

Filling in the Gaps

NEW INSIGHTS INTO OLD QUESTIONS ABOUT SEA TURTLE BIOLOGY

“Despite growing interest, our ignorance of the biology and ecology of the world’s sea turtles still seems the most fundamental obstacle to their survival.”

—Archie Carr, March 1984

It has been more than 50 years since renowned sea turtle researcher Archie Carr published his landmark book, *The Windward Road: Adventures of a Naturalist on Remote Caribbean Shores*. In it, he recounted stories of his early exploits roving the Caribbean, studying sea turtles throughout the region, and pondering and exploring many basic questions about their life history: Where are the primary nesting beaches? Where are the foraging areas for turtles originating from those beaches? How do turtles migrate between those areas? Incredibly, the gaps in our understanding of sea turtle biology that Archie highlighted more than half a century ago continue to drive much of today’s sea turtle research worldwide.

Over the past several decades, conservation and research on sea turtle nesting beaches has thrived, and the development of novel tools such as genetic analysis and satellite telemetry have yielded an ever-increasing wealth of knowledge from around the world. Through those approaches, we’ve learned about important management issues such as genetic stock structure, hotspots of sea turtle habitat, and when and where sea turtles migrate. However, numerous insights have also been gained during this time that remind us of the tremendous value of “low-tech” approaches to studying sea turtles. Gadgetry aside, simple methods such as beach reconnaissance and good, old-fashioned, word-of-mouth networking are still among the most valuable techniques for successfully studying sea turtles.

In the following anecdotes, which are reminiscent of the globetrotting days of Archie Carr, we relay stories of nesting beach discoveries for three species on three continents. Unraveling those sea turtle mysteries did not happen in the 1950s or 1960s, but rather over the past couple of decades, during a time when sea turtle research had seemingly moved on from the fundamental task of cataloguing nesting beaches.

AT RIGHT: Green turtle tracks cover the beach at Ras Al Jinz, Oman. Many sea turtle nesting beaches are still being “discovered” by science, including some that host large nesting populations. Turtle tracks like these are often the first clue of nesting activity. © NICOLAS J. PILCHER





Members of the Eastern Pacific Hawksbill Initiative prepare to attach a satellite transmitter to an adult female hawksbill for the first time in the region. © MICHAEL LILES

Rediscovery of Eastern Pacific Hawksbills



It just didn't make sense. Historical records revealed considerable numbers of small juvenile hawksbills in Mexican Pacific waters, but the scant reports of nesting simply couldn't account for all of the little turtles. The only explanation was the existence of undiscovered nesting sites from which the turtles were originating.

But how could this be? How could science miss those sites? In view of the army of dedicated biologists and turtle enthusiasts who have been combing beaches for decades and are armed with the Internet, digital cameras, and aerial surveys, common sense has suggested that someone had to have seen appreciable numbers of hawksbills nesting somewhere in the eastern Pacific.

The mystery began to unfold early in 2008. In January, Andres Baquero provided the first account of hawksbill nesting activity in Ecuador, at Parque Nacional Machalilla, a site where Baquero and his colleagues had just initiated a sea turtle monitoring program. A month later, researchers Mike Liles and Mauricio Vásquez reported at least 80 hawksbill nests being laid annually on secluded beaches in El Salvador. When all the data were analyzed, this number eventually climbed to an estimated 200 nests. It is unclear whether the near-simultaneous accounts were an accident of history or a so-called alignment of the sea turtle stars. Nonetheless, those discoveries gave the first inkling that eastern Pacific hawksbills—a population thought to be long extinct—might still have a chance for recovery. Since then, regional experts have compiled records of more than 300 nests annually throughout the American Pacific, thereby bringing the connectivity of hawksbill nesting and feeding areas in the region into better focus. These findings are fueling hope that conservation may someday be able to restore eastern Pacific hawksbills to their former glory.

Unexpected Find in Syria



Similar to the serendipitous hawksbill story, researchers recently stumbled upon—almost literally—a major nesting population of green turtles in the Mediterranean. This discovery stemmed from the interest by Ph.D. student (and article co-author), Alan F. Rees, to update information on the nesting activity of loggerhead turtles—not greens. Beginning with

the first description in 1991, Syrian beaches had been shown to host a small nesting population of loggerhead turtles. However, since that time, information had essentially ceased to flow from Syria, and the importance of Syria for sea turtles slipped into relative obscurity. Because of this lack of new information, the search for answers began with a partnership between Rees and Dr. Adib Saad, a Syrian scientist working on sea turtle bycatch issues. Together, Rees and Dr. Saad agreed to cooperate on a two-month reconnaissance survey of the Syrian coast.

