

La Quebrada

# Turning Turtles *in Tortuguero*

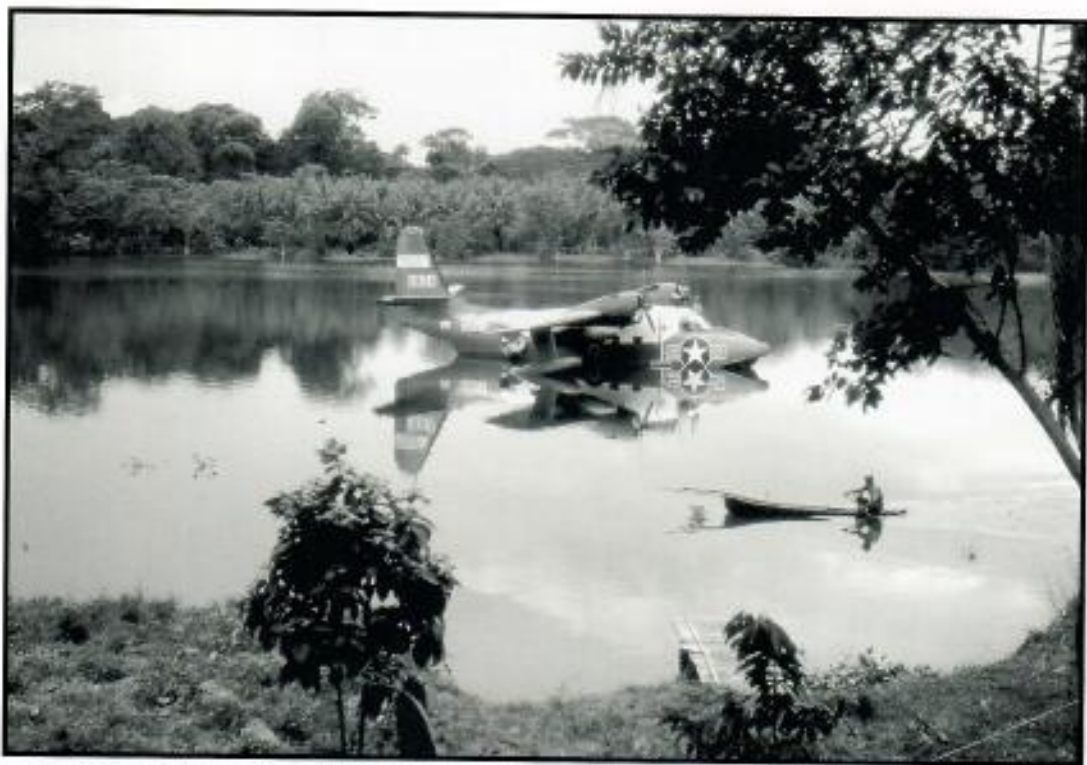
*Stories From the Origins of Sea Turtle Conservation*



*Anne Ake*

*Larry Ogren consultant*

*Foreword by Dr. Archie Carr III*



A man rowing a cayuca pauses to take in the phenomena of a U.S. Navy plane floating on the Tortuguero lagoon. The plane would become a familiar sight over a period of almost ten years and its departure with a squirming cargo of thousands of baby turtles would come to seem almost commonplace.



for predators and to take evasive action. The frigate bird, on the other hand, had proved itself smarter than the turtle by changing its tactics and approaching low and from the rear.

The tracking venture, though disappointing, was a step toward learning about the missing years. Later, another of Dr. Carr's students, Karen Bjorndal and her husband, Alan Bolten, would discover that little loggerheads spend those gap years—between 7 and 12—in the eastern Atlantic, spending much of their time in convergence zones floating in masses of brown algae. This seaweed, called sargassum, floats in large drifts in the temperate and tropical oceans of the world. The mass of seaweed provides the hatchlings with camouflage, resting places, and an abundance of food. Many tiny animals and larval animals also make their home in the sargassum. The young loggerheads dine on these tidbits, not changing their diet to sea grass until they leave the shelter of the sargassum. We still don't know what tells them it is time to move on.

In the 1950s and 1960s methods were not high tech. Moreover, exhausting, frustrating efforts often produced only disappointment. But even experiments that did not appear to have been productive were building blocks to support the next attempt. Bit by bit, understanding of sea turtles was building.



Turtles breeding on the beach is a rare sight. They prefer the privacy and comfort of the water. Perhaps they didn't notice that the waves were pushing them shoreward.

# Flying Turtles And Other Fraught Follies

**T**HE EARLY DAYS of the turtle research station were often marked by frustration, disappointment, and danger; there were acts of heroism, too, sometimes leavened by a touch of humor. These themes are well illustrated by anecdotes that are part of the lore of Tortuguero. They are not stories of failure because each experiment was driven by a passion to know; the aftermath of each narrow escape benefited the turtles or enhanced our knowledge of them. And although results may not have matched anticipations exactly, each contributed to a growing understanding of the world around us. The stories are representative, not unique. They recall a way of life in Tortuguero's John H. Phipps Biological Research Station, and in remote biological field stations around the world.

## **Operation Green Turtle: An Unlikely Coalition**

Beginning in 1959, thousands of little green turtles took to the air aboard a U.S. Navy red and white Grumman Albatross amphibious aircraft manned by Navy pilots in orange jumpsuits and biologists in their uniform of sun-bleached, mildew-etched work clothes. The hatchling turtles were on their way to far shores in an attempt to repopulate Caribbean beaches from which the turtles had long since disappeared. Operation Green Turtle (OGT) was a joint venture of the navy and the Tortuguero turtle research station.



Larry tends hatchlings in a nest moved to the protected nursery area.

The unlikely coalition came about as the result of the navy's interest in the navigational secrets of migrating animals and a little discreet political nudging from a member of the CCC board of directors.

From 1959 until 1968, OGT crews distributed more than 130,000 hatchlings to 28 beaches throughout the greater Caribbean, Mexico, the Bahamas, and even Texas and Florida. It was still a time of turtle slaughter and egg collection on Tortuguero beach, and few hatchlings actually made it to the sea. So the rationale for the project was double edged—to rescue doomed nests and to establish new colonies in places where green turtles had once lived. It was a labor-intensive operation. Freshly laid nests were excavated and the eggs moved to hand-dug nest cavities in a protected area. A wire fence enclosed each nest; the relocated eggs were tended and watched over to preserve them from both human and wild animal predators.

When the hatchlings emerged they were scooped up and transported to wooden troughs protected from the sun by a thatched roof. They were fed on bits of fish, and fresh seawater was brought in daily—one bucketful at a time in the beginning. Later there was a pump for pulling water directly from the sea to the troughs. Sometimes it worked. Transport called for special boxes, which were built from supplies shipped in from Limón. The wooden boxes were about a yard square and a few inches deep. They were lined with plastic and had an absorbent mat to retain moisture during transport. Each housed approximately 200 hatchlings in economy-class comfort.

### **OGT: Knowing the Way**

Dr. Carr supposed from early research that turtles returned to their natal beach to lay their eggs. How they knew where to go was still a mystery. The biologist hypothesized that the key to the turtles' return was somehow implanted in their tiny brains during their trek across the beach and into the sea. Initially some attempts were made to tag the hatchlings



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Keeping the cantankerous pump operating and tending the babies prior to shipment was a labor-intensive operation for Larry and Harry.

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so they could be recognized when and if they reappeared. But how could the biologists tag an animal that lived in saltwater and would increase in size from a few ounces to hundreds of pounds before it returned to the beach to nest? The tags used on adult turtles would interfere with the hatchling's ability to swim. Pediatric-sized tags, sure to be



Larry's attempt to put identifying tags on hatchlings would prove to be wasted effort.

lost or buried in flesh as the turtle grew, wouldn't have enough room for identifying information anyway.

Even so, Larry Ogren experimented with tagging hatchlings.

The tags wouldn't survive long, but if young turtles were found or caught in a net with the tags still in place, researchers would have valuable information about the juvenile years. Help seemed to be at hand when fellow biologists engaged in a shrimp-tagging project offered to send Larry some of their small shrimp tags, which he laboriously attached. Getting the tags on was really hard, Larry says—the squirmy hatchlings were not at all in favor of having a plastic disc pinned to their rear flippers. He persevered, however. The plan was that any tags recovered would be sent back to the shrimp taggers and the information forwarded to Tortuguero. Larry waited, hoping for results to start coming in. Nothing. Finally the truth came out: the shrimp taggers had not thought to keep a record of the tag numbers they sent to Larry. If a tag was returned, it was recorded as just another shrimp.

**OGT: Lessons learned**

Carr and his students understood that their efforts were hampered by their lack of insight into the life of a sea turtle, but the need to do something was urgent. It came down to a hard decision: to take action without benefit of conclusive research data or to postpone action while trying to learn more as the species slipped ever closer to extinction. Carr decided to save as many hatchlings as he could and hope to give them a start in a new location. Sea turtles held in captivity sometimes reached sexual maturity in 6 years, so he anticipated that results from the OGT transplanting efforts would be apparent in 6 or 7 years. Later research, however, showed that in the wild sea turtles don't reach sexual maturity until much later—as long as 30 or 35 years later. So in reality, the earliest results,

Always willing to help, Billy Cruz (right) assists a navy crew member in preparing boxes of turtles for loading.





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if they came at all, would be in the 1990s. Dr. Archie Carr died in 1987, and the 1990s came and went while the Caribbean beaches that hosted the transplanted hatchlings remained empty of turtle nests.

In spite of the disappointing outcome, Operation Green Turtle was not a complete failure. Lessons learned in the process added substantially to the growing body of knowledge



Hatchling turtles were released on beaches around the Caribbean in hopes that they would be imprinted with the location and return there to nest.

of the life history of sea turtles. For example, Larry and Leo Martinez observed that when the little turtles were put in the trough, they began a period of frenzied swimming that lasted about a day. That discovery prompted them to recall that hatchlings plunging into the sea react the same way. That initial burst of energy drives them beyond the inshore predators and sets them on their way to the safety and food resources of the sargassum beds, where they pass the first several years of their lives. The turtles in the experiment, however, had already spent that energy frantically swimming around in the troughs, perhaps with disastrous effects on their chances of survival later, when they were released on the beach.

To restore the advantage, Carr initiated a smaller project in which the researchers transported not hatchlings but eggs, which were buried on the new home beach. The researchers had been successfully moving eggs from fresh nests to the protected nursery area, where the hatchlings for Operation Green Turtle were raised, but packing the eggs in boxes to be transported by air took more expertise than was available at the time. The experience, however, was useful in that it resulted in a way to move eggs without interrupting their development. Today, every effort is made to protect nests in the location that the female turtle chose, but when there is little likelihood of survival, eggs can be successfully relocated.

