups, and journalists. Celebrities come in very handy as well, because they serve as icons that allow you to reach sectors of society who may not normally know or care about the issue.

School children, too, can have a powerful impact, because these young citizens often go home and talk about issues with their parents. I experienced an example of this once during a meeting with Costa Rica's President Laura Chinchilla. She showed me a petition addressed to her from my organization, PRETOMA (Programa Restauración

Tortugas Marinas), on the shark-finning issue that had been signed by over 100 students from the Blue Valley School, Escazú, Costa Rica. The signatures had been gathered by her teenage son, who studies there. "My son is a little activist," she said proudly. Cool stickers with messages are great tools for spreading the word among school kids, and nothing beats an impassioned personal lecture.

Sign-on (petition) campaigns can really create a positive impact on politicians, especially when the letters pile up by the thousands. In addition, always get an e-mail contact from people who sign your letters, so you can keep them informed of all developments.

Those politicians who are obstacles to conservation solutions will need their own special persuasion. Because anonymity shields unpopular action, exposing the identities of obstructionists can often move them toward cooperation. And for those working on the side of conservation, remember to make them aware of how valuable they are in directing public policy. Celebrate all victories, even the smallest ones.

Persuading People to Conserve Their Sea Turtles

By S. HOYT PECKHAM

Among the biggest challenges in conservation is persuading people to personally protect their natural resources. Even in the best of cases, when effective and fair conservation regulations are created through participatory processes based on sound science, the act of conservation comes down to personal choices. The fate of many turtles depends on decisions made by the coastal citizens around the world who interact with sea turtles every day. These people include fishermen, tourists, beach dwellers, and many others. As conservation practitioners, our job then is to empower people to be able to choose in favor of turtles as they go about their everyday lives. The following are some suggestions for how to do this.

Choose a serious problem

Spend scarce conservation resources (philanthropic support, fishermen's time, social capital, and your time and soul) on problems of only pressing conservation concern that directly jeopardize the recovery of a vulnerable turtle population.

Identify a hotspot

Once you've identified the problem, learn where you can have the biggest conservation impact or leverage. For instance, if you've identified poaching or bycatch as a major threat to a turtle population, identify in what nation, region, and community it is most intense, and concentrate your efforts on key leaders there.

Know the community

Start with a community profile. For a fisheries problem, for instance, determine what, when, where, why, and how people fish and interact with turtles, and how these interactions have changed over time. Also, what is the power structure in the community? Who are the key leaders, and who holds influence? Consider conducting a detailed social network analysis, and plan to spend considerable time in the community, on the scale of years.

Set realistic goals and objectives

Once you've zeroed in on the issue and community you will address, the Grupo Tortuguero's Conservation Mosaic model provides a proven framework for engaging and inspiring individuals and communities to conserve turtles. Be transparent. Set realistic goals and SMART (Specific, Measurable, Attainable, Relevant, Timely) objectives. Share them with your collaborators.

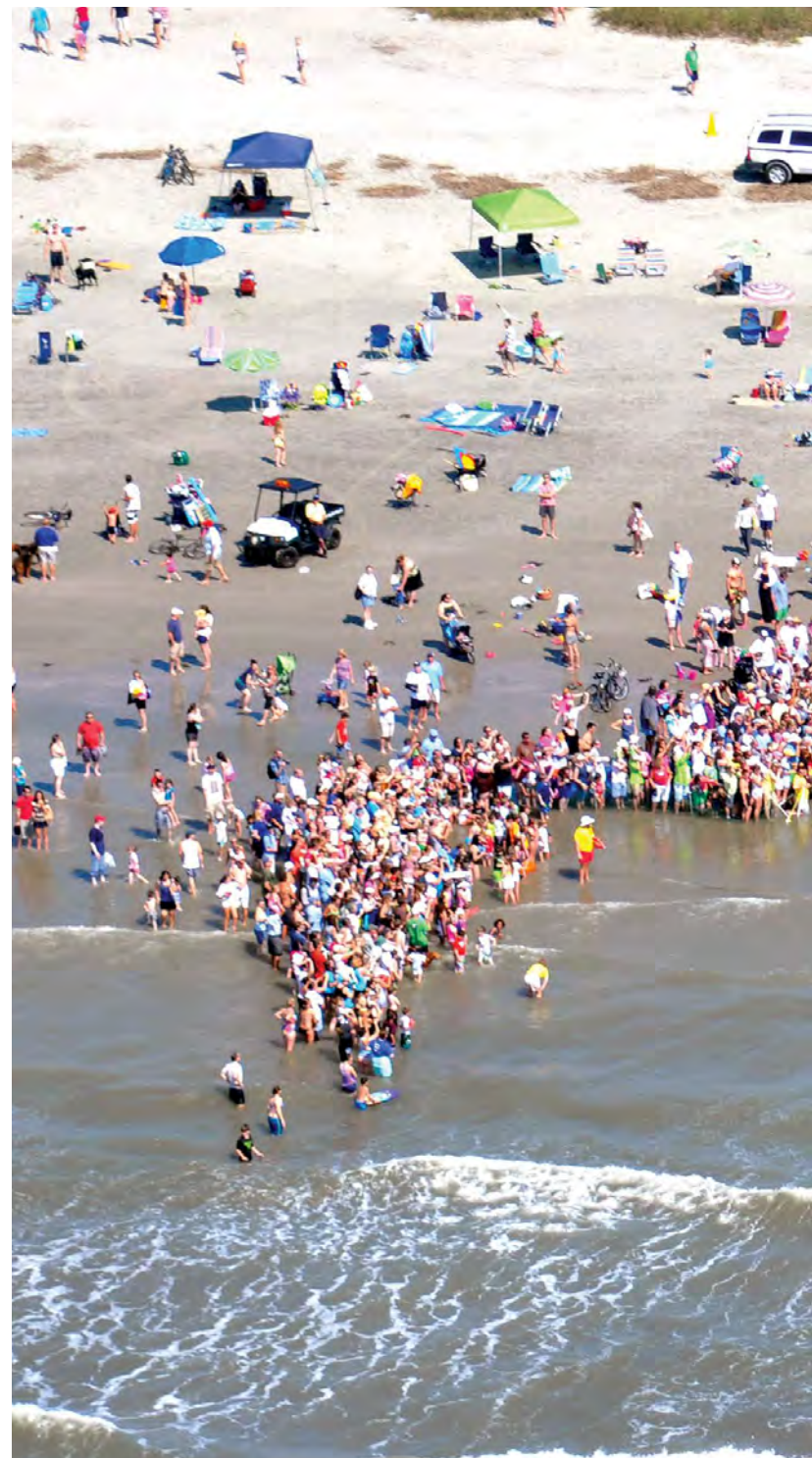
Build a network of concerned citizens

Empower promising leaders by engaging them in local, regional, and international workshops, meetings, and conferences. Through their interactions with colleagues from other neighborhoods, towns, regions, and countries, their perspectives will broaden so that they appreciate

the global impact of their behavior. They will become the spokespeople for sharing the problem and working toward solutions with their families, friends, and neighbors.

Conduct participatory research

Partner with those whose activities directly affect turtles (for example, fishermen or poachers) to assess the gravity of the problem. People will be far more willing to contribute to solutions once they understand the



problem's severity and their role in it. Understand who is having the most impact, as well as why, when, and how. As you consider solutions, identify people's incentives. Solutions need to work not just for turtles but also for people and their community. Figure out with your network how to align those incentives. Examine deeply the implications of potential solutions, in ecological, economic, social, and political terms. Engage as broad a group of citizens as possible to create and test a range of complementary and resilient solutions.

Communicate the problem and its solutions

Apply the principles and practices of social marketing to design and continually refine a suite of outreach and communication initiatives.

Identify locally resonant media, and use them creatively. Draw on your network. The pride campaign methodology used by the non-profit group, Rare, is an excellent example of how to inspire whole communities to conserve turtles and other resources.

Engage government and institutions

Identify which agencies and individuals are officially responsible at local, state, and national levels. Learn how to engage them from the outset, and build alliances so that they can contribute to solutions. Eventually you will look to government or other institutions to reinforce the solutions developed by your local partners. It is always best if your local partners take up the cause for their turtles with their governments. ■

A large crowd looks on as rehabilitated loggerhead turtles are released on Isle of Palms, SC, U.S.A. © TOMMY TEASLEY / SOUTH CAROLINA AQUARIUM SEA TURTLE RESCUE PROGRAM



CONNECTING THE DOTS FOR
turtle



conservation

By BRYAN WALLACE

When you look at a typical global map of nesting sites for any sea turtle species—such as the maps in previous *SWOT Reports*—what you see is a lot of dots. But beneath each of those dots lies much more than meets the eye. Before a dot can be plotted at all, researchers first toil long days and nights on the beach, recording nests or nesting females and then contribute their hard-won data to *SWOT*'s database, allowing spatial analysts to collate similar nesting data from around the world into a standardized global map of nesting distribution. The result is the sea turtle version of that famous snapshot of planet Earth from outer space—beautiful and engaging, particularly because of the details you know are there but cannot see from such a distance.

As beautiful and engaging as these nesting beach maps are, they are also incomplete. The latitude and longitude of sea turtle nests can be recorded and mapped for all to see and explore. But those individual dots are just the tip of the iceberg in terms of what we need to really understand turtle biology and to undertake turtle conservation. Turtles move around a lot, as it turns out. Adult males don't migrate between feeding and breeding areas in the same way that adult females do. Juvenile turtles don't (yet) care about nesting beaches. Turtles that have originated from genetically distinct rookeries often share feeding and nursery areas. Even newly hatched turtles leave those discrete map dots and venture into the great blue open ocean, guided by cues we are only beginning to understand.

All of these aspects of turtle life history mean that, while dealing with threats to turtles on nesting beaches might appear to be adequate, beach successes alone are not enough since the majority of threats to sea turtles are at sea. Plotting beach dots on a map is easy, but the crucial task is to figure out how we can connect the beach dots to the at-sea dots representing foraging, breeding, and migration to form a cohesive picture of turtle biogeography that matches the scales at which sea turtles operate—from sites to regions and back again. To gain this much-needed multiscale perspective, we need multiscale collaboration among different people and organizations and across local, state, and international borders.

Collaboration across boundaries is not a new concept in the sea turtle conservation community. A number of treaties and other multilateral agreements explicitly encourage member countries to collaborate in setting priorities, training personnel, collecting and reporting data, involving the public, and so on. Two examples of

such multi-lateral agreements are the Indian Ocean–South-East Asian Marine Turtle Memorandum of Understanding (IOSEA) and the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC). Both IOSEA and IAC provide a forum for representatives of member governments to develop strategies and share information about sea turtle conservation and monitoring in their regions.

