

GALAPAGOS NEWS

Spring-Summer 2016

TORTOISE RESURRECTION

**When it Rains:
*El Niño History***

**The Gold Rush
& the Tortoise**

PROJECT UPDATE:

Can K-12
Education
Save
Galapagos?

FROM THE
GC BLOG

GC PHOTO
CONTEST
2017



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FROM THE

PRESIDENT

Johannah Barry

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Cover Image

A marine iguana poses on the beach near the Charles Darwin Research Station in Puerto Ayora on Santa Cruz. This iguana "has no doubt witnessed many changes around town," says photographer, Tui de Roy. © Tui de Roy

This issue of *Galapagos News* reflects on some historic rain events in Galapagos and the science that emerged from the astute observations of eminent Galapagos scientists who experienced "the wet." As I write this, my area of the US is experiencing the longest rain event in recent history. Gazing out at yet another rainy day, I wish I could lay claim to some equally cogent insights, but regrettably my thoughts turn to a simple wish for sunshine. As the article indicates, rain patterns in Galapagos can have some extraordinary impacts on native flora and fauna, and as the pictures show, some "once in a lifetime" events.

We are very excited to share with our readers both old and new news on the tortoise front. Cyler Conrad's account of the role tortoises played in the California Gold Rush gives us another glimpse into how and why these animals were exploited more than a century ago. But, we are proud to follow that story with recent excerpts from our GC Blog series, *The 2015 Expedition to Wolf*, as well as a report from Washington Tapia on his work to restore tortoises and the ecological balance on the islands of Floreana and Pinta — one of the ambitious goals of Galapagos Conservancy's Giant Tortoise Restoration Initiative. By finding tortoises whose makeup includes both Pinta and Floreana tortoise genes, the project will begin a captive breeding and repatriation program. To put this initiative in context, tortoises went extinct on Floreana in the mid-19th century, and on Pinta in 2012 with the death of Lonesome George. Hybrid tortoises on Isabela Island's Wolf Volcano have been found to share these extinct lineages. There is great hope that over the next five to ten years, we will be able to repopulate these islands with tortoises that carry the same genes as their extinct ancestors.

We would also like to invite our readers to submit their best Galapagos photos to our annual photo contest. We have come to expect the spectacular from all of you, whose stunning visuals continue to delight year round on our handsome wall calendar. Deadline is July 25.

I would like to close on a personal reflection regarding the loss of Roger Perry, former director of the Charles Darwin Research Station (1964–1970). I had the privilege of working with Roger for many years after he left the CDF and continued his extraordinary career in some of the most far-flung islands and communities in the world. Roger was the ultimate gentleman and scholar and his foresight in establishing a tortoise captive-breeding program sowed the seeds for our work today. We are grateful for his wisdom and insight.



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Galapagos Guardian Society members give recurring monthly contributions that are charged automatically to a credit card. These members help us reduce our fundraising costs because we do not send them annual membership renewal notices for the duration of their support. This is an easy and secure way to provide GC with ongoing funds that we can use to address the most critical conservation challenges in Galapagos.

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GALAPAGOS NEWS

MARINE SANCTUARY

NEW MARINE SANCTUARY

The government of Ecuador has announced the creation of a new marine sanctuary around the islands of Darwin and Wolf in Galapagos that will offer protection to the world's greatest concentration of sharks. The new sanctuary includes 15,000 square miles within the existing Galapagos Marine Reserve (GMR), wherein industrial fishing has been banned since 1998 but smaller fishing operations had been allowed. With the creation of this new sanctuary, several areas within the GMR will now be designated as "no-take" zones, meaning fishing of any kind is off-limits.

The government says that such additional protection is essential, as the habitat has come under increased pressure due to climate change and illegal shark fin poachers. From an economic perspective, a 2015 report found that sharks also have an immense value to tourism that greatly outweighs their value to the fishing industry. Tourists travel from all over the world to visit the Islands and dive to see the sharks, of which more than 34 different species can be found in these waters.

This new designation is the result of a dialogue initiated in 2014 that included input from more than 600 participants across various sectors in Galapagos, including the local fishing industry. The consensus leading to the designation of the new reserve means that 32% of the waters around Galapagos will now be protected from fishing activities.

Above:
Whale Sharks are one of the many shark species that will receive extra protection as a result of the new marine sanctuary in the Galapagos Marine Reserve.
© Pete Oxford/iLCP



Left:
Roger Perry in the 1960s © CDF



ROGER PERRY: FIRST HERO FOR TORTOISES

Galapagos Conservancy is saddened to announce the recent death of Roger Perry, former director of the Charles Darwin Research Station (CDRS) who passed away in January at age 82. Roger was director of the CDRS from 1964–1970, and the longest serving director of the CDRS to date.

"The most urgent task in 1964 was to protect the surviving populations of giant tortoises," he wrote in *Galapagos News* in 2009. "So far as we knew, there were only the remnants of colonies on Santa Cruz and the northern volcanoes of Isabela. Other races, those of Pinzón and Española, were critically endangered. I proposed that we should begin a captive-breeding program. This was to become one of our most encouraging ventures." The Española population (down to only 15 individuals in the 1960s) now stands at over 2,000 individuals, demonstrating the impact of Roger's contribution to the conservation of Galapagos giant tortoises.