### **OGT: Benefits of the program**

The most valuable contributions of Operation Green Turtle fall into the categories of public relations and education. The novel operation brought international media attention to the plight of sea turtles and the heretofore unsung attempts to save them from extinction. The operation was an important part of the growing awareness that taught people to care and to take action. Today many nesting beaches around the world have volunteer groups who walk the beach at all hours and in all kinds of weather. They monitor and protect nesting turtles and the nests they leave behind. Volunteers are on hand at hatchings to protect the little turtles and escort them to the sea, through the gauntlet of predators. The volunteers share turtle lore with bystanders who gather to watch, and they ring doorbells to educate beach residents. As a result, the owners of homes, businesses, and condominiums on many beaches have taken up the cause and switched to special lighting to avoid drawing hatchlings to their deaths in swimming pools and roadways.

Operation Green Turtle also solidified bonds of friendship between the United States and a number of Caribbean countries. The demonstration that the United States

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cared enough to send naval planes and personnel to remote beaches to attempt to reestablish turtle colonies made a strong and lasting impression on our neighbors to the south. Carr hoped not only to protect marine turtles from extinction, but to reestablish them as a sustainable food source.



Archie Carr  
(far left)  
with one of  
the US Navy  
flight crews.

tells about a harrowing trip over Mexico in a thunderstorm. The load of crew, wooden crates, and turtles was heavy. To minimize weight on takeoff, the OGT planes routinely began their journey only partially fueled and made a stop to top off the tanks. On this trip the crew had made arrangements for a fuel stop in Belize. A promise to have airport personnel meet the Grumman there after hours notwithstanding, the airport was dark and the radios silent. The aircraft was low on fuel, but the pilot, Commander Raymond Curry, decided they could make it to their destination of Mérida, on Mexico's Yucatán Peninsula.

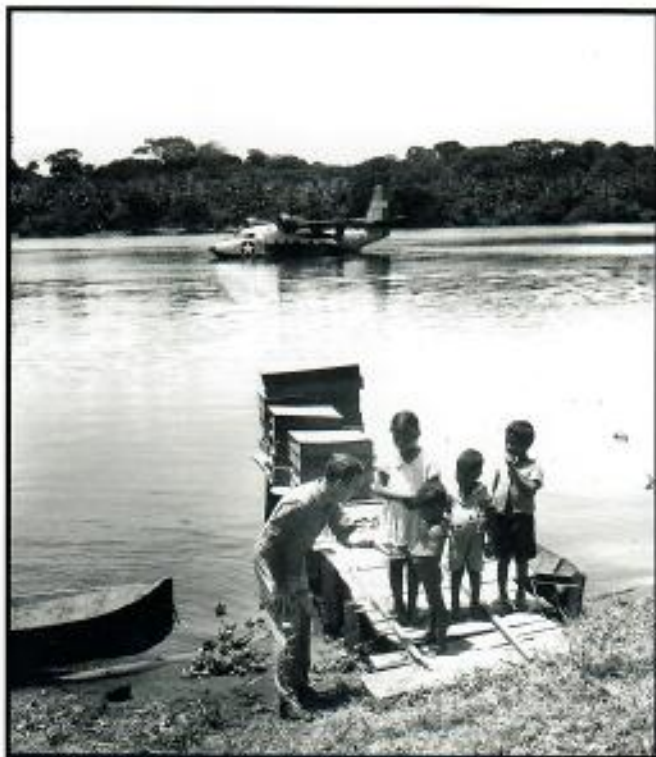
The weather turned bad, however, and storms forced them to fly through heavy rain in a zigzag pattern. Soon they were lost, so Commander Curry dropped lower and lower, looking for landmarks. Then he ordered the crew to rig for a potentially disastrous water landing. As they neared the Gulf

As a side benefit, the unusual operation promoted lasting friendships among the navy personnel and the Tortuguero biologists, and spawned good stories that are still shared.

Larry Ogren



of Mexico, they spotted the headlights of a truck that was likely en route, via the new coastal highway, to or from the airport. Given the fifty-fifty chance of being led in the right direction, they followed the truck. Soon they realized, with great relief, that they were nearing the airport. The crew on duty in the tower spoke only Spanish and the crew on the plane spoke only English, but with the gas gauge reading "empty," the Grumman had to land. As they made their approach and touched down on the only runway they could see, a commercial plane came roaring in over their heads. The tension was palpable as the two aircraft barely avoided colliding on the same runway. But the pilot made a safe landing, and their living cargo was delivered to a nearby beach.



On another occasion, an oil leak delayed the Grumman's start on the return trip to Tortuguero. This was not ideal because it meant a tricky nighttime landing on the surface of the lagoon. The less experienced copilot, intending to help, flicked on the plane's lights as they made their approach. The act, of course, was like shining a light on a mirror. The water reflected the harsh light right into the cockpit, temporarily blinding the pilots. The lights were quickly doused, and Commander Curry made a dramatic starlight landing on the Tortuguero lagoon.

Cmdr Raymond Curry was popular with the local children. Here he allows them to examine a hatchling.

### **OGT: The Lighter Side**

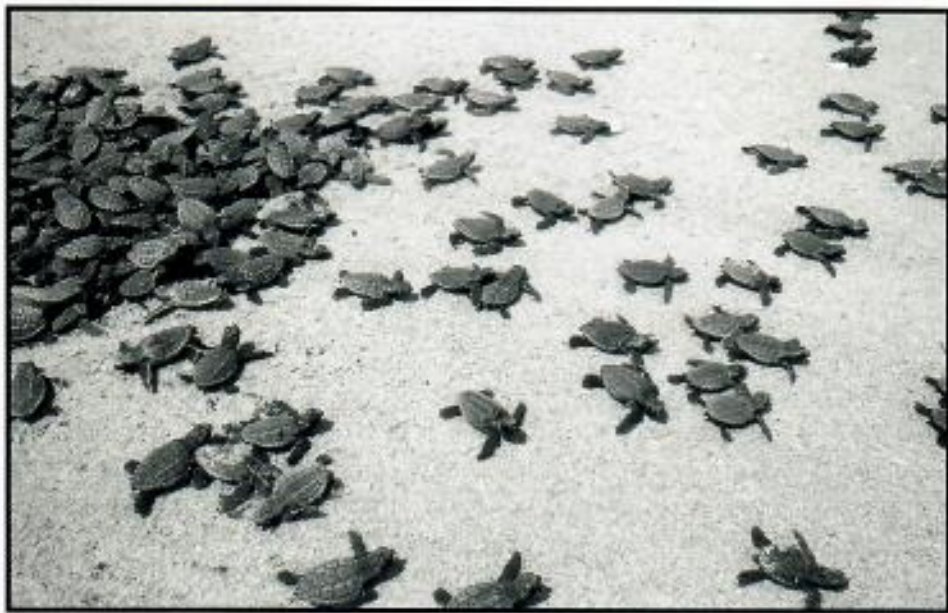
Many of the stories were on the lighter side. Larry chuckles gleefully when describing an overnight stop at a U.S. Air Force base in Panama. He joined the crew for a beer in the officers' club, where the men chatted with some air force officers who were curious about this mixed bag of navy officers and civilians in the club. When asked about their mission, Larry responded succinctly, "Operation Green Turtle." One officer quickly said, "Enough said. We don't have a 'need to know.'" Then he added, "But I hope you get that son of a bitch Russian submarine out of there." Larry just smiled. Quick to steer the conversation away from what they thought to be a top-secret topic, the air force personnel offered a story of their own. Fidel Castro was sending planeloads of pencils imprinted with "Viva Castro! Viva Cuba!" to be distributed to Caribbean schools. Offended by this propaganda, the United States responded in kind, and the air force crew had just returned from a pencil mission. Larry asked what our pencils said and, with a straight face, the officer replied, "Dixon No. 2 Soft."

On one occasion, Larry Ogren and Harry Hirth were escorting turtles to the University of Florida in Gainesville. Rather than packing their cargo in sturdy wooden boxes, they were using cardboard containers designed to transport baby chicks. The itinerary, which had begun with a flight to Miami, was about to conclude aboard a train bound for Gainesville. The cardboard turtle boxes were carefully stacked in the back section of the car, along with passenger luggage. It had been a tiring trip, and the two biologists were relaxing and enjoying the comfort of the passenger car when a conductor tapped Larry on the shoulder and asked, "Do you know anything about the little turtles running all over the place?" Larry and Harry spent the rest of the journey chasing turtles around suitcases and down the passenger aisle, and scooping them out from between their fellow passengers' feet.

### Beaches Breathe

All the while the turtle guys were digging eggs, tending to a nursery of baby turtles, and building travel crates, they were continuing their tagging and research programs. And when the turtle express came to an end, the work went on at the turtle station. The more they learned, the more they understood that there were secrets just beyond their reach. For example, it made sense for a turtle to bury her clutch of eggs deep in the sand—it gave the developing embryos a more stable temperature and some protection from predators. But they knew that the creatures growing inside the eggshells were somehow absorbing oxygen and emitting carbon dioxide. Where were they getting the oxygen, and why didn't CO<sub>2</sub> build up in the nest and poison the entire clutch?

As years passed, new technology made it possible to study the rate of gas exchange in the eggs. Ralph Ackerman, a



The life of hatching turtles—before and after they scabble out of the nest—was cause for much speculation and study by the Tortuguero biologists.



University of Florida graduate student working in the lab and on the beaches of Florida and Tortuguero, devised a method for measuring both oxygen and carbon dioxide in the egg cavities. He found that oxygen levels were higher and carbon

dioxide lower than he expected.

In 2003 Paul Sotherland, a professor at Kalamazoo College in Michigan, was working with Ackerman and James Spotila at Las Baulas Park on the Pacific coast of Costa Rica. Spotila tells Paul's story in his book *Saving Sea Turtles*.

Paul Sotherland had a theory that the water table below the sand went up and down with the tide. He hypothesized that the tide worked like a bellows, pushing air up and down in the sand, thereby evacuating the CO<sub>2</sub> from the nests and flushing them with fresh oxygen. To check his theory, Paul used a method as basic as those used in the early days at Tortuguero: alone on the beach, he dug a hole. When Paul was long overdue at the camp, the rest of the team went looking for him. They found their colleague on the beach, standing in a hole as

#### MURDER ON THE BEACH

In June 2013, masked men abducted Jairo Mora Sandoval, a young sea turtle conservationist, and four volunteers. The group had been patrolling the beach at Moín, Costa Rica, to protect leatherback nests from poachers. The volunteers, three from the United States and one from Spain, were left in an abandoned building without shoes or cell phones. In an odd show of consideration, when Grace, a volunteer from the United States, asked for her SIM card back, one of the kidnappers removed it from her phone and returned it.