In addition to intergovernmental entities, many hands-on initiatives to address the need for regional integration of monitoring and conservation efforts have been operating for decades. For example, the Wider Caribbean Region is home to six of the world's seven sea turtle species, but it also comprises almost 50 nations and territories, a handful of official languages (and dozens of dialects), and a rich human cultural history with roots in several other parts of the world. From a sea turtle monitoring perspective, the region could represent lots of data dots but not many connections.

Enter the Wider Caribbean Sea Turtle Conservation Network, better known as WIDECAST. Founded more than 30 years ago and led for most of that time by Karen Eckert, WIDECAST is “an expert network of biologists, managers, community leaders and educators ... committed to an integrated, regional capacity that ensures the recovery and sustainable management of depleted sea turtle populations.” Put another way, WIDECAST provides the common language—and venue—for people from all corners of the Caribbean to work together to study and protect sea turtles and to share experiences, ideas, and information.

WIDECAST country coordinators meet annually, and have woven an enduring fabric of friendships and collaboration that have produced numerous resources to aid managers, researchers, and the public in efforts to raise awareness and implement best practices in sea

AT LEFT: Researchers measure a green turtle at Atol das Rocas, Brazil.
© PROJETO TAMAR IMAGE BANK

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turtle conservation. These efforts include manuals for nesting beach monitoring, egg hatcheries, turtle tagging, mitigating influences of artificial lighting and coastal development, sea turtle injury response and husbandry, and responsible ecotourism. Dozens of locally run research and monitoring efforts have been started, each with mentoring from the network's more experienced project leaders and each with access to a unique treasure trove of resources designed specifically for the Caribbean context.

These collective monitoring and information sharing efforts culminated recently in WIDECASST's *Atlas of Sea Turtle Nesting Habitat for the Wider Caribbean Region*, a region-wide summary of more than 1,300 known sea turtle nesting sites, including legal status, threats, and management actions. It provides a thorough perspective of sea turtle distribution and conservation status from site to regional scale and is a model for other groups around the world.

Fortunately, WIDECASST is not working alone. Countless international networks, organizations, meetings, movements, and research initiatives around the world have a common goal of scaling up sea turtle research and conservation efforts to achieve broader impacts. In the Southwest Indian Ocean, researchers pooled seasonal data on green turtle nesting that had been collected at sites scattered across thousands of kilometers to create a cohesive, regionwide view of how nesting varies with environmental conditions. In their study, published in the scientific journal *PLoS ONE*, Mayeul Dalleau and his colleagues showed that nesting seasons were in sync in the northern part of the region but were different from eastern and southern rookeries and that variations in feeding areas used by different rookeries could be the reason for the differences. On the other side of the globe, colleagues from Argentina, Brazil, and Uruguay have also rallied around the turtle populations that inhabit their nations' shared waters. Putting aside their intense *fútbol* rivalries, sea turtle specialists from the three countries formed a vibrant community called ASO (after the Spanish term for Southwest Atlantic Ocean), which organizes regular symposia, undertakes collaborative research efforts, and supports regionwide conservation initiatives.

With so many initiatives focused at site and regional scales, a global perspective is extremely useful for assessing sea turtle status and establishing global priorities to guide activities around the world. The Marine Turtle Specialist Group (MTSG)—part of the Species Survival Commission of the International Union for Conservation of Nature (IUCN)—has filled this very important niche for sea turtle scientists, managers, and policymakers since 1966. By leveraging the collective

expertise of its hundreds of experts from all over the world, the MTSG has gone beyond its primary mandate of performing Red List assessments. Recently, it redefined how sea turtle populations are described and assessed, and created the first global portfolio of conservation and research priorities for all sea turtle species and populations. This work is influencing how limited resources are being allocated to prevent extinctions and to ensure the recovery of sea turtle populations around the world.

So what is to be done once all of this information is gathered by so many different groups, operating at different geographical scales? How can information gathered from all corners of the globe best be organized and presented? In an encouraging trend, answers increasingly can be found in freely available online tools that make collaborative research and communication easier than ever. SWOT is one example, through its data management partnership with Duke University's Ocean Biogeographic Information System—Spatial Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP) project. Another excellent example of this is Seaturtle.org. If you are active in sea turtle research or conservation, it's likely that you have used one of Seaturtle.org's tools, resources, databases, or server space in the past few days or even hours. It hosts online discussion lists and forums for working groups, an online bibliography of sea turtle-themed publications, and an online nesting data management tool. It also offers valuable services such as an international directory of sea turtle researchers and conservationists and a jobs board.

But perhaps Seaturtle.org's most popular technical service is the Satellite Tracking and Analysis Tool (STAT). Although satellite telemetry is widely used to figure out where sea turtles go when they're not in plain sight, the task of sifting through nearly unintelligible data relayed from satellite tags can be cumbersome, to say the least. This is where STAT comes in: researchers can open a free STAT account, enter their tag's ID information, set a few filters based on the details of their study, and STAT does the rest.

More than 1,000 projects—not all of them tracking turtles, by the way—have used STAT's user-friendly interface to set up tracking studies, process data, and even obtain publication-quality maps (using yet another Seaturtle.org product called Maptool). And because so many users rely on STAT, it has created a *de facto* community of researchers whose collective data represent a treasure trove of information about important turtle areas around the world. For example, a recent study, led by Becky Scott from the University of Exeter (U.K.) and published in *Global Ecology and Biogeography*, analyzed satellite tracking data from several projects around the world that had used STAT to process raw satellite data. Scott and her colleagues analyzed green turtle movements and habitat use in relation to marine protected areas (MPAs) and found that more than a third of all turtles were tracked within MPA boundaries, highlighting the importance of well-established and well-maintained protected areas. Without the common platform offered by Seaturtle.org, these kinds of meta-analyses, which combine data from otherwise unrelated projects and people, would be nearly impossible.

Integrating information from different places and across spatial scales is one thing, but what about integrating information from different projects that use different methods, perhaps even on the same turtle population? SWOT ran headlong into this problem when we started collecting and mapping global nesting data, because we found



A student looks on as a green turtle fitted with a satellite tracking device returns to the sea on Glorieuses Island in the French Îles Éparses. The turtle was tracked as part of a study to identify foraging areas and monitor postnesting movements. © JÉRÔME BOURJEA

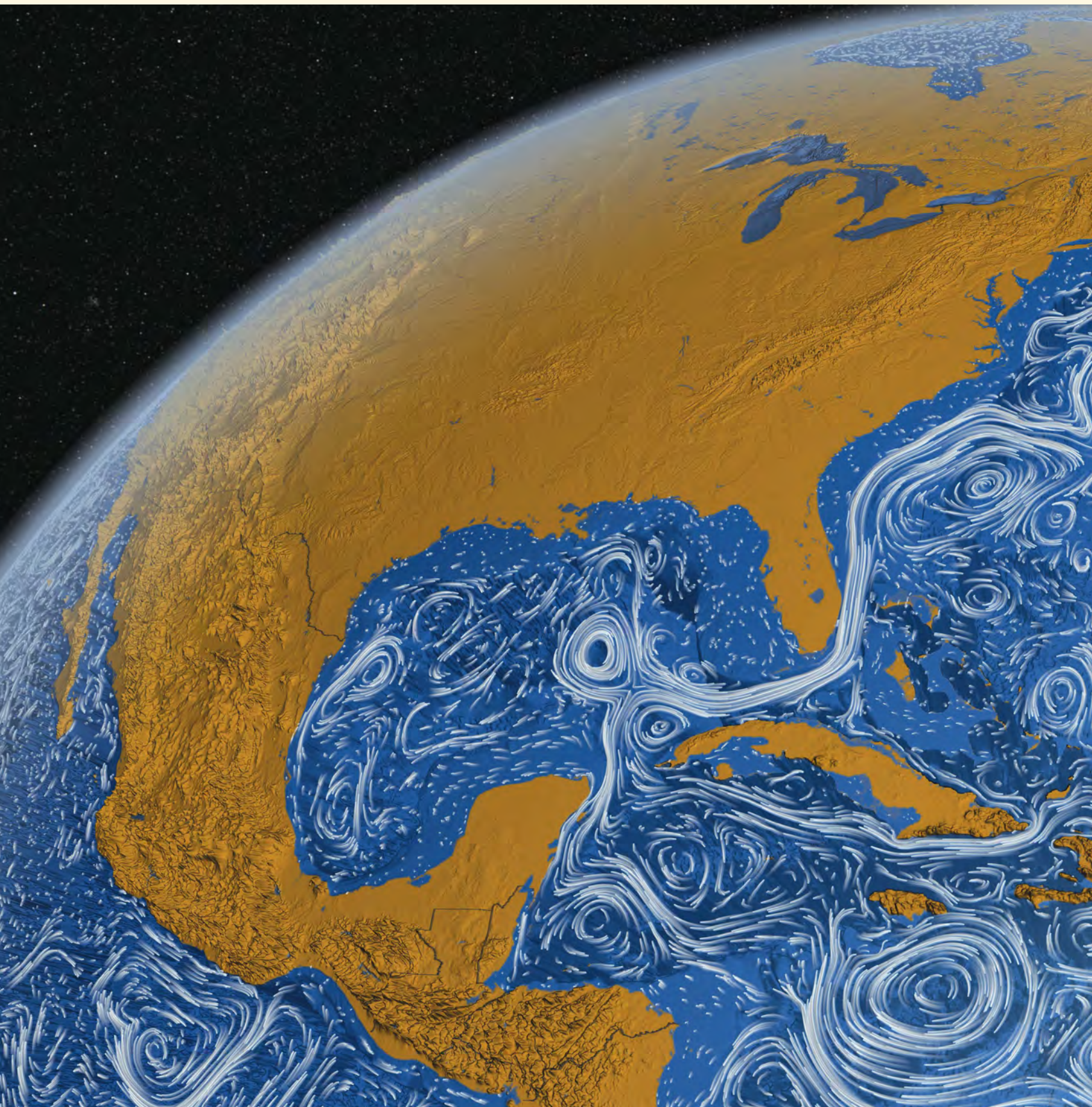
out quickly that no two nesting beaches, monitoring protocols, or turtle nesting populations are identical. To display and analyze nesting data collected using disparate methods, we assembled a group of sea turtle monitoring experts who came up with the first globally applicable data standards for nesting beach monitoring (see *SWOT Report, Vol. 6, 47*). So now, no matter where a beach is or what species is nesting there, we have a way to standardize and compare the data generated by different monitoring techniques. And thanks to our global SWOT Team of data providers, the SWOT database now contains and displays data from more than 3,000 distinct nesting sites across all sea turtle species, all of which have been classified according

to our minimum data standards. And we are not stopping there (see the SWOT Team updates, 34)!