ILLEGAL FISHERMEN CAUGHT

On Saturday, April 9, 2016, the *Maria Tatiana IV* fishing boat was intercepted by Galapagos National Park rangers and staff of the Ecuadorian Navy at the harbor of Puerto Ayora, Santa Cruz Island for conducting fishing operations 10 miles inside the Galapagos Marine Reserve (GMR), northwest of Fernandina Island.

The authorities initially gathered longline fishing gear, which is prohibited in the GMR, and then found six small speedboats with the *Ma. Tatiana IV* — where they ultimately discovered 60 pieces of swordfish, 23 albacore, 55 shark fins, and 81 parts of sharks from a variety of shark species, some of which are designated as *vulnerable* on the International Union for Conservation of Nature (IUCN) Red List of endangered species.

“Ecuador is committed to the conservation of sharks. Galapagos National Park rangers are faithful custodians. We will use control measures and all legal tools to defend the rights of nature,” said Environmental Minister, Daniel Ortega. Court hearings will be conducted for this environmental offense in the coming days.

SEA CUCUMBERS CONFISCATED

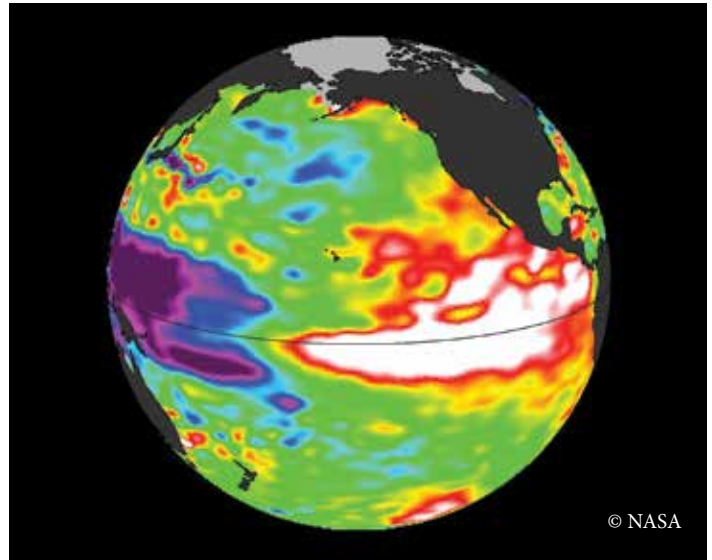
In January 2016, the Galapagos National Park Directorate (GNPD) — in coordination with the national police — discovered an illegal shipment of approximately 3,600 sea cucumbers from two different species during a baggage control operation at Baltra airport in Galapagos. Sea cucumbers are protected within the Galapagos Marine Reserve, and the sea cucumber fishing season was closed at the time.

Environmental Minister Daniel Ortega said that his administration will maintain the fight against the trafficking of protected species nationwide. The GNPD has initiated an investigation to identify the persons responsible.

Isostichopus fuscus, or brown sea cucumber, is listed as endangered on the IUCN red list due to a population decline of at least 60% across its entire range in the last 30–50 years. *Isostichopus horrens* is listed as “data deficient” by the IUCN, as it is often misidentified. While previously not a high value species in fisheries, the latter has increased in value in Galapagos due to the decline of the brown sea cucumber.



© GNPD



EL NIÑO UPDATE

In November 2015, the World Meteorological Organization confirmed that an El Niño event was underway. Galapagos experienced more rainfall than normal with an intense period in January causing localized flooding in the highlands of Santa Cruz. This affected several households and closed the road from Baltra to Puerto Ayora for a short time. However, to date, the rainfall and ocean temperatures in Galapagos have not come close to levels seen during the last major El Niño of 1997–98, which is good news for the wildlife.

SEA TURTLE MONITORING

In January, the Galapagos National Park established camps at Las Bachas on Santa Cruz and Quinta Playa on Isabela, both important nesting sites for green sea turtles (*Chelonia mydas*). By monitoring the number of females that come ashore, the nests, and the hatchlings produced, the rangers will be able to assess the impact of El Niño and the presence of tourists on this species.

IGUANA TRAFFICKER SENTENCED

A Mexican citizen who attempted to smuggle 11 iguanas from Galapagos has been sentenced to two years in prison and a fine of \$20,000. In September of 2015, Gustavo Eduardo Toledo Albarran was arrested in Puerto Ayora after he was found with nine marine iguanas (*Amblyrhynchus cristatus*) and two land iguanas (*Conolophus subcristatus*) in a backpack. These are both species endemic to Galapagos. He was sentenced in February under Article 247 of the Ecuadorian Criminal Code.

When it RAINS

Sea surface temperature departure (°C)



With an El Niño underway, we look at the impact of this cyclical weather phenomenon on life and work in Galapagos.