The volunteers later managed to escape and go for help. But it came too late for Jairo, who evidently was the target of the attack. His body was found on the beach. Investigators first told the press that the cause of death was a gunshot to the head, but Grace said that later reports stated that the young man died of head injuries from a beating. In a newspaper article less than a month earlier, Jairo had proposed that there was a connection between turtle egg poaching, drug trafficking, and organized crime. Jairo Mora was a dedicated conservationist whose death represents a great loss to Costa Rica's environmental programs.

deep as he was tall. The sides of the hole had caved in, thanks to Paul's attempts to dig himself out; now the young biologist was trapped in sand that rose higher than his knees.

The next day Paul started over with the aid of a couple of

student assistants and an escape ladder. They dug a hole much broader at the top, and terraced, so that the sides couldn't fall in on the diggers. The ladder allowed them to climb out without causing a cave-in—which was a very good thing, since they were 10 feet down when they hit water. Paul inserted a length of large-diameter PVC pipe into the water at the bottom of the hole, which he then backfilled. He attached a rod to a toilet ball float and put it in the pipe. The float rose and fell with the tide. Students sat by the pipe and recorded the level hourly. As the tide rose, air was pushed up through the nests, providing oxygen and flushing away carbon dioxide. Of course, in the early days at Tortuguero, even simple supplies like PVC pipe and a toilet bowl float would have required advance planning to order them from Limón and be sure someone was on hand to take delivery.

### **Running with Harse**

There is an oft-told story of Chuck Carr as a young man racing down the beach on a horse at full gallop, stopping only to flip turtles lying helpless on their backs, awaiting the return of machete-wielding poachers. When asked about the incident, Chuck's mouth twitched up in the wry smile that makes him look a little shy and maybe a bit embarrassed. He said that the story had been somewhat embellished over the years. He did have a horse with him. It was Leo's old horse Harse, and it was more a matter of dragging Harse along behind him as he ran down the beach. It was true, though, that he was flipping turtles, to give them a chance to make it back to the sea before dawn, when the poachers would be back to harvest the valuable calipee.

Like the veladors of old, the poachers turned turtles as they came ashore to nest. The next day, however, rather than facilitating the short trip from the beach to the Bessie, the poachers slaughtered the turtles on the spot. The activity was now illegal, so the poachers worked in haste, taking only the easy-to-carry, easy-to-market calipee, leaving the turtles to die on the beach and their meat to go to waste. Chuck doesn't remember exactly how old he was on that heroic night, but says

he must have been really young to be that stupid. The machetes the poachers carried were long and sharp, and the outlaws were intent on protecting their precious illegal harvest. The Black Panther, the leader of the poachers Chuck was outrunning, was known for his cruelty. According to Larry Ogren, he put out the word that he would kill that Carr boy if he showed up in Limón.

### **Best-laid Plans**

Archie Carr as a naturalist resisted the trend toward molecular biology and high-tech science. Yet when technologies were developed that could help him learn about sea turtles, he welcomed the opportunity. Therefore, he was greatly excited when he was granted an electronic address on the Nimbus II satellite, which was launched in May of 1966. The satellite would be able to accurately track a sea turtle on its travels through the seas! Through his tag-and-recapture programs at Tortuguero and other sites, Archie had learned that the old fishermen were right—turtles did travel great distances and return to the same beaches to nest. Tortuguero turtles often showed up in the sea grass beds of Nicaragua several hundred miles away, and tagged turtles returned to Tortuguero to nest after two or three years' absence.

Turtles that nested on the beaches of Ascension Island in the South Atlantic traveled to feeding grounds off the coast of Brazil—a distance of 1,400 miles—and back to Ascension when they felt the urge to reproduce. Ascension Island is a 7-mile-long strip of volcanic rock about midway between Africa and Brazil; there are no landmarks between the two points—only open sea. Even mariners equipped with the most sophisticated equipment available had trouble finding the tiny island. For a turtle, the feat of navigation was stunning, and biologists hungered to know how they accomplished it.

Dr. Carr dreamed of all the great data that would be collected by the satellite, while consultants designed a radio transmitter that the chosen turtle would drag behind as she

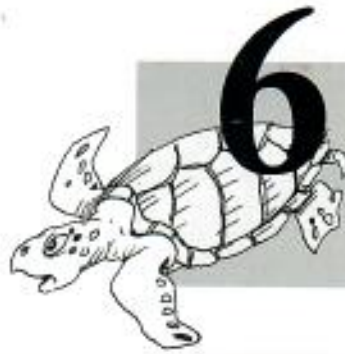


traveled. An amazing device was completed and delivered to Archie. The tubular metallic machine had an antenna, a lead keel, and a propeller that would record the turtle's speed through the water. The equipment would transmit data, including the exact location of the turtle, to the Nimbus satellite, which would transmit it to a station in the United States. Archie made the long flight on an air force cargo plane to Ascension Island, where he supervised the attachment of this custom-built device to the shell of a nesting turtle. Carr believed that the satellite information would provide insight into the turtle's route and navigation methods as she made her way to Brazil or to some other destination they did not yet know about.

In an article for *Conservation Biology*, Chuck Carr wrote about the excitement in the Carr household before the trip and the family's anticipation as they waited two weeks for the traveler's return. The children questioned their father eagerly, and learned that Ascension Island was remarkable and that the turtles were larger than those of Tortuguero—many weighed as much as 500 pounds. Chuck wrote:

But Daddy, Daddy, what about the transmitter?" we cried. "What about Nimbus II?" Mother gazed at him, alarm growing in her knowing eyes. "The radio flooded," Daddy said with disgust. "We wired it to the turtle. She walked off the beach into the sea and the radio filled with water. It cracked and popped. The radio was not waterproof. They forgot to make it water proof!"<sup>15</sup>

Technology has changed, but the need to know has not, and as Archie Carr learned on Ascension Island, even high-tech methods can—and often do—go wrong. Biologists are still driven by a passion to understand what makes the planet tick. And the importance of understanding the intricately woven web of life on earth is becoming more evident every day as we face climatic changes and an unprecedented number of extinctions.



In 1998 Leo Martinez celebrated his 80th birthday. Larry was working on a leatherback project in Parismina at the time and made a trip to Tortuguero to wish his old friend a happy day. Two years later, unable to be in Tortuguero to celebrate with Leo, Larry sent him this photo framed with the message below.

*To Leo Martinez  
In Celebration of Your 82nd Birthday  
My Unforgettable Compadre Who Shared His Ranch  
And So Much More With Me in Those Early Years  
My Warmest Greetings to You.  
Larry Ogren*

## And Life Goes On

**I**T HAS BEEN almost 60 years since Archie Carr started the world's first sea turtle research and tagging program in Tortuguero. Larry Ogren, Harry Hirth, and the other early researchers were called "marooners" because of their isolation from the world. But although they lacked what most of us consider the most basic of necessities, they adapted. They depended on the local people for friendship, food, and guidance. They learned to improvise and do without, and they devised simple methods to learn complex truths about turtles. The hardship they endured and the ingenuity it spawned followed them through life; their work is the foundation of turtle biology and of conservation biology, as well.

Larry Ogren maintained an association with the CCC/STC throughout his career. He returned to Costa Rica often to assist with various projects and even now is an emeritus member of the STC board of directors. Larry's life path was set in Tortuguero. He devoted his career to the protection and conservation of marine turtles. In Florida, as the specialist in endangered sea turtles at the National Marine Fisheries Service, he reviewed research showing a direct correlation between the opening of shrimping season and the number of dead turtles washing up on the shore. To reduce this mortality, he searched for a method to protect turtles from shrimp trawls—a method that would have minimal impact on the harvest.

Trawls are nets that are pulled behind a boat, or two boats working together. When the nets are deployed, air-breathing turtles get caught in the mesh and drown. TEDs (turtle excluder devices) are devices that allow turtles to swim out of the nets while keeping most of the shrimp inside. Different



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models have been tried, but all allow some of the shrimp catch to escape along with the turtles and other bycatch, a result that made shrimpers reluctant to use the excluders.

Larry donned scuba gear and followed shrimp trawls to



TEDs attached to shrimp nets allow shrimp to be netted while preventing turtles and other large marine life from getting swept into the trawls.

The turtles, Larry found, were leery of the big nets and tried to stay ahead of them; when they tired, however, they slowed down and soon became entangled. Larry, working with the Gear Research Team from the Pascagoula, Mississippi NMFS lab, studied trawls fitted with different types of TEDs, hoping to identify the devices that were most effective for the shrimpers and least harmful to the turtles. Bolstered by his underwater research, Larry fought for the mandatory installation of the devices on shrimp trawls.

Most shrimpers, however, were very much against any measure that would force them to acquire and use TEDs. Thus the devices, meant to be a compromise to allow both shrimpers and turtles to survive, were instead a source of bitter controversy and rebellion. The fight was long and heated, but in 1987, the Florida legislature passed a law requiring all trawling shrimp boats to equip their nets with TEDs. Two years later, Congress enacted the Shrimp-Turtle Law, which requires all countries that export shrimp to the United States to certify that only boats equipped with TEDs had harvested the catch.

watch the behavior of turtles when the nets approached. Perhaps the correlation reported between turtle deaths and the start of shrimping season was a coincidence. Perhaps the TEDs could be modified in a way that hadn't been tried yet, a way that would keep all the shrimp in the net.

Larry, who never misses an opportunity to find a note of humor, even macabre humor, tells a story of a demonstration by shrimpers to protest the new legislation. During a Florida Marine Fisheries Commission meeting in Tallahassee, shrimpers and their supporters were gathered in front of the capitol building with signs proclaiming "STOP TED." They were soon confronted by an opposing group bearing "SAVE TED" signs. It seems the second group thought the shrimpers' signs referred to the impending execution of Ted Bundy, the serial killer. Knowing nothing of shrimp or turtles, they'd assumed that the trawlers were supporters of the death penalty and hastily made signs of their own to protest the "TED" protesters. Both groups were unsuccessful.

### **Other Tortuguero Veterans**

Archie Carr not only passed on his passion to his students but taught them, through his own writing, the importance of being able to write and speak clearly and simply about complex subjects. The names of many of the Tortuguero veterans have become legendary in the annals of marine turtle biology and conservation biology. Harry Hirth is a professor emeritus of biology at the University of Utah. David Ehrenfeld, a professor of biology at Rutgers University and the first editor of the journal of *Conservation Biology*, is the author of several popular books. James Spotila's books include *Sea Turtle* a beautiful full-color volume on the biology, behavior, and conservation of sea turtles, as well as *Saving Sea Turtles*, a good read on the biologists and processes of sea turtle biology that have contributed to our understanding.