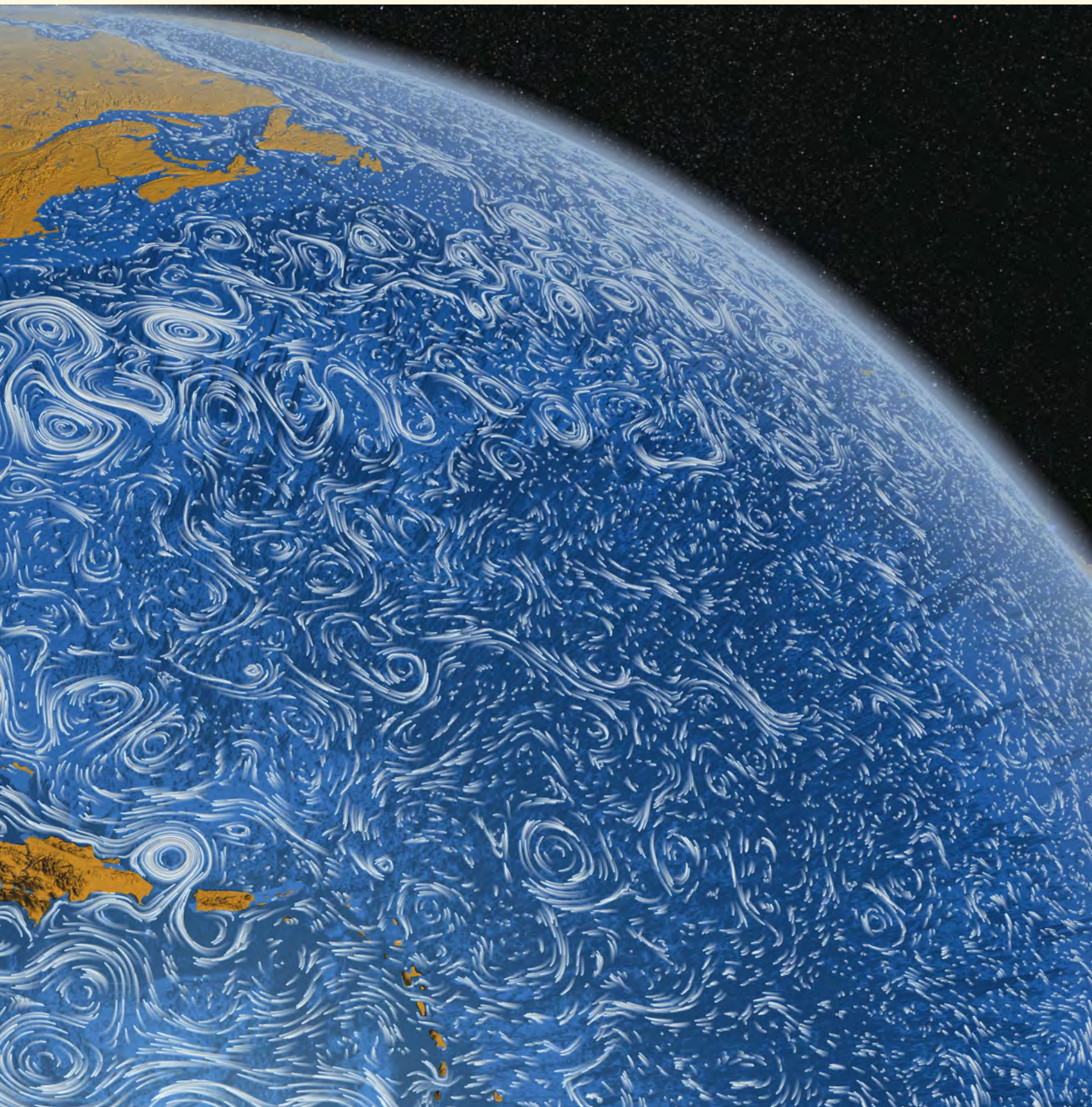
So the next time you look at a map of sea turtle nesting sites or turtle tracks zig-zagging across an ocean basin, remember that although each dot or line stands for a project, an organization, and at least part of a turtle population, it does not stand alone. Scores of people, organizations, research projects, online tools, intergovernmental treaties, and many others are working diligently and creatively to connect those dots. And as they do, our picture of sea turtle life histories that span borders, beaches, and ocean ecosystems will come into better focus, along with our plans on how to safeguard them. ■

OCEAN CIRCULATION MODELS ARE SOLVING MYSTERIES OF SEA TURTLE LIFE HISTORY

By NATHAN F. PUTMAN, F. ALBERTO ABREU-GROBOIS, and EMILY M. PUTMAN



Despite being big, charismatic animals that cross oceans and nest on beaches around the globe, sea turtles remain mysterious in many ways. We have come a long way in solving those mysteries, but we have yet to figure out some essential aspects of sea turtle biology. When we consider that sea turtle life histories play out over entire oceans and span decades, it's no wonder that direct observations of survival rates, growth rates, age at maturity, and other critical data from turtles in the wild are hard to come by. These obstacles of scale and accessibility have hindered our ability to obtain information on sea turtle distributions in oceanic habitats and to detect underlying drivers of population trends observed at nesting beaches.



Overcoming these obstacles is vitally important because, on a fundamental level, successful conservation and management of sea turtle populations require an in-depth understanding of factors that influence population dynamics. Whether a population grows or declines is based on survival rates, reproductive output, and the number of individuals joining and departing the population being studied. And these demographic parameters are all based, to some extent, on the movement of individual animals. If a just-hatched baby turtle can escape nearshore waters where predators are most abundant, it is more likely to survive its first few days of life. Whether a turtle finds high-quality feeding areas will influence growth rates, time to maturity, and reproductive success. An adult turtle will contribute to its natal population if it can navigate back to its home beach. In all of these scenarios, turtle movements—and a variety of factors that influence them—are key to understanding these vital population parameters.

Advances in computing power, simulation modeling software, remotely sensed data for ocean currents, sea surface temperatures, and other conditions, and new data on sea turtle biology are giving rise to a new generation of problem-solving tools for sea turtle research and conservation.

It's one thing to know what factors are important; it's another to be able to measure them. Collecting biological data on sea turtles has historically meant investing in substantial people power for patrolling nesting beaches and in-water habitats to take measurements on live turtles in real time. These data are incredibly valuable, but we haven't collected enough to fully answer all of the questions raised above. But what if we could speed up turtle time scales, zoom out on ocean basins, and watch how turtles move around oceans? Using such data, maybe we could assess where turtles are, how they get there, and when and why they are there, and thereby shed some light on their secret lives.

We now have available some technologically clever ways to do just that. By turning to computer models to put all those hard-won biological data to use in reconstructing—really, reimagining—turtles' lives, we are beginning to get a new perspective on how turtles live and how turtle populations work. Advances in computing power; simulation modeling software; remotely sensed data for ocean currents, sea surface temperatures, and other conditions; and new data on sea turtle biology are giving rise to a new generation of problem-solving tools for sea turtle research and conservation.

Of course, these models are only as good as the information and assumptions used to build them. Fortunately, a lot of the biological information needed to build basic models has been collected during the past several decades of laboratory, field, and tracking studies. This information is fed into realistic environmental models that take into account variations in environmental conditions that influence turtles' survival and growth. And because the movement of a turtle at sea is a combination of its own swimming behavior and the ocean currents it encounters, information on ocean conditions is important. To this end, rapid progress has also been made in modeling the complexity of physical processes in the ocean and the space and time scales over which they are quantified. Sophisticated ocean circulation models can incorporate measurements from satellites and from the oceans themselves to accurately characterize ocean current patterns around the globe. The output of these models, called current velocity fields, can be paired with particle-tracking software that computes the trajectories of virtual particles drifting through the ocean environment. Thousands of particles can be released from specific locations, under a specific set of conditions, and their subsequent locations can be recorded through time (see figure 1). If you replace the word "particles" with "turtles," you can begin to imagine how these models can help us solve previously intractable problems of understanding how turtles move over vast areas and over several years.

The simplest use of such techniques considers only the particle movements attributable to ocean currents, but this approach can still address questions that are impractical to study with field- or laboratory-based observations. Recent studies that modeled the passive drift of "turtle particles" across the nesting ranges of Kemp's ridley, Japanese loggerhead, U.S. loggerhead, and eastern Pacific leatherback populations show that the highest nest densities for each population occur at sites with nearby currents that are capable of whisking away hatchling turtles from dangerous nearshore areas full of predators to safer offshore waters full of food and hiding places. These results give a better understanding of the evolution of natal homing by adult females and help explain why nesting abundance varies among nesting sites: females are likely to nest in greatest numbers at beaches that produced the most surviving hatchlings, and these beaches, in turn, are likely to be close to currents that carry hatchlings offshore quickly.

Modeling that uses simulated turtles in ocean currents has also helped answer numerous, more complex questions about how turtle movement patterns can influence life history traits. Among the topics that have recently been explored by combining observed behaviors and computer modeling are: (1) whether the population structure of Caribbean hawksbill foraging grounds reflects ocean current patterns; (2) whether the foraging grounds of adult Pacific leatherbacks and Mediterranean loggerheads can be predicted by modeled dispersal patterns of hatchlings; (3) whether transit times of loggerheads between Florida nesting beaches and the waters around the United Kingdom and the Azores can be predicted; and, (4) whether the transatlantic dispersal in juvenile green turtles from Guinea Bissau is likely.

Most studies have focused on young sea turtles and assumed that their movements would be well represented with information about ocean currents, because little turtles are presumed to have limited swimming abilities. This assumption can still lead to informative predictions even for larger turtles with stronger swimming abilities, such as adult leatherbacks. For example, by subtracting the speed and



Hatchling loggerhead turtles take refuge in Sargassum weed near Juno Beach, FL, U.S.A. After swimming out to sea, hatchling turtles may spend years swimming actively in and passively drifting with ocean currents. © MASA USHIODA / COOLWATERPHOTO.COM PREVIOUS SPREAD: The swirling glows of tens of thousands of ocean surface currents are shown in this scientific visualization created at NASA's Goddard Space Flight Center. Researchers are using computer models of ocean currents to predict the movements of hatchling turtles during their "lost years" at sea. © NASA / SVS

direction of currents from the paths of satellite-tracked sea turtles and then comparing the current-corrected tracks with those of passively drifting particles released along the animal's track, researchers can figure out how much influence currents have on observed turtle migration patterns. These types of results provide valuable insights into the physical cost of migration in relation to ocean currents, and thus its potential influence on reproductive output.