This loggerhead survey in Syria occurred during summer 2004 and was made possible by grants from the Marine Conservation Society and the British Chelonian Group. Dr. Saad and Rees were joined by Mohammad Jony, who became a surveying expert by the end of the summer. The first day of surveying took place in the middle of the nesting season, and the team was expecting to see a handful of old turtle tracks and maybe one or two fresh crawls. They were not prepared for what they found: in their first 300 meters (984 feet) of walking, they identified what they thought were numerous, odd-looking loggerhead tracks. Further along, they located a nest from the previous night, and it became clear that these weren't tracks from loggerheads at all, rather they were from green turtles!

The first survey by Dr. Saad and Rees in 2004 recorded more than 80 tracks, almost all of them attributed to green turtles, a species not previously known to nest in the country. Soon thereafter, tracks were corroborated by confirmed green turtle sightings, and Rees recorded greens doing what the species has likely been doing—unseen by the outside world—on the beaches of Syria for centuries: nesting. Ultimately, more than 100 green turtle nests were recorded, making the previously unknown Syrian population one of the 10 largest in the Mediterranean region.

Local Knowledge Goes Global in Gabon



The so-called discovery of the Gabonese leatherback rookeries is remarkable in that it went unnoticed by the international community for decades, despite what turned out to be a staggering volume of nesting activity. Until the early 1980s, knowledge of leatherback nesting in Gabon existed in local communities, but it was virtually nonexistent in the outside world.

This paradigm shifted when French biologist Jacques Frétey—a long-time sea turtle researcher in Africa—was forwarded a letter from

Nicole Girardin describing the “bulldozer tracks” at Pongara Point in Gabon that neither she nor her students could identify. That letter set into motion a series of beach surveys by Girardin and Fretey, the results of which were soon shared with the rest of the world. However, even Fretey underestimated the enormous leatherback population in Gabon on the basis of his initial surveys.

In the 1990s, the local nongovernmental organization titled Aventures Sans Frontières and the European Union program titled Protection des Tortues Marines d’Afrique Centrale (PROTOMAC) started more thorough surveys of the Gabonese beaches. They recorded an astonishing number of leatherback nests—an estimated 6,000 to 7,000 females nesting in southern Gabon each year! As a result, Gabon came to the world’s attention not simply as home to important nesting sites for leatherbacks in western Africa, but also as one of the largest leatherback nesting populations in the world. By 2005, several groups involved in leatherback conservation in Gabon had formed the Gabon Sea Turtle Partnership. Over the past few years, members of this partnership have flown over the entire coastline of Gabon three times per season, and their nest counts and abundance estimates continue to refine our understanding about the extraordinary number of leatherbacks nesting in Gabon.

Why did it take so long to make these discoveries?

The stories of hawksbills, green turtles, and leatherbacks described here reflect the many unfilled gaps in our knowledge of sea turtles, including fundamental questions such as where and how many sea turtles nest around the world. When one considers the technological advances of the past few decades, it is hard to understand how major nesting populations can go unnoticed for so long by a global cadre of sea turtle researchers. This mystery may relate to the elusiveness of

nocturnally nesting turtles, which tend to appear on secluded beaches rather than populated coastal areas. More important, the persistence of those mysteries within the scientific community also arises from a fundamental disconnect between so-called local knowledge and scientific knowledge. Indeed, the stories spelled out here are clearly discoveries to science, but not necessarily to the local communities near those sites. On the contrary, each of the nesting populations has most certainly been known to local inhabitants for decades, if not generations. Nevertheless, the discoveries provide a sobering reminder that the scientific community has much to learn about the whereabouts and wanderings of sea turtles.

So, where do we go from here? Clearly, the scientific community’s understanding of sea turtle ecology and of the conservation strategies necessary for turtles’ survival has advanced substantially over the years. Although our high-tech gizmos and remote observations can reveal clues about some of the remaining mysteries, we must remember the equal or greater value of low-tech strategies that fill the gaps in our basic knowledge; the questions of how many, where, and when sea turtles exist continue to be among the most important advances that can be made for sea turtle conservation worldwide.

Dr. Jeffrey Seminoff is a marine ecologist and leader of the Marine Turtle Ecology and Assessment Program for the National Marine Fisheries Service, Southwest Fisheries Science Center. He has been active in marine turtle research and conservation in the eastern Pacific for nearly 20 years. **Alan F. Rees** is a Ph.D. student and member of the Marine Turtle Research Group based at the University of Exeter, Cornwall, U.K. His current research examines the migration patterns of the sea turtles nesting on Masirah Island, Oman. **Dr. Manjula Tiwari** is a research scientist at the National Marine Fisheries Service, Southwest Fisheries Science Center, and has been involved in sea turtle research and conservation in West Africa for almost a decade.

A leatherback nests in Loango National Park, Gabon. © MICHAEL NICHOLS / NATIONAL GEOGRAPHIC STOCK