In the mid-1970s, researchers learned that the sex of certain species of freshwater turtles was determined by the temperature in their nests. Spotila and another biologist, Ed Standora, were curious to know if the same thing occurred in marine turtles. Invited by Carr to come to Tortuguero to study the matter, they recruited David Ehrenfeld; soon the three

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had put together a team of research assistants.

The project was well timed, for until very recently, measuring the temperature in a well-buried sea turtle nest had been impossible. Spotila, Standoro, and Ehrenfeld, however, were able to use a new thermocouple device to capture accurate measurements of the temperature in a nest. The team discovered that during a certain period of sea turtle embryo development, temperature is indeed the factor that determines sex in the hatchlings. Specifically, cooler temperatures produce males and warmer temperatures produce females.

### Archie's Angels

The last three graduate students Carr accepted, all female, came to be known as Archie's Angels. Larry says, "Carr loved those gals. They were dedicated scientists, who went to any lengths to accomplish their goals, they caused no problems,



Karen Bjorndal  
checks a  
nesting turtle.

and they kept good field notes, and even more importantly, wrote and published papers on their work." All three are now among the leading sea turtle biologists in the world.



The first of the trio to study with Carr as a postgrad was Karen Bjorndal, who is now the director of the Archie Carr Center for Sea Turtle Research at the University of Florida. Recognized today as the world's leading expert on *Chelonia mydas*, the green sea turtle, as Archie's student she studied the animal's diet and digestive processes. She put diapers on captive turtles so she could poke through their poop to find out what it contained and how well that food had been processed.

After learning that in the Caribbean *Chelonia's* diet consisted almost exclusively of sea grass, she studied grass beds. Dr. Bjorndal was the first to note that green turtles have a marked effect on sea grass beds, and she was quick to point out that their extinction could change the ecology of tropical seas.

Another angel was Anne Meylan, who did her doctoral thesis on the feeding ecology of hawksbill turtles. She learned that adult hawksbills dine almost exclusively on sponges. But the startling discovery was that they show a preference for species that contain needlelike silica spines, called spicules, which can puncture or lodge in the hawksbill's internal organs; these sponges also produce toxic chemicals. To build up a tolerance to the sharp spikes and the toxins, the juvenile hawksbill changes its diet gradually, to condition its digestive system to accept the noxious materials. No one knows why the turtles undergo this difficult process, but biologists note that



Anne and Peter Meylan, both turtle biologists, work together to weigh a turtle.

the silica-bearing sponges are a food source for which there is very little competition.

The discovery that hawksbills eat glass cost Anne a hand. While she was examining the stomach contents of a hawksbill, some of the silica spicules stuck in her right hand and broke off beneath the skin. Years later a tumor formed around a shard in one finger and spread to her right hand, which had to be removed; but her energy and dedication to her work were unscathed. Dr. Meylan is a senior research scientist with the Florida Fish and Wildlife Conservation Commission in St. Petersburg.

The third angel, Jeanne Mortimer, has studied sea turtles in some 20 countries with emphasis on the Seychelles, an island group in the Indian Ocean; she has written extensively for both adults and children. Jeanne scored a spectacular success for the turtles when she took on the U.S. Air Force to protect a nesting beach. She'd learned that the military was about to build a new runway on Ascension Island and wanted to source the concrete aggregate locally. The plan was to remove sand—tons of it—from an important nesting beach. Jeanne took her concerns straight to top brass in Washington and, as a result, the contractors were instructed to find their aggregate elsewhere.

Like Anne Meylan, Jeanne has also taken a special interest in hawksbills—one of the most seriously endangered sea turtles. Dr. Mortimer, who chairs the Hawksbill Task Force for the International Union for Conservation of Nature (IUCN) Marine Turtle Specialist Group, often speaks out on the subject. She says "Of all the species of sea turtles, the hawksbill has experienced the longest and most sustained history of commercial exploitation. Primarily as a result of this trade, hawksbills have declined by 80 percent or more during the last three hawksbill generations throughout their global range."<sup>17</sup> The exploitation here is not primarily for meat and eggs, though eggs are often taken, but for the hawksbills' beautiful translucent shells.

## TURNING TURTLES

had put together a team of research assistants.

The project was well timed, for until very recently, measuring the temperature in a well-buried sea turtle nest had been impossible. Spotila, Standoro, and Ehrenfeld, however, were able to use a new thermocouple device to capture accurate measurements of the temperature in a nest. The team discovered that during a certain period of sea turtle embryo development, temperature is indeed the factor that determines sex in the hatchlings. Specifically, cooler temperatures produce males and warmer temperatures produce females.

### Archie's Angels

The last three graduate students Carr accepted, all female, came to be known as Archie's Angels. Larry says, "Carr loved those gals. They were dedicated scientists, who went to any lengths to accomplish their goals, they caused no problems,



Karen Bjorndal checks a nesting turtle.

and they kept good field notes, and even more importantly, wrote and published papers on their work." All three are now among the leading sea turtle biologists in the world.



## Coconuts Falling Near the Tree

And of course, there were the Carr offspring. With both parents celebrated conservationists, Archie and Marjorie's children acquired a reverence for the world around them. They all visited Tortuguero as youngsters and as teenagers, and each of the four boys spent at least a season or two working the turtle beach. Mimi, the oldest of the Carr flock, became an actress. She has expressed her love of nature and her family heritage through videos such as *Celebrating a Forgotten Place: The Carr Family Cabin in the Florida Scrub*.

Chuck, as senior conservationist with the Wildlife Conservation Society, was in charge of the group's projects in Central America. Now retired, he serves on the board of directors of the Sea Turtle Conservancy, farms a portion of the family land near Gainesville, and keeps bees for delicious wildflower honey. He is also a talented writer and has contributed generously to this book.

Steve spent numerous seasons studying Gulf sturgeon on the Suwannee River. The task entailed netting the big fish, then measuring, tagging, and releasing them in a procedure similar to that used in the turtle work.

Tom was described by David Ehrenfeld as one of the best naturalists he had ever known—possibly even better than Archie. Tom, always something of an adventurer, has channeled his appreciation for nature into designing educational, ecosensitive tours to wilderness areas all over the world. Larry Ogren has very fond memories of a rafting trip down the Rio Plátano in Honduras with Tom as his guide. With a chuckle, Tom recalls that they started the trip on muleback. Larry was a little hesitant about riding a mule,



Chuck, David and Tom Carr. Life choices for all of the Carr children reflect their parents' dedication to conservation biology.

## TURNING TURTLES

so Tom made sure he was given a docile one. Her name was Muñeca, which means "doll" in Spanish. Larry grew fond of Muñeca and was afraid she would get lost trying to find her way home after he and Tom had left the mules to continue their journey by raft—he wanted to share his raft with her. The mule, however, made its own way safely home.

David, the youngest son, worked at Florida Defenders of the Environment and the Caribbean Conservation Corporation and served on the staff of the Agriculture and Natural Resources subcommittee of the Florida House of Representatives. David and his wife, Peggy, a University of Florida professor, bought a property near Gainesville that was threatened by development. On the outskirts of the picturesque little town of Micanopy, they renovated the old gas station as Pearl's Country Store and Barbecue, now a highly rated restaurant and catering service.



Over lunch in January, 2013. Larry and Tom reminisce with much laughter and camaraderie

Tom Carr died in November 2013.

Following Tom's death, his brother, Chuck, told Larry, "You were always his hero." Larry says, "I didn't know how to respond to that, because Tom was my hero. He was such a free spirit. Always ready for an adventure."

While working for NMFS, because of Tom's fluency in Spanish, Larry was often able to employ him as an interpreter for field trips and aerial surveys of nesting beaches. In 1978 they went to Rancho Nueva, Mexico just prior to the annual Kemp's ridley arribada as an advance team to check nesting conditions and local reactions. By day they posed as entrepreneurs looking for a site to open a fishing lodge. By night they coaxed an old VW beetle into areas where outsiders were not welcome and where most 4WD vehicles would have difficulty.

### Upgrades and Modernization

David Godfrey came to work for CCC (now STC) in 1993 having spent the previous five years working for Marjorie Carr. In 1997, a few days before his 30th birthday, he was appointed executive director and holds that position today. As a birthday gift, Archie's widow had a courier deliver a note and a package; the note said that Archie would have been proud to have David as a part of CCC. The package contained a pre-Columbian carved stone sea turtle that had been Archie's. Marjorie Carr, who clearly expected great things from her protégé, would not be disappointed if she were alive today to savor his accomplishments.

Godfrey guides the international organization through the hurdles of fundraising, strategic planning, and managing staff, as well as communicating the message of sea turtle conservation to the media, the public, and elected officials. He identifies threats to marine turtles and their habitats, seeks solutions to these threats, and campaigns to bring about policy changes that address the problems. An energetic, personable organizer, he surrounds himself with dedicated staff who share his passion for their mission. Under his directorship, not only has Tortuguero's John H. Phipps Biological Field Station expanded and modernized, but the STC has established a variety of programs in the United States and Panama. The organization is an international leader in establishing policy and fighting to save marine turtles from extinction.

Larry Ogren says that one of the good staffing decisions Godfrey made was to hire Sebastian Troeng as the station's scientific director. Between 1997 and 2006, Sebastian reorganized, updated, and improved research, data collection, and recording techniques. Dr. Troeng is currently a senior vice president with Conservation International.

Larry first met Sebastian Troeng when the new scientific director called him for advice. Jaguars had been killing turtles and leaving the corpses behind on the beach. Sebastian had



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*Since the early days in Leo's house, the Tortuguero marooners have enjoyed three homes.*

*Top: The house designed by Carr and built on Leo's property. The stilt structure, built on a concrete slab, was an innovation for Tortuguero. It lifted the living area up to catch the sea breezes and provided covered storage and work space below. Leo collected many loads of rock and gravel in his cayuca to construct the concrete slab.*

*Middle: Casa Verde, remembered fondly by many Tortuguero veterans.*

*Bottom: The concrete block structure which replaced Casa Verde, provides both housing and workspace for modern marooners.*



been gathering and burying the victims, but the next morning there would be more. Knowing that jaguars like their meat aged, Larry suggested leaving the dead turtles on the beach. He explained that the predators had been killing turtles, eating a few choice parts, and abandoning the rest to allow it to ripen. But when they came back the next night and found that their stash had mysteriously disappeared, they simply killed more turtles.