Recently, sea turtle researchers have also begun to incorporate additional biological information into particle-tracking simulations, including swimming behavior that could be random, fixed-directional, or a response to specific environmental cues; metabolic rates in response to temperature; growth rates related to age; and mortality based on temperature and nearshore predation. These studies have demonstrated that accounting for key biological factors can have a dramatic influence on predicted trajectories and their ecological consequences for sea turtles.

For instance, using information obtained from laboratory studies on magnetic orientation in hatchling loggerheads from Florida (U.S.A.), researchers programmed particles to swim in the same direction as lab-tested turtles when they encountered the oceanic regions where the magnetic fields existed. Though speeds at which particles swam might have seemed too slow to make a difference (about two kilometers per day), these swimming particles were nearly 190 percent

more likely to reach foraging grounds near the Azores than were passively drifting or randomly swimming particles within the same five-year period. These findings show that even little turtles are able to navigate and actively swim toward their targets, despite being in a big ocean with strong currents pushing them around.

Although characterizing the open sea navigation of young sea turtles is important, nearshore swimming also has long-lasting effects on their distribution. In simulations of newly hatched flatbacks, which remain in nearshore waters their entire lives, particles remained in favorable reef habitat by swimming into waves and then in the direction of the current, whereas particles that drifted passively tended to disperse over less favorable areas. Other recent analyses that incorporated mortality from cold temperatures and predation over the continental shelf suggested that even minimal swimming by hatchling turtles could have substantial benefits. A recent study showed that about 10 percent of virtual loggerheads released near southeast Florida survived their first two years of life when they drifted passively, whereas survival increased to about 30 percent when the virtual turtles were programmed to swim offshore over the course of a week.

Such wide discrepancies between predictions based on passive drift and oriented swimming show that despite their diminutive stature, young turtles can, to some extent, control their own destinies. More data on sea turtle orientation and navigation behavior would

help to improve models of turtle movements and generate a better understanding of their implications for demographic and population dynamics.

So far, models have focused primarily on testing hypotheses specific to a single life stage, but the techniques exist for studying multiple stages and large-scale, long-term ecological processes in sea turtles. Such models can explicitly track individuals that are not amenable to other kinds of tracking, such as when turtles are too small to carry satellite transmitters or when lack of genetic resolution prohibits assigning a beach of origin for turtles caught at sea. Variability in oceanic conditions across years, which significantly affects demographic and dispersal processes, can be readily incorporated in such approaches. Likewise, models can assess effects of ecological disturbances caused by human activities, such as oil spills and fisheries. In essence, these techniques allow researchers to investigate big questions that might be logistically or financially impossible to test using conventional methods.

Of course, these modeling techniques also have limitations. All models depend on the quality and accuracy of the information that goes into them (“garbage in, garbage out,” as the well-known saying goes). Using daily or hourly recordings of current velocity fields can capture the effects of fine-scale weather events (think of tropical cyclones) that average monthly velocity fields cannot. Likewise, a model set up to work at scales of kilometers will be able to depict fine-scale features associated with ocean currents, such as fronts and eddies, whereas coarser model scales (10 to 100 kilometers) will be unable to characterize these features. Better data on nearshore and inshore currents in sea turtle-rich regions are necessary to improve the accuracy of hatchling transport models, especially for populations that exhibit life histories that are closely associated with coastal habitats, such as those of the eastern Pacific hawksbill. An obvious consequence of these limitations is that results—and how they should be interpreted—will vary greatly depending on the scale and quality of available data used to build models.

... as these collaborative efforts between modelers, field biologists, and lab-based researchers progress, they will make the lives of sea turtles a little less mysterious.

As physical models of the ocean continue to improve along with our ability to program turtle behavior, the types of questions that they can meaningfully address will greatly expand. Models will become increasingly useful in providing insights about sea turtle demography, predictions about how turtle populations respond to their dynamic environment, and about juvenile dispersal routes and adult migratory routes that link nesting beaches with oceanic and nearshore foraging areas. In the future, these models could potentially be used to predict interactions between turtles and fishing gear or other anthropogenic influences, to highlight ocean areas of high conservation priority, and to evaluate the effectiveness of management strategies.

But in the end, the extent to which such models can be applied to sea turtle conservation depends on researchers’ continuing to get their hands wet collecting biological data for model inputs and validation of model predictions. And as these collaborative efforts between modelers, field biologists, and lab-based researchers progress, they will make the lives of sea turtles a little less mysterious. ■

AT RIGHT: A juvenile loggerhead wearing a satellite transmitter swims near Praia do Forte, Brazil. Newer, smaller satellite transmitters like this one are making it possible to study the movements of juvenile turtles, and these novel data will improve models of turtle distributions at sea. © PROJETO TAMAR IMAGE BANK

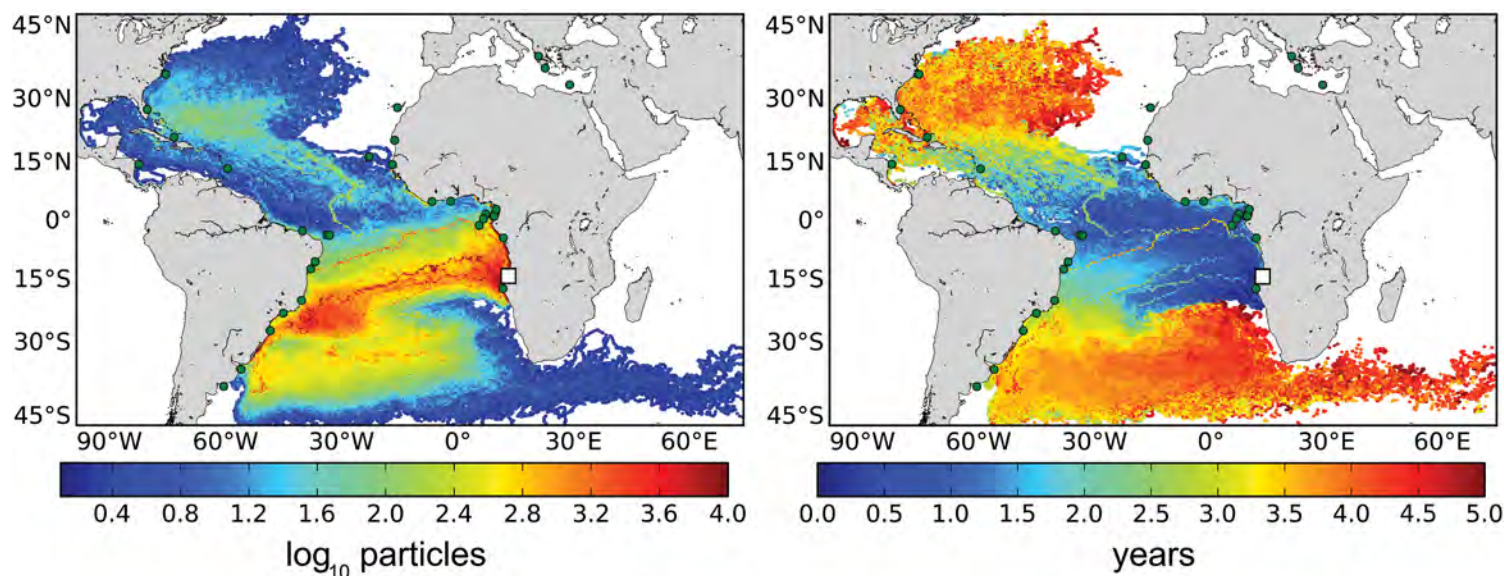


FIGURE 1. Dispersal of virtual particles released offshore of green sea turtle nesting beaches in Angola within the Global Hybrid Coordinate Ocean Model. The white square shows particle release location; green circles indicate known foraging grounds of juvenile green turtles in the Atlantic basin. The left-hand panel shows particle abundance throughout three five-year simulations (note log₁₀ scale, 1 = 10, 2 = 100, etc.). The right-hand panel shows the mean age of particles at each location. The figure shows that more simulated hatchlings leaving Angola are expected to disperse west-southwest toward Brazil initially (left panel), before spreading into more northern and southern latitudes after three to five years at sea (right panel). Such simulations are useful for providing insights into data-limited populations by highlighting likely movement corridors for young sea turtles dispersing from their natal beach to foraging grounds.



Finding the Resources

CONFRONTING THE FUNDRAISING CHALLENGE

By DAVID GODFREY, NECA MARCOVALDI,
GUY MARCOVALDI, AMANDA GIBSON, MORRISON MAST,
and WALLACE J. NICHOLS

Money alone does not make conservation happen, but it is a necessary ingredient, and acquiring it can be one of our greatest challenges as conservationists. Among government agencies, nonprofit organizations, corporations, and individuals seeking to affect conservation practices, the most often cited obstacle to those efforts is the lack of resources. This obstacle can mean a shortage of labor, expertise, or even political will, but these all bring us back to money. People must be paid, and volunteers need to eat and be housed; expertise requires training and practice; and lobbyists cannot affect political will without financial fuel. Community organizations and nonprofit groups on the front lines of conservation must spend a significant portion of their time focused on fundraising.

A volunteer with Sea Turtle Conservancy measures a nesting green turtle at Tortuguero National Park in Costa Rica. Volunteer programs can provide an important and free source of labor, as well as funding to cover some project costs. © NEIL EVER OSBORNE





Of the many techniques used by nonprofit groups to support their work, preparing proposals for grant funding is an important and reliable way to raise money. Yet other types of fundraising ideas are evolving faster than bacteria in this era of personal engagement, online payment, and 24/7 Internet access. Following the description of grant funding are several fundraising initiatives of the Sea Turtle Conservancy (STC, formerly Caribbean Conservation Corporation); Projeto TAMAR, a leader in conserving Brazil's sea turtles for 30 years; and others. They are presented as a source of inspiration and guidance to others seeking to finance their conservation work.

Grant funding applications

In the United States alone, thousands of registered private foundations award grant funding for nearly every type of cause imaginable. Therefore, everyone working in the field of sea turtle research and conservation should have a basic understanding of how to prepare and submit grant proposals to private foundations. Numerous reliable sources of information are available for researching foundations, and many also provide training and other resources to help teach people the art of grant writing. Many organizations provide their resources and databases for free, and others charge modest subscription fees. Some of the best ones to check out include GrantStation.com, Foundation-Center.org, and FoundationSearch.com. Dozens of federal, state, and local government sources are available as well, along with multilateral organizations such as the World Bank, United Nations, and Asian and African Development banks, to name a few.

Sea turtle specialty license plates

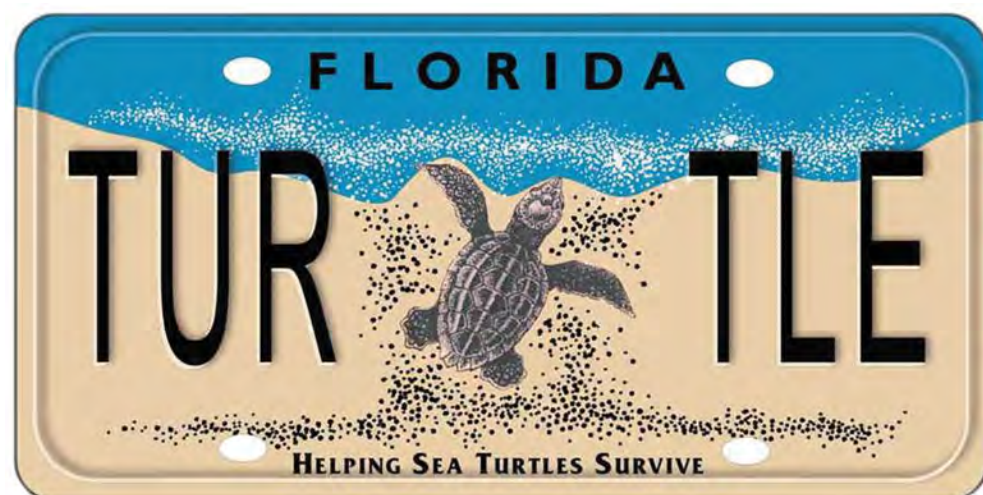
Many U.S. states issue specialty license plates that can be purchased voluntarily by vehicle owners for an additional fee. The revenue generated by sales of these plates is typically earmarked for specific charitable purposes or for support of different kinds of state programs. In 1995, STC led a successful campaign to establish Florida's sea turtle specialty license plate. Since its release, the sea turtle plate has become the second-highest-selling specialty tag in Florida and now generates over \$1.5 million annually. Seventy percent of Florida's turtle tag revenue is earmarked for the state's Marine Turtle Protection Program, which carries out regulatory, research, and enforcement

functions within the Florida Wildlife Conservation Commission. The remaining 30 percent of revenue is disbursed to STC for distribution through the Sea Turtle Grants Program, which provides competitive grants supporting sea turtle research, conservation, and education projects benefiting sea turtles that nest on Florida's beaches. In the years since Florida established the sea turtle plate, several other states, including both of the Carolinas and Georgia, have issued sea turtle tags that now generate revenue supporting conservation. Specialty license plates could be an untapped opportunity for fundraising in other countries also.

Paying volunteer programs

STC's long-term green turtle monitoring program at Tortuguero, Costa Rica, was one of the first biological research projects anywhere to begin raising funds by inviting paying eco-volunteers to assist with the program. Today, dozens of sea turtle groups around the world advertise paid, hands-on volunteer programs as a method of securing additional funds for their work. These programs have the benefit of raising money while also attracting eager volunteers to assist with project work. In the process, such programs typically help cultivate lifelong sea turtle advocates and supporters. In the case of STC, several of the organization's largest individual donors and many of its recent board members were first introduced to the group through the Tortuguero Research Participant Program.

Volunteer programs require a large commitment of staff time to manage, promote, and oversee operations, and there is a certain amount of liability associated with including laypersons in your research, but if your group has adequate staffing and facilities to organize a paid volunteer program, this can be an important source of revenue. However, it is critical to ensure that the process of including volunteers and meeting their expectations does not interfere with the main purpose of a research project. Volunteers must be fully informed about the physical challenges of any work they will be doing, and they should understand and be prepared for the kinds of facilities and meals that will be provided, especially when accommodations are very rustic. Finally, all volunteers should be required to acknowledge, in writing, that they understand all risks associated with the volunteer program and release the sponsoring organization from all liability.



Sales of sea turtle specialty license plates, such as this one from Florida, U.S.A., are one creative way to generate funding for conservation programs.



Spectators and corporate sponsors gather at the starting line of Sea Turtle Conservancy's Tour de Turtles. The campaign recruited corporate turtle sponsors to fund satellite tracking research and to generate public awareness for conservation. © SEA TURTLE CONSERVANCY

Any group wishing to start a volunteer program should get advice from other groups that are already providing such programs.

Special events

Groups can organize an endless variety of special events as a way to raise money. Examples include holding parties or benefit concerts to which people buy tickets. It is also common at such events to hold either a silent or live auction of donated merchandise. The key to making a profit with such events is to get as many of the costs donated as possible, including the labor needed to put on the actual event. For example, it is often possible to find a free venue; musicians will sometimes perform for free; local businesses will donate items used in charitable auctions; local radio or television stations will provide free public service announcements about an event; and even caterers and beverage providers will sometimes donate food or offer greatly reduced rates. The more money you can save at the outset, the more you can earn at the end. Other types of successful fundraising events include charitable fun runs, golf tournaments, or black-tie dinners or galas. One thing to remember about special events is that they can be incredibly labor intensive, and they often do not make money in the first year. When an event is hosted annually, participation can grow and sponsorship can increase as an event matures over time. Another approach is to consider attaching your organization to an existing event or concert to help boost attendance, thus raising funds without the logistical responsibilities.

Adopt-an-animal and animal sponsorships

Private donors often like to have a personal connection to their charitable giving, and “adopt-an-animal” campaigns are an effective

way to deliver this needed connection. STC, Seaturtle.org, Defenders of Wildlife, World Wildlife Fund, Sea Turtle Hospital, and many other groups in the United States and abroad have ongoing adopt-a-turtle programs. The oldest nonprofit group dedicated to ocean conservation, Oceanic Society, has run adoption programs for whales, dolphins, turtles, and even atolls for decades. These campaigns, originally done by mail, are perfect for online donors, because the Internet provides a low-cost way to keep donors directly engaged through stories and updates about their adopted animals.

An interesting spin on the adoption technique is that of obtaining corporate sponsorships for individual animals, such as that undertaken in the Great Turtle Race, an effort spearheaded by a consortium of nonprofit, university, and corporate partners in the late 2000s. These online entertainment and outreach campaigns used actual leatherback satellite tracking data to create two-week-long online transoceanic races between turtles sponsored by companies (e.g., Yahoo), schools (e.g., Drexel University), and rock bands (e.g., Pearl Jam). The turtles were given names like Backspacer, Stephanie Colburtle, and Purple Lightning and were even assigned Olympic swimmer coaches. The races served as the backdrop for blogs, news stories, and press conferences and advertising campaigns designed to engage viewers, demonstrate corporate commitment to conservation, educate the public about sea turtle and ocean conservation, and of course raise money. Variations on the Great Turtle Race are still active today, including the Great Canadian Turtle Race (Canadian Sea Turtle Network) and STC's Tour de Turtles.

Corporate partnerships

Corporate partnerships can be among the easiest and the toughest ways to raise money in support of sea turtle conservation. The only

truly easy case is when a corporation decides on its own to do something for sea turtles and contacts your group or institution to offer financial support. However, accepting such support must be weighed carefully after considering whether the partnership poses any potential risks by association. For example, a charitable cancer group in the United States was criticized harshly for setting up a partnership with a fast-food chain that produces fatty fried foods that have been linked to various health problems. Before accepting corporate support, an organization should consider the nature of the business and whether there is any aspect of the relationship that the group either cannot or chooses not to have to defend against outside criticism.

If implemented correctly, corporate partnerships can be very important sources of funding for sea turtle research and conservation. For example, STC recently formed a partnership with a spirits manufacturer that had launched a Caribbean-made, turtle-themed rum (Naked Turtle Rum). This partnership is expected to generate recurring revenue for years to come. Endangered Species Chocolates dedicates a full 10 percent of profits to conservation groups, including SEEturtles.org. The new Billion Baby Turtles campaign launched by SEEturtles.org is raising funds for community-based sea turtle protection projects around the world by partnering with small businesses that agree to build the cost of protecting a hatchling into their sales. CauseBars.com soap is an example of a sustainable organic product whose sales generate cash for conservation. Other turtle groups have formed partnerships with companies such as The Body Shop and Ocean Spray Juices. A wide variety of companies might be inclined to support sea turtle conservation. The challenge is finding the right person to whom you can present your idea and convincing them that the partnership can be mutually beneficial.

A local community craft group creates handmade t-shirts that will be sold in stores run by Projeto TAMAR. TAMAR's innovative retail program supports community employment and funds conservation programs in coastal communities throughout northern Brazil. © PROJETO TAMAR IMAGE BANK



Crowd-funding

Crowd-sourced fundraising, or crowd-funding, is catching on not only as a way to raise money for conservation projects, but also as a way to achieve outreach and education goals. Most people use online crowd-funding as a way to find small amounts of financial support for individual, one-off efforts, such as paying for satellite transmitters, making a documentary film, or sourcing specific small projects; however, the awareness generated through this type of public engagement potentially can yield valuable long-term commitments well beyond the value of the dollars raised. Websites specializing in this type of crowd-sourced fundraising have sprung up in recent years, the most popular being Kickstarter.com (geared toward creative projects) and Indiegogo.com (designed for independent artists and nonprofit organizations). For instance, the *Return of the Black Turtle* photo documentary project recently used crowd-sourced funding through Emphas.is to cover an emerging sea turtle conservation success story in the eastern Pacific. The funds allowed photographer Neil Osborne to travel to key locations and events related to black turtle conservation.