By the late twentieth century, jaguars had almost disappeared in Costa Rica, but thanks to the country's aggressive conservation programs their numbers now are growing. Jaguars still prey on turtles, but natural predation is sustainable, while exploitation is not. In an interview published online, Julienne Gage emphasizes this point by quoting Dr. Troeng: "Never before has there been the level of global awareness of the need for a healthy planet to ensure human well-being and survival that there is today. . . . Fortunately, because ocean degradation and poor management are caused by humans, it is also within our power to resolve these problems."<sup>16</sup>

### What's Happening at the Station?

Key STC personnel in Costa Rica as of 2013 include Costa Rica director, Roxana Silman, and scientific director, Emma Harrison, both based primarily in San José. Field coordinator Catalina González and station manager Randall Torres oversee operations at Tortuguero, and education coordinator Juan Guerrero is in charge of outreach projects.



Emma Harrison, STC scientific director, and the author (left) in San José, Costa Rica.



## TURNING TURTLES

Field research coordinator Catalina González Prieto explains the nesting data displayed in charts posted in the Phipps station work room.



Argentinian Alan Rosenthal, a research assistant, relaxes with his laptop.



Over the years, the infrastructure has grown and evolved from the earliest accommodations: first Larry's single bunk in the sawmill, then on to a room in the house of Leo Martinez and next, in 1960, to the simple stilt house a village carpenter, Chico Montalbán, built for the researchers on Leo's property. The stilt house was a virtual palace for the marooners.

A few years later, in 1963, Billy Cruz helped the CCC purchase a green wooden building that had been built and briefly used by the United Fruit Company. It came to be known as Casa Verde (green house) and served as home for the station for 30 years. Staff and volunteers struggled to stay ahead of the termites, dampness, and rot that consume wooden



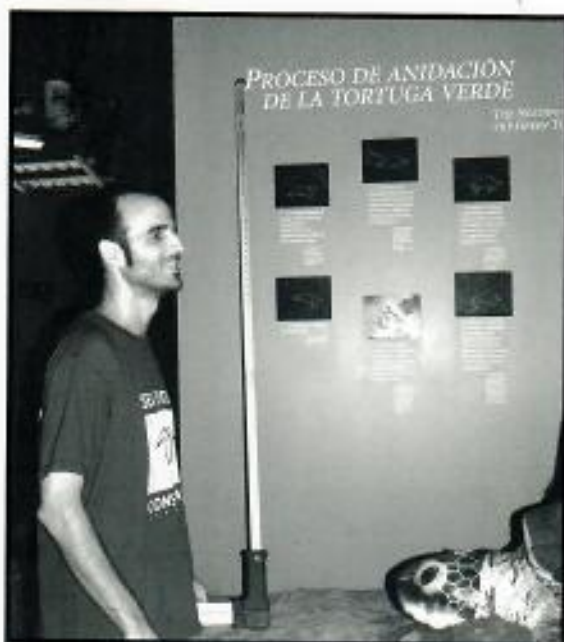
**TAGGING DATA**

In 1955, the first year of the tagging program, 644 turtles were turned between July 2 and August 29. Of those, 149 were recaptures, turtles that had been caught and tagged earlier in the season: of the 149, 44 were recaptured twice, 7 three times, and 2 were recaptured 4 times. The recaptures provided the first indication that turtles nest more than once in a season. Recaptures also allow researchers to follow a few turtles over a long period of time. In 2012, 740 previously tagged turtles were recaptured. Of those, 173 had first been tagged more than 10 years earlier, and 10 more than twenty years earlier. The longest recorded nesting history was a turtle last encountered in 2011; she was first tagged in 1980—31 years before.

In 2012, an estimated 172,760 green turtle nests were laid. Considering that most females nest from two to five times in a season, this would suggest a population of between 28,793 and 61,700 nesting females. Evidence of poaching of either eggs or turtles was seen on half of STCs daily surveys. Dogs destroyed nine green turtle nests and a minimum of 69 green turtles were killed by jaguars. STC researchers and volunteers put in more than 2,000 patrol hours between June 6 and October 31. On August 18, 3459 new nests were counted, the largest number for a single night. The number of nests fluctuates from year to year with 78,852 in 2011 and in 2010 180,310 green turtles nested on 18 miles of Tortuguero beach. On a single night, August 28, researchers counted 3,384 nests. The STC annual reports, published on the organization's website, [www.conserveturtles.com](http://www.conserveturtles.com), give detailed nesting statistics, as well as information on leatherback, loggerhead, and hawksbill nesting activity on Tortuguero beach.

structures in the jungle, but in vain. In 1995, too far gone to salvage, Casa Verde was torn down. Any salvageable materials such as corrugated roof panels, reusable wood, electrical, and plumbing materials were reused or donated to the village.

Today the Phipps Biological Research Station facilities consist of a concrete block dormitory and work building, a dining hall that doubles as a meeting and classroom building, a small museum and gift shop, and a video screening room. There is also a separate dormitory to house volunteers, who pay for the privilege of participating in the strenuous nightly beach walks and other station activities. Those activities now include outreach and education as well as turtle monitoring,



Education & Outreach Coordinator Juan Daniel Guerrero Blanco, from Spain talks to a new group of research assistants in the museum.

tagging, and research in both green turtle and leatherback turtle nesting seasons.

The STC employs approximately seven permanent staff in San José and Tortuguero, a dozen or so in the United States, and two in Panama, plus local cooks, building and maintenance personnel, security, and a boat captain. In green turtle season the station recruits research assistants, who in groups of six to eight serve 6-week internships; another smaller group works leatherback season, which occurs earlier in

the year than the green turtle nesting. The research assistants still walk the beach in the dark and face the same dangers and frustrations that challenged the first marooners more than half a century ago. Now though, they work a four-hour shift on the darkened beach, either from 8:00 p.m. until midnight or from midnight until 4:00 a.m. And of course, they perform other duties during daylight hours. Techniques have changed somewhat on the beach. Turtles are no longer turned—flipped over onto the back. The researchers decided that making the turtle lie on its back for hours put unnecessary stress on its internal organs—not to mention the indignity of the manhandling. Fortunately, with more people on the beach, the tagging and data collecting can be done on the spot. A hen that is making her nest and laying eggs is focused on the job at hand, in fact in a trancelike state. While she takes care of her business, the research assistants do the same. They affix a tag to her flipper, or if she already bears a tag they record the information. They weigh, measure, check for injuries and tumors, count eggs, and mark the location of the nest so it can



be monitored daily. The station now has electricity, running water, and a few window air conditioners. The change from the '50s and '60s is extreme, but the crew still works long hours, and though the isolation is not as absolute, there are still no roads and no cars in Tortuguero. The village has a few cafés, but running into Limón for a beer or to buy a new pair of shoes is not an option.

### Where Have the Turtles Been?

Tagging returns, computerized data, and new instrumentation have demonstrated in indelible terms that the uneducated coastal fishermen had informed Archie Carr correctly when he queried them about turtles. They knew, because they knew the sea, that sea turtles traveled the globe and came back to their natal shore to reproduce. The tagging program showed it to be true. But we had to wait by the sea for the tags to come back.

When turtles crawl up on the beach wearing Tortuguero tags, we know they have been there before, and we know whether it was 2 weeks ago or 20 years ago. Tags showing up back at Tortuguero in the years after the inaugural tagging in 1955 proved beyond a shadow of a doubt that turtles return to the same beach. Data gathered on the beach at Tortuguero has provided much information on the turtles' nesting behavior, but one of the earliest questions remains: Where have they been? The all-important answers are provided year after year by tags that are sent back from far places. Unfortunately, a returned tag usually means a dead turtle, one that has been caught in a shrimp

Transmitters are affixed to a turtle's shell in a way that allows maximum service life for the equipment without harming the turtle.





## TURNING TURTLES

net or washed up on a distant beach, where someone has noticed the tag and removed it. All the information from the returned tags, and from the historical record, is used to chart turtle migrations. Tagging data accumulated over decades has demonstrated that sea turtles travel hundreds or thousands of miles between feeding grounds and nesting beaches, even when



Indira Torrez Ocampos (left), manager of the station gift shop, enjoys browsing old station photos on the author's iPad along with Noel Lau Hernández, a guide (center), and another unidentified guide.

there are other feeding grounds located much closer to their nesting beach.

New technology retells old stories in more precise scientific terms, showing clearly that sea turtles are global animals. In the old days, the tags showed that turtles consistently returned to the same beach—perhaps, many suspected, the beach where they were hatched. But because hatchling turtles had not been successfully tagged, there was no data to support that supposition. Now detailed migration records have been supplemented by DNA analyses, and individual turtles can be identified with a particular beach. DNA results can also demonstrate that some of the turtles feeding in Nicaragua also nest on Tortuguero beach. Similarly, turtles feeding in Brazil nest on Ascension Island. Not only can we identify turtles by DNA, but Archie Carr's dream of tracking turtles by satellite is now a reality. Scientists can follow a turtle on its travels around the world, and so can you—by going to the STC's website, [www.conserveturtles.com](http://www.conserveturtles.com), and clicking on "Track a sea turtle."

To allow people to follow a turtle on its travels, researchers

attach a waterproof platform terminal transmitter (PTT) to its back by a method that neither harms the turtle nor interferes with its movements; the expensive tracking devices continue to work for up to a year, then fall off harmlessly. Two methods are used to attach the PTTs to hard-shell turtles, and a third was devised for the soft-shell leatherback.

### **Tour de Turtles**

Each year since 2008, STC has hosted Tour de Turtles, an Internet-based interactive turtle migration marathon. It is a fun and educational way to focus worldwide attention on one central fact: marine turtle survival is a global problem that cannot be resolved without international cooperation—our turtles are your turtles. Tortuguero can't protect its turtles if Nicaraguans dine on turtle soup.

In Tour de Turtles, more than a dozen turtles are fitted with transmitters and followed for three months from their nesting beaches as they travel to their foraging grounds. Each turtle has a page on the Tour de Turtles website, where photos and interactive maps let visitors to the site track its movements. The turtle that travels the farthest in three months is proclaimed the winner. Turtles can also win in the Causes Challenge, so named because each turtle represents a particular threat to sea turtle survival. Fans can donate to their cause and the turtle that raises the most money is declared the winner.

Tour de Turtles is designed to raise awareness of sea turtles and the challenges they face, and the scientific community benefits from the data collected on little-known migration routes. To help school children enjoy the fun of the Tour, a free educators' guide is available for teachers. Only the combined efforts of the world community can ensure the survival of sea turtles. The more we know about where they live and how they make their living—the better their chances of survival.



Eighty-five year old Bill Sambola has seen many changes come to the Bogue. His love and knowledge of his home make him a popular guide.



## It's Still Pura Vida in Turtle Bogue

**T**HERE IS A clatter of activity at La Pavona boat launch. Returning tourists grab the hands of grinning guides and jump from open boats, landing with a wet splat on the sand. They watch anxiously for their luggage, which will be tossed from a multicolored pile remaining on their boat or come pattering up in a separate luggage boat. The ever-cheerful guides sort the gaggle of incoming and outgoing tourists and their accoutrements—sending some toward the waiting buses and helping others make the long step from shore to ship.