Social entrepreneurs Amanda Gibson and Morrison Mast recently launched a campaign at Indiegogo.com designed to support sea turtle conservation through the establishment of a SWOT minimum data standards project in the small Panamanian village of Armila, site of a large leatherback nesting population. As one of the most traditional Guna Indian villages in the country, Armila still forbids the exploitation of this potential source of protein, but heavy Western influences are taking their toll on the culture and on the Guna's harmonious relationship with leatherbacks. The pair of entrepreneurs collaborated with SWOT, Ocean Revolution, and a local folkloric music group, *Gammibe Gun Galu*, to record, produce, design, print, and distribute the first-ever album of Guna music. The funds generated by online sales will help jump-start some of Armila's conservation and sustainable development efforts. Moreover, it is hoped that the global sharing of Guna music will contribute to both local pride and ongoing interest in and support for Guna culture, which has a special reverence for nature, especially sea turtles. Mechanisms have been built into the campaign to ensure long-term sustainability of project funding.

One-off campaigns are common, but microphilanthropy and crowd-funding also can be used to recruit recurring donors who provide long-term monthly contributions to a project. One example is 100BlueAngels.org, established by Wallace J. Nichols as a source of support to pay the recurring costs of his work to conserve sea turtles and to make the oceans healthier and safer by collaborating with coastal communities and grassroots organizations around the world. This revenue allows him to remain an independent scientist, advocate, and



A member of the Campillo family musical group coaches the next generation in playing the kammu purwi, a Guna instrument fashioned from reeds. By producing and selling online the first album of Guna folkloric music, social entrepreneurs raised funds for sea turtle conservation while helping preserve the musical traditions of Panama's Guna Indians. © MORRISON B. MAST

communicator in a time when new ideas and the freedom to express them are sorely needed.

Crowd-funding isn't necessarily a stand-alone, long-term solution to fulfilling large budget needs, but when seen in conjunction with all other aspects of building a strong ocean conservation movement and used alongside social media, it is an approach that is here to stay.

T-shirts to the rescue

Following the prohibition of Brazil's extractive sea turtle industry, Projeto TAMAR did not leave affected communities to fend for themselves. Instead, the Brazilian conservation organization created the social production chain, in which TAMAR t-shirts and souvenirs are manufactured in coastal communities. The production chain uses local raw materials from start to finish, thus providing former turtle harvesters with jobs and alternative sources of incomes at a variety of levels. With many donor and public organizations seeking to tap into the private sector's capacity for sustainable and scalable projects, Projeto

TAMAR already has the business side figured out as well. The production chain, developed over many years, also includes tourism activities and retail sale points throughout the country. It sustains over 1,200 jobs and alleviates unsustainable pressure on Brazil's nesting sea turtles. Between 30 and 50 percent of the nonprofit organization's annual revenues are generated by the retail sale of these items in TAMAR-managed visitor centers and strategically located shops, which help to educate over 1.5 million tourists every year about sea turtle conservation.

The sum of fundraising success

Never before have the citizens of the world been more conservation-aware, more concerned about the planet, and more charitable. Although fundraising may seem like a daunting task, it can also be fun and rewarding. Success in fundraising for conservation will come from pursuing traditional values—hard work and persistence—but superlative rewards will be reaped by those demonstrating the greatest ingenuity, creativity, and tenacity. ■

SWOT TEAM UPDATE

SWOT Keeps Growing



A leatherback hatchling crawls to sea in Armila, Guna Yala, Panama. © MORRISON B. MAST

There is always more we can do to improve our work and to build toward a common vision. But sometimes we ought to raise our heads from the daily grind and cast our gaze to the past to gain perspective on the progress that has already been made toward that vision.

Looking back at SWOT's humble beginnings in 2004 when we launched our database with a year's worth of leatherback nesting data from beach projects worldwide, we can see clearly how much the SWOT database and online application have grown. From that first single-species SWOT map, which included just under 80 data records from 50 countries, the SWOT database has expanded to host almost 6,000 data records contributed by nearly 600 providers from more than 130 countries, including 3,000 distinct nesting sites globally for all sea turtle species.

But SWOT hasn't stopped at nesting sites. Our original goal was to create a database for all sea turtle species, all life stages, everywhere

on Earth. We're happy to report here that we've made significant progress toward that lofty goal, but we are also looking for ways to keep growing.

In 2011, we developed the world's first globally applicable minimum data standards for nesting beach monitoring to identify datasets that could be used in future analyses of abundance and long-term trends (see *SWOT Report, Vol. 6, 47*). Nearly all data records in the SWOT database are now coded according to the minimum data standards. That same year, we added the first georeferenced data layers of global species distributions and published genetic stocks and regional management units (RMUs, or subpopulations) to the SWOT online

application hosted by Duke University's Ocean Biogeographic Information System–Spatial Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP, <http://seamap.env.duke.edu/swot>). Users can now view and interact with sea turtle biogeography data from the scale of individual nesting sites to population boundaries to global distributions—and back again—all in the same Web browser window.

We have also worked hard to make SWOT data available—under terms of use designed to protect data providers—to researchers whose work might advance sea turtle conservation as well as our understanding of sea turtle biology. We are currently undertaking a review of the past five years of data requests for SWOT nesting data and downloads of shapefiles (such as RMUs and genetic stocks) to assess applications and products based on SWOT data. This review will allow us to identify key data gaps at site and regional levels. We also will be able to prioritize future efforts to increase reporting rates among existing data providers and to include more data providers from currently underrepresented regions.

In a fantastic example of the collective power of the SWOT database, Dr. David Pike, of James Cook University in Australia, used SWOT nesting data in a recent analysis (published in *Global Ecology and Biogeography*) to determine environmental niches and nesting habitat suitability for all sea turtle species, globally (see figure 2). In return, Dr. Pike has graciously produced data layers of nesting habitat suitability for all species; these are now available alongside the aforementioned data layers on SWOT's online application. We look forward to other creative and useful applications of SWOT data in the future.

The most exciting news is that the time has finally come for SWOT to “get wet” and expand the database to include satellite

telemetry data. The objectives of this effort will include a global meta-analysis of tracking data to identify “important turtle areas” that will inform conservation priority setting globally. It will also allow us to integrate telemetry data with other data types in SWOT's online database and thereby allow users to interact with all data types using SWOT's online application.

But this initiative will not be successful without willing data providers and key partners. In this vein, we are happy to announce that we have formalized a working agreement with Dr. Michael Coyne, executive director of Seaturtle.org, that outlines a promising and strategic partnership and features collaboration and cross-promotion to our respective users to advance the use of SWOT and Seaturtle.org tools and programs. In particular, we will be working together to encourage current and future users of the Satellite Tracking and Analysis Tool (STAT) to contribute their telemetry data to SWOT, and current and future SWOT data providers to consider using Seaturtle.org's Nest Monitoring tool to manage their nesting data.

Given the important and highly complementary roles that SWOT and Seaturtle.org play in making information from sea turtle monitoring projects accessible and useful to the broader community, this partnership will greatly benefit both organizations in the future. Stay tuned for more on these initiatives.

Although we are proud of the progress SWOT has made since 2004, the people who really deserve the credit are the SWOT Team members who voluntarily contribute their precious data to a collective effort to study and save sea turtles. Thanks to you, SWOT has become a truly global platform for presenting and analyzing sea turtle biogeography data, and SWOT's future looks very bright. ■

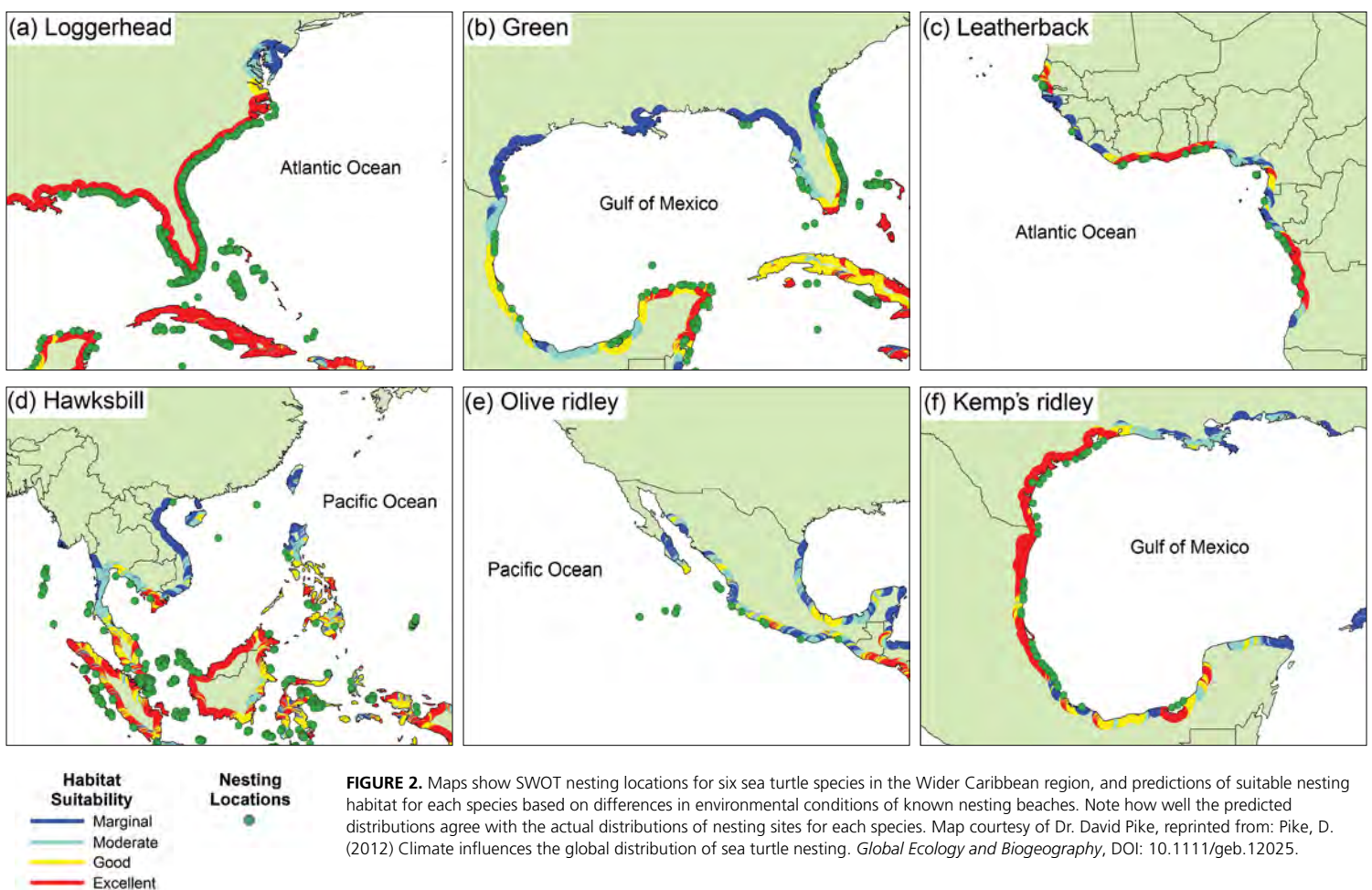


FIGURE 2. Maps show SWOT nesting locations for six sea turtle species in the Wider Caribbean region, and predictions of suitable nesting habitat for each species based on differences in environmental conditions of known nesting beaches. Note how well the predicted distributions agree with the actual distributions of nesting sites for each species. Map courtesy of Dr. David Pike, reprinted from: Pike, D. (2012) Climate influences the global distribution of sea turtle nesting. *Global Ecology and Biogeography*, DOI: 10.1111/geb.12025.

Acting Globally

SWOT Small Grants 2012

Visit www.SeaTurtleStatus.org to apply for a 2013 SWOT small grant!

Since 2006, SWOT small grants have helped field-based partners around the world realize their research and conservation goals. To date, we have given 43 grants to partners in 27 countries. SWOT grants are awarded annually to projects in each of SWOT's three areas of focus: networking and capacity building, science, and education and outreach. The following are updates from each of our six grantees in 2012.

BANGLADESH

Asian University for Women

A 2012 SWOT grant is being used to support a team of 16 students from the Asian University for Women in Chittagong, Bangladesh, to translate SWOT's "Minimum Data Standards for Nesting Beach Monitoring" into Bangla, Burmese, Khmer, Hindi, Malayalam, Sinhalese, Tamil, Urdu, and Vietnamese. Translations will be made available in electronic and printed form for use by nongovernmental organizations (NGOs), universities, and government agencies. Through these materials, the team, led by Dr. Andrea Phillott, hopes to increase regional awareness and understanding of sea turtle conservation issues and encourage the use of best practices for nesting beach monitoring throughout the Indian Ocean and Southeast Asian region.



Students of the Asian University for Women in Chittagong, Bangladesh, are translating sea turtle materials from English into several Southeast Asian languages for greater accessibility. © ANDREA PHILLOTT



Children gather for an educational presentation by project staff. © TE MANA O TE MOANA

FRENCH POLYNESIA

Te Mana o Te Moana

Te Mana o Te Moana has been working to protect sea turtles in French Polynesia since 2004, and its conservation education programs have reached over 39,000 children in the past eight years. Despite a 1990 ban on harvesting sea turtles, their research has found that fishermen in the region lack a basic understanding of the threats to sea turtles and the vulnerability of their nesting and reproductive habitats to fishing practices. Using its 2012 SWOT grant, Te Mana o Te Moana will collaborate with the La Rochelle Aquarium and the French Development Agency (AFD) to produce an educational book titled *Sea Turtles of French Polynesia*, which will cover basic sea turtle biology and ecology, field identification, threats to turtles, conservation and research actions, and sea turtles' cultural significance in French Polynesia.

COLOMBIA

Conservación Ambiente Colombia Foundation (CACF)

Located on the Caribbean coast of Colombia, CACF began as a conservation initiative run by community leaders in the village of El Lechugal, which previously poached nearly 100 percent of nesting turtles. CACF has collaborated with local government to help change the attitudes of local people by engaging them in sea turtle monitoring, environmental education, and community projects such as recycling. Using its SWOT grant, CACF plans to replicate this existing model in the neighboring community of Mulatos, which is visited by nesting hawksbills and leatherbacks. By facilitating these exchanges, CACF hopes to educate other communities in the region and to build local capacity for research and conservation.



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SÃO TOMÉ AND PRÍNCIPE

Association for the Research, Protection, and Conservation of Sea Turtles in Lusophone Countries (ATM)

Based on Príncipe Island off the coast of West Africa, ATM has identified wide data gaps and a need to establish a national strategy to conserve the country's imperiled sea turtle populations. Green, hawksbill, and leatherback turtles in São Tomé and Príncipe are subject to poaching for jewelry and meat, despite a 2009 ban on turtle products. With its 2012 SWOT grant, ATM will collaborate with a wide range of stakeholders to generate recommendations for best conservation practices at the national level. They will also establish a long-term monitoring program using SWOT minimum data standards and create a national database to inform future management decisions and conservation actions.

Turtle guard Hipólito Lima, from the organization Marapa in São Tomé, explains to fellow guards the importance of taking data correctly and having standardized protocols on both islands. © JOANA HANCOCK

MADAGASCAR

Blue Ventures

Blue Ventures' marine turtle research and conservation program has been operating in Madagascar since 2006, with research on an active, yet illegal, turtle fishery and a severely declining nesting population along the island's west coast. A 2012 SWOT grant will help Blue Ventures continue to monitor a nesting population in the remote Barren Isles. The first year of monitoring at Barren Isles revealed a small nesting population of turtles that is highly threatened by migrant fishers. Using an established team of community monitors, Blue Ventures aims to further assess the status of nesting as part of a larger program to create a locally managed marine area for the protection and sustainable management of the Barren Isles ecosystem.



A community nest monitoring team member inspects a sea turtle track in Madagascar. © BLUE VENTURES

INDIA

Maharaja Krishnakumarsinhji Bhavnagar University

A 2012 SWOT grant will be used to assess areas on the coast of the Gulf of Khambhat (Cambay) from Bhavnagar to Diu, India, a zone identified by the International Union for Conservation of Nature (IUCN) Marine Turtle Specialist Group as a critical data gap for sea turtles. The major threats to coastal ecosystems in this part of Gujarat have been rapid industrialization and urbanization, plus coastal plantations, sand mining, and problems related to factory effluents and domestic sewage in nearshore waters. The Gulf of Khambhat is likely an important migratory pathway for green turtles and is believed to also serve as foraging habitat for greens and other species. This survey, led by Dr. I. R. Gadhi, will provide important baseline information about these poorly known sea turtle populations.



Students collect trash along the beach in the Gulf of Khambhat, India. © I. R. GADHI

SWOT Team Member Spotlight



Raquel Briseño Dueñas (Mexico)

I have been working with sea turtles for the past 36 years, based at the Mazatlán Academic Unit of the Institute of Marine Science and Limnology, part of the National Autonomous University of Mexico (UNAM). I also coordinate the Marine Turtle Database (BITMAR), serve as one of the East Pacific regional vice co-chairs of the IUCN Marine Turtle Specialist Group, and am president of the Sinaloa Sea Turtle Network (RETOS). As a member of the local, national, and international sea turtle community, I have the privilege of sharing the tasks of conserving this charismatic species with a huge network of dedicated specialists who collaborate to produce synergistic effects on the health of our oceans and coastlines. SWOT is an invaluable tool for achieving our collective conservation goals.



Michael Coyne (United States)

I founded and have directed Seaturtle.org—Global Sea Turtle Network since 1997, and have been working with sea turtles for 22 years. My primary goal is to make information about sea turtles as accessible as possible. I am based in Durham, NC (U.S.A.), but one of the benefits of my work is that most of it can be done from anywhere, as long as I have a computer and an Internet connection. By far, the biggest challenge I face is encouraging colleagues to work together and helping them feel comfortable sharing data and information. The more open we are, the more quickly we can find solutions to some of the very difficult conservation problems faced by sea turtles and other species. SWOT serves an important communication and information-sharing role that has enhanced the mission of Seaturtle.org and will continue to do so.



Alexsandro Santana dos Santos (Brazil)

I have worked as a biologist and the regional technical coordinator of Projeto TAMAR in Brazil since 1993, and for the past six years I have served as the national coordinator of SITAMAR (Projeto TAMAR's information system on sea turtles). For over three decades, Projeto TAMAR has led efforts to understand and conserve Brazil's five species of sea turtles and to engage local communities, governments, businesses, and the public in its efforts. The biggest challenge I face in my work is to provide organized, standardized, and reliable information to researchers to better deal with the threats faced by sea turtles in Brazil. *SWOT Report* not only grants us easy access to a vast repository of data and information on research initiatives but also provides a unique global vision for sea turtle conservation.



Jack Woody (United States)

After serving in the U.S. Navy and other wildlife and fisheries jobs, I accepted a position with the U.S. Fish and Wildlife Service (USFWS) in Washington, DC, which I hated. I was soon transferred to Albuquerque, NM (U.S.A.), where in 1972, I was made regional chief of endangered species, and later international sea turtle coordinator for the USFWS. Starting in 1972, I represented the United States on countless international wildlife conservation projects for 20 years. I helped launch the long-term conservation program for black turtles in Michoacán, Mexico, which has been an outstanding success, and I also worked to develop the Inter-American Convention for the Protection and Conservation of Sea Turtles. But I am most proud to have initiated the binational recovery project for the Kemp's ridley, based in Rancho Nuevo, Tamaulipas, Mexico. This has been a successful effort by the governments of two countries, countless institutions, NGOs, and individuals of both nations that brought the species back from the brink of extinction.

SWOT Data Contributors

A growing, global movement

SWOT's global network of volunteer data providers is the lifeblood of the SWOT initiative. As described in the SWOT Team Update (p. 34–35), SWOT's database now hosts information from more than 3,000 nesting sites and more than 130 countries worldwide. Below, we recognize ALL data providers who have contributed to SWOT since 2004; names are listed by the country from which data were contributed. To all of you who have contributed to making SWOT a success: THANK YOU!