My friend Mary and I had been picked up from our San José hotel at 6:00 a.m. by a modern bus that belonged to Pachira Lodge. We had managed to hitch a ride to the village of Turtle Bogue because we were booked to spend the last few days of our trip at Evergreen, Pachira's sister lodge. Our guide was already on board, providing a barrage of chatter in alternating English and Spanish, his voice overriding conversations in a variety of languages, creating a pleasant babel. The bus trip from San José had taken approximately five hours, including a stop for breakfast. The journey by boat to Tortuguero would take another hour or two.

I exchanged greetings with Noel, a guide I knew from a previous trip. Instead of squeezing Mary and me onto the crowded Pachira boat, he helped us secure seats on a boat transporting workers to the various lodges, making sure the captain understood that we were to be dropped off at Miss Junie's. We grabbed outside seats near the front on opposite sides of the narrow aisle. I thought wistfully of Larry flying in

## TURNING TURTLES

on the Aerovias Costarricenses Cessna and being paddled down the lagoon by Bertie. But both the airline and Bertie are long gone. Now a small passenger plane makes daily flights from San José to a landing strip where boats wait to motor passengers on to the village or surrounding lodges. The bus/boat trip takes longer, but is fun and less expensive; the lodges include it in their package prices.



Visitors arriving by boat are welcomed by giant sculptures overlooking a pretty park.

### Welcome to Turtle Bogue

The village is much changed since Larry Ogren lived there with Leo Martinez and took his meals with Sibella, Leo's sister. Sibella's house is gone and, according to Dorling Taylor, the El Collbri souvenir shop and Buda's Caffè occupy the site of Leo's house. Our boat dropped us on the sandy shore of Miss Junie's property. Her grandson Byron, who'd come down to greet us, dragged our luggage up the steep bank and over to the lodge reception area. After settling in, we wandered into the village and stopped to watch the tourist

## STILL PURA VIDA

boats tie up at the small waterfront park in the center of the village, under the watchful gaze of two giant colorful statues, a toucan and a parrot. The unpainted thatch-roofed houses are gone—replaced by concrete block buildings roofed in tin. Paint colors are cheerful and bright, and several buildings are adorned with colorful murals of local wildlife and other subjects. The sea turtle is commemorated in concrete statuary, murals, and mosaics, as well as in knick-knacks and jewelry displayed in the several souvenir shops. There is a school and a grocery, a few restaurants, and basic tourist accommodations. The village now stays in touch with the rest of the world through mail, telephone, and e-mail, but communication can be iffy, depending partly on the weather.

Despite the advent of tourism, the village feels authentic. It lacks the slick, plasticized, commercial display of many modern tourist venues. The artwork designed to entice visitors has a primitive charm that suits the setting. The people are open and friendly, and the few restaurants serve up local

There are no cars or trucks in Tortuguero. Goods brought in from Limón on small boats are moved about the village on handcarts.





dishes, although what is offered does not always jibe with the menu. Shipments from Limón are more reliable now, but as before, much depends on what is available on any given day. Local fish dishes are still popular if someone has caught fish, but the daily fare does not include turtle, manatee, or tepezcuintle!

There are still no roads leading to Tortuguero, though one paved street stretches from near the ranger station at the national park through the village, ending abruptly at Miss Junie's wooden gate, with its hand-carved, wooden sea turtle. Transportation in the village is by foot, boat, or bicycle. Young men with rubber-wheeled pushcarts collect goods from wooden docks, deliver them to waiting merchants, and return with cases of empty beer bottles. Sand paths lead to the school and houses that sit away from the single center street. In the village proper the street no longer meanders around coconut trees. Coconuts still grow on Miss Junie's property, however, and you will do well to stay on the path if it is the season for falling coconuts. There is even an Internet café, though Wi-Fi service is spotty. For tourists, home seems a long way away—another world. Older residents probably share that feeling of disconnect from a familiar lifestyle. For them, changes to the village must seem rapid and radical.

### **First Family**

The history of the Martinez family is the history of Turtle Bogue. Walton Martinez, a ship builder and trader from San Andres, Colombia, knew the Bogue as a place of great numbers of turtles and therefore a place with good prospects for making a living. Economic conditions were changing in Colombia in the early 1920s, and some of Walton's nine children had moved away. The patriarch then determined that it was time to relocate the remaining members of his household. When he decided on the move to Turtle Bogue, he sold his business interests in San Andres and sailed to Tortuguero with Leo, his youngest son, to

establish a homestead. There were a few turtle harvesters living there at the time, and Martinez gradually bought their land. Eventually all but two of his children joined him in the Bogue.

Leo's job in the early years was to raise chickens and pigs, as he had done in San Andres. Edna Gail Dases, who interviewed Leo at the turn of the century, quotes his recollections of his youthful responsibilities: "It was my responsibility to walk over to the old volcano, which we now call the cerro, and round up our pigs which freely pastured there. . . . In those days, there were many tigers [Central American people often refer to jaguars as tigers] living there and they would follow the pigs. It was a hard and dangerous chore."<sup>18</sup>

By the time the turtle station opened, Walton Martinez had died. But Leo and his brothers Sam, Obid, and Shefton worked with the turning and tagging program, while their sister, Sibella, and later her daughter Junie, cooked for the biologists. Miss Junie's cooking is remembered with fondness by the many researchers who have eaten at her table, and the old-timers praise her mother's cuisine, as well.

Miss Junie has not given up cooking for hungry gringos. She now owns a hotel and restaurant, and at 75 still does much of the cooking. She is the head of a strong family unit, the next generation of which consists of her children: five



Taking a break from her busy day, Miss Junie relaxes on a bench outside of her home.

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daughters, Karol, Noly, Purl, Dorling, and Karla, and her son Cleoid; a daughter, Gloria, is deceased. And then there are grandchildren, siblings, cousins, nieces, and nephews. Miss Junie's property sits between the village and the turtle station, which makes it convenient for her to maintain a warm relationship with the biologists. The hotel is rustic and charming, but a spot on the end balcony gets pretty good Wi-Fi reception. With your back against the upper-level porch railing, you can view the sea to your left and the lagoon to your right while finding a tenuous e-mail connection to your other life.

The station now has its own kitchen. When I visited in August of 2012, Juanita Fernandez and Miss Junie's cousin



Miss Junie's cousin Eliza Alvin Garcia (foreground) carries on the family tradition of cooking for the biologists along with Juanita Fernandez (background).

Eliza Alvin Garcia were cheerfully chopping vegetables for the evening meal. Most of Miss Junie's family members, however, are involved with tourism. The whole family seems to pitch in to help with the lodge and restaurant, with grandson Byron taking a leading role.

Dorling owns a bakery in the village, and Noly guides tourists eager to view nesting turtles; Cleoid is a nature guide for one of the nearby lodges, and Karla, a naturalist, operates her own business.

Karla was one of 22 Costa Rican students chosen from among several hundred applicants to be awarded a scholarship by the University of Pennsylvania to study taxonomy. The classes were primarily held on the mountains and in the forests of Costa Rica. After completing the course, Karla accepted a job with the privately funded National Institute



of Biodiversity in the western part of the country. For seven years she worked on their initiative to inventory every living species in Costa Rica—a daunting task considering that Costa Rica, though covering only 0.03 percent of the planet's surface, contains 5 percent of the world's biodiversity, a density unmatched anywhere else on earth.

Karla later worked for several tourism companies, but she missed home and wanted to be her own boss. She moved back to Tortuguero and started her own business: Karla Taylor—Travel Advisor. Karla, who offers various travel services, has been described as “a walking encyclopedia of lore about Costa Rica's flora and fauna.” She specializes in canoe trips on the rivers and canals. Miss Junie's youngest daughter says the best thing about being a guide is that it allows her to “see the world through other people's eyes.”

*Karla Taylor, Travel Advisor, chats with the author on the balcony of Miss Junie's lodge.*

Bill Sambola, another popular canoe guide and close friend of the Martinez family, was one of the men who paddled up the Agua Fria in the dark to rescue 14-year-old Chuck Carr and biologist Harry Hirth. Mention the incident to Bill today and he slaps his thigh and shouts, “Hah! Chuck!”



and laughs long and hard. Bill says he has been “pushing” a canoe through the waters of Tortuguero since the age of 6. As a young man he worked for the turtle station, and at 85 he paddles his canoe with up to four passengers on round-trip explorations lasting 4 hours.

Mary and I joined Bill for a canoe tour. He likes to leave around 5:00 a.m. to beat the other boats to the ranger

## TURNING TURTLES

station, where everyone must pay the \$10 park fee. After paying, we headed across the lagoon, threading between boats now waiting their turn to get to the ranger station. On the far side, Bill slipped the canoe into a slough that reached a narrow finger into the dense jungle. As he paddled, he spotted wildlife, identified the flora and fauna of his home, and regaled us with local lore. Back on the shore in front of Miss Junie's, he spent an hour or so calmly wielding a machete to chop away the outer shells of green coconuts, a local skill that has you holding your breath as the blade descends toward each coconut, held in the machete expert's unprotected hand. Mary and I hung around to watch him work, and he paused to whack off the top of three of the denuded coconuts, creating a "pipa" of refreshing coconut water each for Mary, me, and Karla's young son. Before heading home, Bill loaded his canoe with scraps from Miss Junie's restaurant to feed his chickens.

After paddling a canoe for four hours, Bill Sambola still has plenty of energy for wielding a machete to hack away the outer shell of coconuts to ready them for sale as refreshing pipas.



### The Bogue Today

For the most part, the attitudes of the families who have lived in Tortuguero for generations have evolved with the times.

Their tongues may occasionally long to savor the flavor of a good turtle stew, but intellectually they recognize that they can live better by not eating the turtles. Turtles bring the tourists, and tourists bring the money that allows the village to not only survive but thrive.

The turtles, however, didn't bring the first tourists to Tortuguero—the fish did. Giant tarpon and snook drew a few hardy fishermen when turtles were still a menu item. But once the turtle station was in operation, Dr. Carr and the CCC began bringing people to Tortuguero to see for themselves the overharvesting and the critical decline of the turtle population. Arribadas of scientists, politicians, environmentalists, and journalists descended from tiny aircraft, where they'd been packed in with bedding, ice, beer, and other local necessities. They were willing to endure difficult travel and primitive living conditions just to see twentieth-century descendants of an ancient species drag themselves onto the beach to lay their eggs.

Carr told the people of Turtle Bogue that many other visitors would come for the turtles if the village welcomed and accommodated them. For the people of Tortuguero, nesting turtles were not unusual or special—they had always been there. Turtles were dinner and a source of income. As the village reached out to the trickle of specialists arriving with Dr. Carr, however, they saw that outsiders found something special and exciting in the turtles. And they began to believe



Lauren Murdock and Trevor Bringloe of New Brunswick, Canada, relax on Miss Junie's balcony. The two young biologists were drawn to Tortuguero by the prospect of seeing nesting turtles.



TURNING TURTLES



Tortuguero now boasts a small market, and though guaro is no longer delivered weekly, cases of beer are brought in by the boat load.

Carr's prophecy that the turtles could provide sustenance for the village without going the way of the soup pot. Slowly tourism began to grow, and the villagers adapted to take advantage of the new source of income. Turtles are still the focal point of the tourist industry, but the tropical environment and the abundant birdlife draw visitors year round.

Many of the villagers, like their parents, have lived their entire lives in Tortuguero. They have a strong sense of place—of home. They were practically born with canoe paddles in their hands; they respect but do not fear the limitations and dangers of the waterways and the jungles of their land. They learn early not to walk under the coconut trees, and they're taught at a young age where the crocodiles hang out. The older residents have fond memories of Archie and Marjorie Carr, Larry Ogren and Harry Hirth, and the Carr children. The stories have passed through the generations until some of the younger ones, who never really knew Carr-the-man, have almost deified Carr-the-savior of turtles and the village, speaking in hushed tones of the great Dr. Carr and his good works. Dr. Carr was no god, but he respected the people of Tortuguero and was concerned about their needs as well as those of the turtles.

Most of the residents of the village are involved in one way or another with the tourist trade. Ecotourism has also brought new residents to the village to take advantage of the influx of money, and there is some resentment of the newcomers. The old-timers say the outsiders come only for



Some things haven't changed. The coconuts on Miss Junie's property are still harvested by climbing the tall palms.



**THE DOWNSIDE OF ECOTOURISM**

Ecotourism is not a clearly defined term, and the intent of idealistic early promoters can easily become distorted. The practice usually begins with guides bringing small groups into ecologically sensitive areas to learn about, photograph, and enjoy the beauty of a pristine ecosystem. Serving the needs of these visitors also means income for area residents, and that is a good thing. Communities such as Tortuguero, impoverished only a generation ago, are thriving because of ecotourism. Then growth happens. It is only natural that as word spreads, more and more visitors want to come. The community must expand accordingly, and outsiders move in to take advantage of the opportunities. Campsites and rustic cabins lose ground to bigger and more luxurious accommodations.

Eventually, the operation is no longer ecotourism. It is just tourism. The environment is being degraded, resources are being used up, and the miracles of nature that initially brought people to the area are diminished. The balance that allows both the community and the environment to benefit is very delicate and must be constantly monitored.

Sales of tickets to Tortuguero National Park have grown from a few hundred a year after the park opened in the early 1970s to 117,341 in 2012. Costa Rica is trying hard to profit from tourism without destroying the very things that draw the tourists. To make the enterprise work, there must be cooperation from governments, businesses, and individuals, as well as constant oversight.

the easy money—they don't understand the history of the village or its ways.

Poaching continues to be a problem in the Bogue. Some like to blame the newcomers, who are not concerned with the long term. But Karla Taylor says the problem is bigger than that, observing that both long-time residents and newcomers play a role. The day before Mary and I arrived, there had been a demonstration to protest the lack of sufficient park rangers to protect the turtles. Karla said, with sadness in her voice, that the protesters were drawn mostly from her family and the biologists at the station. Some people still just don't understand.

The death in 2013 of Jairo Mora Sandoval introduces another grim note, suggesting that Costa Rica is not immune from the lawlessness that plagues other Central American



countries. Although the murder, and the kidnappings that preceded it, did not occur in Turtle Bogue, the fate of the young conservationist serves as a reminder that turtle poaching is still serious business.

### The Park

Walking along Tortuguero's main street, you pass a house offering mud boots for rent, cross a footbridge, and enter Tortuguero National Park. The path takes you to the park office located in what appears to be an old landlocked boat. Here you can pay the \$10 entry fee and hike the muddy trails. A

more comfortable way to see the park, however, is by boat. The park borders the lagoon and the sea and is networked with rivers, creeks, and canals. The canals date from the days when timber was being harvested in the rainforest and the logs were floated down the

lagoon, and then on to the sawmill. You can take a boat from the village, where there are a variety of options, from canoes and kayaks to the open boats with seats for 12 to 18 passengers. The bigger boats are long and narrow—designed to navigate the narrow waterways of the park and provide easy viewing for passengers.

Whatever boat you choose, the trained eye of the guide spots wildlife that otherwise would blend in with the greens and browns of the rainforest. Alerted by a knowledgeable guide, you may suddenly find a mossy lump high in a tree peering back at you—it's a sloth, slowly turning its head to



Open boats allow tourists a good view of the flora and fauna of the rainforest.

### SLOTHS

Sloths can sometimes be spotted snuggled into a tree fork or hanging upside down from a branch high in the rain-forest canopy. But they are hard to see. They can remain very still for a long time, and green algae growing on their shaggy coats provides effective camouflage. Costa Rica has two species of sloth, the brown-throated, three-toed sloth and the Hoffmann's two-toed variety. Their slowness of movement and general inactivity can be attributed to a very slow digestive process. They must conserve energy! Many herbivores digest food within a few hours, but it may take a sloth many days to digest a single leaf.

Sloths spend most of their time in the canopy, but about once a week they make a slow descent to relieve themselves at the base of the tree. The sloth does not urinate or defecate in the meantime and therefore may expel as much as one-third of its body weight in a single visit to the ground. Biologists don't know why the sloth doesn't just poop from a tree limb and let it fall.



This young sloth may be lost or may have just been making its way to the ground for its weekly toilet session when it found itself surrounded by a gaggle of turtle biologists. Can't a guy have a little privacy!

check out the activity below. Monkeys chase each other through the trees—three species, Geoffroy's spider monkey, mantled howler, and white-faced capuchin—live in the park. Near the boat, caiman, crocodiles, and river otters searching for a meal blend seamlessly into the water plants in response to the disturbance. Iguanas up to 5 feet long, sun themselves on tree limbs or on the bank, and exquisite birds are everywhere calling from the trees or fishing the shallows.

Tortuguero National Park was created in 1970 in order to protect the beach's green turtle nests, estimated at the time at 100,000 annually. It is by far the largest green turtle nesting beach in the Western Hemisphere. Archie Carr and his friend and ardent supporter Guillermo Cruz played an important role in the establishment of the 47,000-acre park that includes 22 miles

of beach and extends approximately 18 miles into offshore waters. Though sea turtle conservation was a primary reason for establishing the park, its boundaries also protect 11 highly sensitive types of habitat. Tortuguero National Park can be reached only by air or water, but despite its isolation, it is the third most visited park in Costa Rica, with 117,341 paying visitors in 2012.

### Turtle viewing in the park

During the day, canoes and other sightseeing boats come and go at will—as

long as they stop at the park office each time to pay the \$10 per person entrance fee. Turtle viewing, however, is much more strictly controlled. During turtle season, which runs from June through September, strictly regulated visits to see the

nesting turtles are arranged under the auspices of the national park; when the sun goes down, visitors are not allowed on the beach except in the company of a certified guide. In 2012 an average of 221 people per night for a total of 28,537 people were authorized to go on turtle tours. Guides take pride in their certification and donate a portion of their earnings back to the community.

Every night during the season, each guide is assigned by lottery an area of the beach and a time (8 p.m. or 10 p.m.). A guide may take up to 10 people in his time slot, with a maximum of 400 visitors allowed on the beach per night. The



Tourists wait at a numbered path until a turtle is spotted, and the guide who is up next is directed to the numbered path closest to the nesting site.



## TURNING TURTLES

A green turtle  
nests in the  
black sand of  
Tortuguero  
beach.



guide leads the little group along a sand track that follows the shoreline, stops in the designated area—and waits. Depending on nesting activity, you may be out for an hour or for several hours. It may be raining. The main path is separated from the beach by 15 feet or so of dense jungle, broken periodically by numbered paths that cut through to the beach. On a recent visit, my friend and I joined Noly's group in a slight drizzle and clustered on the main path, chatting quietly. We didn't have to wait long before a spotter on the beach contacted Noly, giving her a path number and the location of a turtle. Noly extinguished her small flashlight, and only her soft voice guided us as we concentrated on walking blind and staying upright in the mass of shifting sand.

As we approached our turtle, a group going the other way passed to our left. It was a moonless night, and we could only sense the others' presence as we moved in to replace them. They had watched the hen excavate a nest and were now being shuttled out of the way to make room for us. Noly sat by the big reptile's head, holding a small red-shaded light. Dr. Ehrenfeld's research had shown years ago that turtles do not see red light at all well, so we were able to look into the completed nest cavity, knowing that the turtle wasn't being disturbed. I dropped to the sand next to the turtle and watched raptly as the wet leathery eggs, glowing pink in

the red light, dropped one by one, into the nesting cavity. I suppose the process lasted about 20 minutes.

When the last egg had been deposited, the light was extinguished, and we backed away to give the tired turtle room to complete her night's work. We sat in a tight group in the sand. We couldn't see each other or the turtle, but we could hear small sounds that told us she was filling the cavity, tamping it down, and throwing sand around to conceal the site. When she finished, still oblivious to our presence, she began dragging herself toward the sea. We followed—reverent attendants paying homage to a grande dame of Tortuguero and her timeless ritual.



## TURNING TURTLES

### Notes

Several quotations have been used from personal letters in Larry Ogren's private collection and have not been individually noted.

#### Introduction

1—Archie Carr, *The Sea Turtle: So Excellent a Fish*, reissue ed. University of Texas Press, Austin 1984, p. 243

#### Chapter 1

2—Archie Carr, *The Windward Road: Adventures of a Naturalist on Remote Caribbean Shores*, reissue ed. Gainesville, University Press of Florida, 1979, p. 50–51

3—Larry Ogren, Letter to Dr. Archie Carr, August 20, 1956, Department of Special and Area Studies Collections, George A. Smathers Libraries, University of Florida

4—Edna Gail Dases, *A Place of Turtles: Reflections by Tio Leo Martinez*, 2000, unpublished.

#### Chapter 2

5—Archie Carr, *The Windward Road*, p. xxxii

6—David Ehrenfeld, *Beginning Again: People and Nature in the New Millennium*, Oxford University Press, 1993

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8—Ibid

9—James Spotila, *Sea Turtles: A Complete Guide to Their Biology, Behavior, and Conservation*, Baltimore, The Johns Hopkins University Press and Oakwood Arts, 2004, p.8

#### Chapter 3

10—Harold Hirth, letter to Dr. Carr dated Friday, July 14, 1961, Smathers Libraries

11—Chuck Carr, (Archie Fairly Carr III) *Time Before*, unpublished essay

#### Chapter 4

13—Chuck Carr, *A Century of Sea Turtles*, Keynote presentation to The 20th Annual Sea Turtle Symposium, Orlando, FL March, 2000

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15—Chuck Carr, "Archie Carr, Model Naturalist," *Conservation Biology*, February 1997, Vol. 11, No. 1. Page 264.