AMERICAN SAMOA

Irene Kinan Kelly
Kimberly Maison

ANGOLA

Conrad Brian
Tamar Ron

ANGUILLA

James Gumbs
Jeanne A. Mortimer
Stuart Wynne

ANTIGUA AND BARBUDA

Cheryl Appleton
Tricia Lovell
Peri Mason
James Richardson

ARUBA

Edith Van der Wal
Richard Van der Wal

ASCENSION ISLAND

Annette Broderick

AUSTRALIA

Lachlan Barker
Ian Bell
Tamra Chapman
Ray Chatto
Kirstin Dobbs
Mick Guinea
Mark Hamann
Karen Hattingh
Irene Kinan Kelly
Col Limpus
Kimberly Maison
Roland Mau
Kellie Pendoley
Bob Prince
David Waayers
Andrea Whiting

BAHAMAS

David Addison
Karen Bjorndal
Alan Bolton
Christopher De Ruyck
Eleanor Phillips

BANGLADESH

M. Zahirul Islam

BARBADOS

Jennifer Dunn
Julia Horrocks
Barry Krueger

BELIZE

Bacalar Chico Marine Reserve
Belize Audubon Society
Friends of Nature
Gales Point Wildlife Sanctuary
Management Team
Janet Gibson
Glovers Reef Marine Reserve
Isaias Majil
Sapodilla Cayes Marine Reserve
South Water Caye Marine Reserve
Toledo Institute for Development
and Environment
University of Belize

BENIN

José S. Dossou-Bodjrènou

BERMUDA

Jennifer Gray

BRAZIL

Paulo Barata
Armando Barsante
Claudio Bellini
Jaqueline Castilhos
Augusto Cesar Coelho Dias
da Silva
Antonio de Padua Almeida
Eron Paes e Lima
Gustave Lopez
Maria Angela Marcovaldi
Alessandro Santos
Luciano Soares
João Carlos Thomé
Frederico Tognin

BRITISH VIRGIN ISLANDS

Joel Dore
Gaverson Frett
Shannon Gore
Mervin Hastings
Bertrand Lettsome
Arlington Pickering

BRUNEI DARUSSALAM

Kartik Shanker

CAMEROON

Alain Gibudi
Jules Ngunguim

CAPE VERDE

Elena Abella-Perez
Nuno de Santos Loureiro
Luis Felipe Lopez Jurado
Paula Sanz

CAYMAN ISLANDS

Janice Blumenthal
Gina Ebanks-Petrie
Joni Solomon

CHAGOS ARCHIPELAGO, BRITISH OVERSEAS TERRITORY

Jeanne A. Mortimer

CHINA

I-Jiunn Cheng

COCOS (KEELING) ISLANDS

IMAPS-UNEP

COLOMBIA

Diego Amorocho
Zunilda Baldonado
Karla G. Barrientos-Muñoz
Claudia Ceballos
Ana Eugenia Herrera
Juan Patiño Martínez
Carolina Monterrosa
Alvaro Andrés Moreno-Munar
Vivian Páez
Alejandro Pavia
Liliana Quiñones
Cristian Ramírez-Gallego
Elizabeth Taylor

COMOROS

Jérôme Bourjea
Stéphane Ciccione
Claire Jean
Chris Poonian

COOK ISLANDS

Irene Kinan Kelly
Kimberly Maison
Michael White

COSTA RICA

Iñaki Abella Gutierrez
Randall Arauz
Asociación Salvemos las Tortugas
de Parismina
Didiher Chacon-Chaverri
Gerardo Chaves
Endangered Wildlife Trust
Estación Las Tortugas
Gabriel Francia
Alex Gaos
David Godfrey
Emma Harrison
Alec Hutchinson
La Tortuga Feliz
Monica Lopez-Conlon
Mariana Malavar Montenegro

Alvaro Manzano
Frank Paladino
Rotney Piedra Chacón
Andy Pyle
Wagner Quiros
Isabel Rose Peterson
Guido Saborio-R.
Pilar Santidrian Tomillo
Rachel Silverman
Roberto Solano
Jim Spotila
Vicky Taylor
Sebastian Troëng
Elizabeth Vélez Carballo
Ruben Venegas
Sandra Viejobueno
Marc Ward
Ingrid Yañez

CÔTE D'IVOIRE

Jacques Fretey
José Gomez Peñate

CUBA

Julia Azanza
Fernando Hernandez
Felix Moncada

CURAÇAO

Paul Hoetjes
Brian Leysner

CYPRUS

Marie Allen
Annette Broderick
Andreas Demetropoulos
Wayne John Fuller
Brendan Godley
Myroula Hadjichristophorou
Ian Trenslove

DOMINICA

Rowan Byrne
Stephen Durand
Seth Stapleton

DOMINICAN REPUBLIC

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ECUADOR

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Equilibrio Azul
Alex Gaos
Marco Herrera
Patricia Zarate

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Mahmud Hanafy

EL SALVADOR

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Michael Liles
Wilfredo Lopez
Georgina Mariona
Johanna Segovia
Mauricio Vasquez

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Gail W. Hearn
Heidi Rader
ERITREA
Mahta Goitom
Teclé Mengstu
Yohannes Tecl'emariam

FIJI

Aisake Batibasaga
Irene Kinan Kelly
Kimberly Maison
Neema Nand
George Petro

FRANCE

Flegra Bentivegna
Michel Delaguerre

FRANCE— RÉUNION ISLAND

Jérôme Bourjea
Stéphane Ciccione
Claire Jean

FRENCH GUIANA

Amana Nature Reserve
Association Kulalasi
Association Kwata
Association Sèpanguy
Benoit de Thoisy
Laurent Kelle

FRENCH POLYNESIA

Irene Kinan Kelly
Kimberly Maison

FRENCH SOUTHERN TERRITORIES

Jérôme Bourjea
Kélonia / IFREMER TORSOOL
Database
Jean-Yves Le Gall
François René

GABON

Guy-Philippe Sounguet
Bas Verhage

THE GAMBIA

Jacques Fretey

GHANA

Richard Adjei
Kathleen Beyer
Jacques Fretey

GREECE

Dimitris Margaritoulis

GRENADA

Marina Fastigi
Rebecca S. King
Carl Lloyd
Gregg Moore

GUADELOUPE

Sophie Bedel
Sandrine Bonotto
Jean Boyer
Monique Charrieau
Moise Chasselas
Fabien Créantor
Philippe De Profit
Eric Delcroix
Xavier Delloue
René Dumont
Jérôme Flereau
Alain Goyeau
Sophie Guilloux-Glorieux
Fortuné Guiougou
Thierry Guthmuller
L'Association Eco-Lambda
Cécile Lallemand
Alexandra Le Moal
Franciane Le Quéllec
Laurent Malglaive
Pauline Malterre
Simone Mege
Renato Rinaldi
Caroline Rinaldi
Sebastien Rives
Alain Saint-Auret
Guilhem Santelli
Olivier Tartaglino

GUAM

Irene Kinan Kelly
Kimberly Maison

GUATEMALA

Anabella Barrios
Ana Beatriz
Colum Muccio
Jaime Pérez

GUINEA

Jacques Fretey

GUINEA-BISSAU

Castro Barbosa
Paulo Catry
Jacques Fretey

GUYANA

Annette Arjoon
Romeo de Freitas
Michelle Kalamandeen
Peter C. H. Pritchard
Dominique Saheed

HAITI

Jean Wiener

HONDURAS

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Norman Javier Flores
Fundación para la protección de
Capiro Calentura y Laguna
Guaymoreto (FUCAGUA)

Rafael Gutiérrez

Gerson Martínez

Carlos Molinero

Lidia Salinas

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Harry Andrews
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Naveen Namboothri
Kartik Shanker
Devi Subramanian

INDONESIA

Creusa “Tetha” Hitipeuw
Maggie Muurmans
Ketut Sarjana Putra
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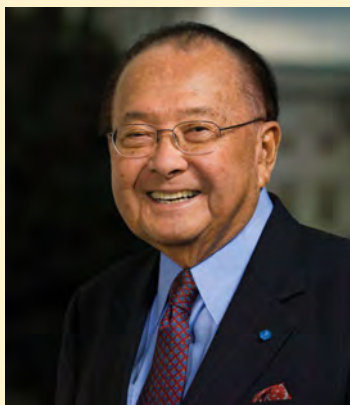
Lui Bell (1956–2012)



The people and the turtles of Polynesia, Melanesia, and Micronesia have lost a truly iconic and inspirational leader. Lui Bell of the Secretariat of Pacific Regional Environment Programme (SPREP) passed away in late 2012. He will long be remembered, admired, and loved by

family, friends, and colleagues. The “Turtle Man of the Pacific Islands,” Lui was a humble and thoughtful person who walked within and intuitively understood the two worlds of his life, not only in Samoa but also in the many islands of the region he served and frequently visited. The old days and ways are passing in the Pacific, too fast for many. Lui understood that change very well and with it the need to retain and teach patience, respect, humility, a gentle voice, and the value of taking things slowly—in spite of the constant pressures from the outside world demanding more and fewer resources to address conservation needs. Lui opened every SPREP turtle meeting and training session with a prayer, asking God to bless the participants and guide their work and decisions in striving to conserve sea turtles for the benefit of the marine and island ecosystems and for the cultural needs of the people. May God bless Lui, and watch over and give comfort to his family. Talofa, Vinaka, Aloha, and Fond Farewell.

Daniel K. Inouye (1924–2012)



On December 17, 2012, the *Honolulu Star-Advertiser* carried the headline “Hawaii mourns ‘An American Hero,’” announcing the passing of U.S. Senator Daniel K. Inouye at age 88. He had served as Hawaii’s senator in Washington, DC, for 50 years.

Senator Inouye’s record on human rights and many other just causes linked to equality, ethnicity, culture, national dignity, strength, and freedom will forever be recorded in history books. Perhaps less known was his vigorous support for sea turtle research and conservation through congressional initiatives starting in the mid-1980s. If not for Senator Inouye, our knowledge of Hawaii’s sea turtles would be a mere shadow of what it is today. When asked how he would like to be remembered, he said, “I represented the people of Hawaii and this nation honestly and to the best of my ability. I think I did okay.” His staff said his last word was “Aloha.”

Thank You

The Editors of *SWOT Report* are grateful to many people and institutions. The SWOT Team has made invaluable contributions of data, articles, and images. Thank you all for your time, resources, and expertise, and for your dedication to the mission of SWOT to create a global network that makes a difference for sea turtles and the ocean. Special thanks to Morrison Mast for his assistance in producing this volume of *SWOT Report*. We are particularly indebted to all of our authors (listed below), to our photographers (credited along with their photos in this issue); our Editorial and Scientific Advisory Boards (see masthead, page 4), to Duke University’s OBIS-SEAMAP Program, and to the many generous donors, including Lauren Babior, Alex Balkanski, Frances and Benjamin Benenson Foundation, Betlach Family Foundation, Bill Broyles, Michele Clarke, Shawn Concannon, Casey Coates Danson, Bob and Randi Fisher, Jeff and Janie Gale, Goldring Family Foundation, Tom Hormel, Jim and Harla Hutchinson, International Union for Conservation of Nature—IUCN, Landmark Charitable Foundation, Hugh McCormick, Moore Family Foundation, Yasmin Namini, Don Niemann, Offield Family Foundation, Panaphil Foundation, Perseus Telecom, Sarah Plimpton, David Przygoda, Nancy Ritter, the Schein Family, John Swift, and U.S. State Department.

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