#### Chapter 6

16 Sebastian Troeng, quoted by Julienne Gage, *Sebastian Troeng*, profile for *40 Under 40, International Development Leaders*,

<http://dc40.devex.com/meet-the-40-under-40/sebastian-troeng/>

17—Jeanne Mortimer, *Hawksbill Proposals are a Croc*, STC Press Release, April 13, 2000, [conserveturtles.org](http://conserveturtles.org).

#### Chapter 7

18—Edna Gail Dases, *A Place of Turtles: Reflections by Tio Leo Martinez*, unpublished.

19—Christopher P. Baker, Moon Travel Guides blog, June 20, 1911,

<http://www.moon.com/blogs/cuba-costa-rica/choosing-personal-wilderness-guide-costa-rica>





## Sources and Suggested Reading

My central source was Larry Ogren through conversation and access to correspondence and papers both published and unpublished. Chuck Carr contributed generously of his time and unpublished writing. Other interviews included: Tom Carr, David Godfrey, Emma Harrison, Catalina González Prieto, David Ehrenfeld, James Spotila, and Karla Taylor. Much was gained from casual conversation with Miss Junie Taylor, other Tortuguero residents and STC staff in Costa Rica.

I mention here a selection of publications for further reading. Any of Archie Carr's books are a good read for the armchair naturalist or serious scientist. Two are specifically about sea turtles. *The Windward Road*, first published in 1956, has been reissued several times. *The Sea Turtle: So Excellent a Fish*, first published in 1967 and reissued in 1984,

tells about Carr's early turtle research and the field station at Tortuguero. James Spotila's book *Sea Turtles: A Complete Guide to Their Biology, Behavior and Conservation* (Johns Hopkins University Press, 2004) is packed with good information and beautiful color photography. Spotila's *Saving Sea Turtles* (Johns Hopkins University Press, 2011) is a good read about conservationists dedicated to sea turtle preservation.

Carl Safina's *Voyage of the Turtle: In Pursuit of the Earth's Last Dinosaur* (Henry Holt and Co., 2010) follows the life and travels of the giant leatherback. Frederick Rowe Davis details the life and work of Archie Carr in *The Man Who Saved Sea Turtles: Archie Carr and the Origins of Conservation Biology* (Oxford University Press, 2007). Two older books that were helpful are *The Green Turtle and Man*, James J. Parsons, University of Florida Press, 1962, and *Turtle Bogue: Afro-Caribbean Life and Culture in a Costa Rican Village*, Harry G. Lefever, Susquehanna University Press, 1992.

The sea turtle has become a conservation icon and there are many excellent books available. There are also many websites devoted all or in part to sea turtles including Sea Turtle Conservancy's extensive site.



Harry Hirth (left), Leo Martinez (back), Durham Rankin (right), and an unidentified man in the far back release a batch of hatchlings recently hatched in the nursery.

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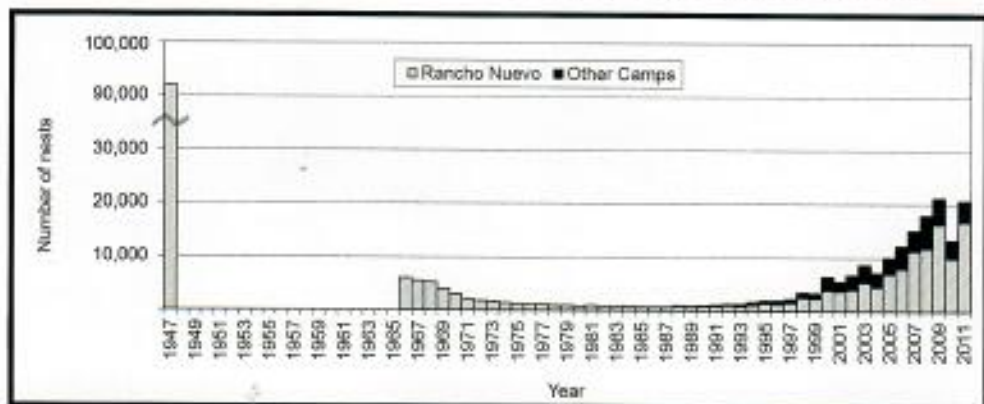
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Miss Junie prepares tamales for lunch.



Jeff Schmid PhD, of The Conservancy of Southwest Florida, a protégé of Larry Ogren's share's Archie Carr's fascination with in the Kemp's ridley. The Kemp's, the most seriously endangered sea turtles almost disappeared. Prior to the April, 2010 oil spill in the Gulf of Mexico, it had made a remarkable recovery. However, after the spill, more dead Kemp's ridleys than any other turtle were collected. Because of the slow growth and maturity rate, it will be many years before the full impact of the spill can be accessed. Jeff's graph below shows how the population plunged from the huge arribadas of the 1940s to almost zero, then thanks to conservation efforts slowly began to rebuild.



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## TURNING TURTLES

Larry sent this cartoon to his colleagues at NMFS an inside joke for the benefit of enforcement agents who had the hard work of dealing with poachers and looking for ways to bust them.



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## Photo credits

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### Foreword

Anne Ake: P 6  
Sea Turtle Conservancy (STC): P 8

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All photos in Chapter 1 are from  
Larry Ogren's collection.

### Chapter 2

STC: pp 28, 29, 36, 38, 42, 45 (top)  
Department of Special and Area Studies  
Collections, George A. Smathers Libraries,  
University of Florida: pp 32, 36  
Larry Ogren: pp 35, 43, 45 (bottom)  
Tom Carr: pp 44

### Chapter 3

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### Chapter 4

Larry Ogren: pp 70, 71, 78, 80  
STC: pp 75, 76, 85  
Robert Schroeder: p 68

### Chapter 5

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### Chapter 6

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### Chapter 7

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Schroeder: p 137  
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### Back Matter

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Jeff Schmid: p 141  
Elaine Anderson: p 144

## TURNING TURTLES



### Village People:

Two men take  
a break on  
remnants of the  
old saw mill.

Three children  
huddle on a  
playground  
bench.

A boy and his  
chicken.

All is pura vida.





**IT FIGURES** -- In times of inflation, it does no real harm to join in with some high numbers of our own, picked at random: Ocean City, N.J. has applied for a permit to dredge 2,000,000 cubic yards of estuarine sand onto its ocean beaches ... some 1,300,000,000 gallons of raw or partially treated sewage are dumped into the Hudson River daily by New York City ... according to a German company, B.A.S.F., its chemical plant planned for the banks of the Colleton River, Beaufort County, S.C., will be a \$400,000,000 investment by 1976 (it will take 15,000,000 gallons of water a day from the Savannah River) ... Great Lakes Dredging Co. wants a permit to dredge 5,000,000 cubic yards of sand from Long Island Sound near Great Neck ... approximately 250,000,000 gallons of oil are lost to the ocean yearly through spills, tanker mishaps, well blowouts, and seepage from onshore tank farms ... last year electric generating plants in this country used and then returned to rivers and estuaries, at higher temperatures, 45,000,000,000 gallons of water for cooling, which inspired Larry Ogren to react with the sketch below:



"The time has come the walrus said, to talk of many things  
Of ships and shoes and sealing wax, and cabbages and kings;  
AND WHY THE SEA IS BOILING HOT, and whether pigs have wings."

Through The Looking Glass, Ch. 4  
THE WALRUS AND THE CARPENTER

Larry Ogren was way ahead of the times when he expressed his concern about the effects on wildlife of pollution and rising temperatures in our seas and waterways. This cartoon was published in the American Littoral Society newsletter in 1970.

This is a remarkable narrative, told with none of the stridency that infects lesser environmental writings. It speaks almost in a whisper and focuses on the close-at-hand – the turtles, a man, a village. Hats off to Anne Ake!"

**Ted Gup**

Harvard fellow, award winning author, Pulitzer Prize nominee, investigative reporter, Emerson College journalism department chair.

Readers feel the salt spray and the mosquito bites, enjoy the camaraderie of village life, and admire the beauty and hardships of that past time. Larry thrives and becomes an inspiration to those of us who have had the honor of following in his footsteps.

**Karen A. Bjorndal**

Distinguished Professor, Department of Biology, and Director, Archie Carr Center for Sea Turtle Research, University of Florida

Anne Ake's *Turning Turtles* accurately captures the challenges and adventure surrounding the launch of the world's first sea turtle conservation program. *Turning Turtles* is a fascinating journey. . .

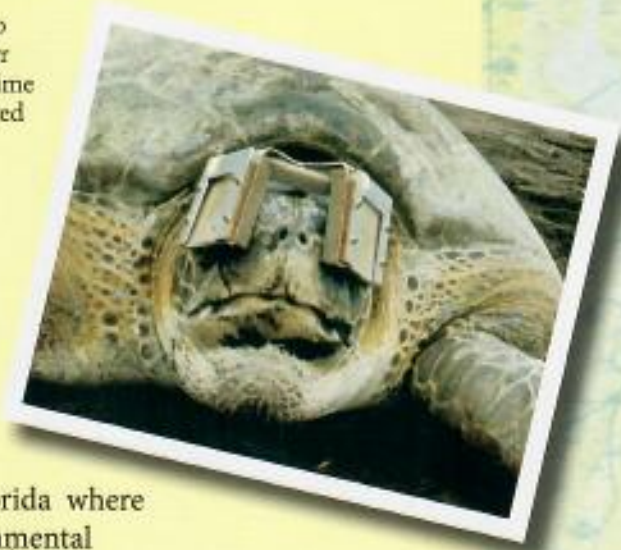
**David Godfrey**

Executive Director, Sea Turtle Conservancy

For a Costa Rican sea turtle biologist who began his career in 1987, the year Dr. Carr passed away, this book summarizes a lifetime of groundbreaking work, one that has lasted and will continue to last for generations.

**Roldán Valverde**

President International Sea Turtle Society  
Associate Professor Southeastern Louisiana University



Anne Ake lives in Lynn Haven, Florida where she volunteers with several environmental groups. She has written six previous books.

The front cover photo, taken in the mid 1960s, shows Archie Carr, followed by an unidentified man, then Harry Hirth, with Larry Ogren bringing up the rear. They are moving a turtle down the beach for weighing. National Geographic®.

The back cover photo was also taken in the mid 1960s on Tortuguero beach by Dr. Robert Schroeder®