El Niño is a big deal for most species in Galapagos. The trade winds, which normally blow across the Pacific from east to west, begin to weaken and the Humboldt Current that brings cold, nutrient-rich water from Antarctica to Galapagos slows. As the temperature and composition of waters around Galapagos change, so too does the marine ecosystem, with consequences for any species further up the food chain. The increased temperatures can result in excessive rainfall and localized flooding. Under these conditions, the struggle for survival can become too great and many species may suffer a precipitous decline, experiencing changes in population structure that can last for years.

The suffering is not only felt by plants and animals, but also by humans. We asked several Galapagos residents and researchers to describe how they have been affected by El Niños past.

Linda Cayot, Galapagos Conservancy

Late one afternoon, during the first months of the 1982–83 El Niño, I was completing a two-day watch of an adult male tortoise on Santa Cruz when he decided it was his time to migrate. Once the rains begin in earnest, the highlands are transformed. Rivers, sometimes 30 meters wide, rush through the forests. And there is mud. So much mud. The tortoises escape this by heading down to the lowlands en masse.

Rather than plodding down the muddy trail, this tortoise chose a more efficient route: a river. He floated, bounced against rocks, walked a bit, then floated again. I followed, crawling with the current. Bushes grabbed at my daypack, much as they did at the tortoise's carapace, giving me a new sense of empathy for my study species. El Niño and the resulting migration of tortoises had a huge impact on my work. After nearly two years collecting data in the highlands, I had to start over in the lowlands.



© Linda Cayot

The tortoise floated, bounced against rocks, walked a bit, then floated again. -Linda Cayot



It was the first and last time
I took a swim in a quadrat.
-Ole Hamann

Ole Hamann, University of Copenhagen

It was the first and last time I took a swim in a quadrat.

One of the ways botanists monitor plants is to peg out quadrats, patches of habitat that are visited repeatedly to see how the vegetation is changing. In 1983, soon after the El Niño rains had stopped, I travelled to Santa Fe only to find that one of my quadrats had become a lake. The corner poles were barely visible. All the plants were drowned. Without any data to collect, I took a dip.

Even large plants and trees can be seriously affected by extreme rainfall. After the 1982–83 El Niño, almost all the old *Scalesia* trees in the Santa Cruz highlands died. Seedlings did eventually emerge a couple of years later, but they struggled to compete against invasive plants taking over. The *Opuntia* cacti too can become seriously waterlogged and collapse under their own weight. On Santa Fe, for instance, the number of big *Opuntias* decreases dramatically after an El Niño event and the number of shrubs increases.

Carlos Valle, Universidad San Francisco de Quito

El Niño is not a new phenomenon, so there have probably been very severe episodes in the past. But for the marine realm in Galapagos, the most dramatic event on record is indisputable. During the 1982–83 El Niño, the seabirds in Galapagos stopped breeding and abandoned their nests, eggs, and chicks. Inshore feeders, like the blue-footed booby, wandered through the Archipelago in flocks of several hundred birds, while others left the Islands altogether in search of food.

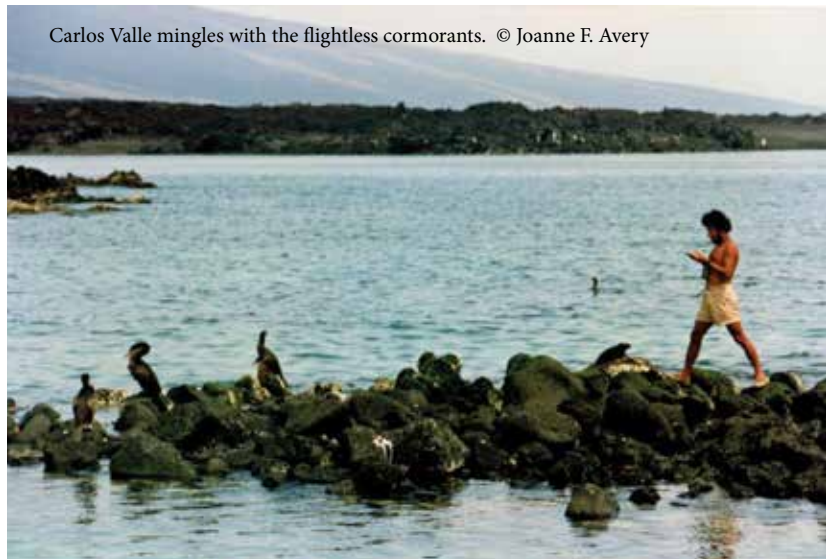
At the time, I was working on Galapagos penguins and flightless cormorants around Fernandina and both these species suffered greatly, the penguin population declining by around 80% and the cormorants by some 50%. Once the El Niño had passed and the fish returned to the waters, the penguins and cormorants began to breed again. I'll never forget how the cormorants used the mummified remains of marine iguanas to line their nests.

Kate Huyvaert, Colorado State University

We knew we were in trouble just looking at the clouds building over the ocean behind Punta Cevallos on Española. They were big and dark, heavy with rain and lightning, a portent of things to come. After the rains began in late October 1997, we spent our days measuring the effects of the El Niño event: we emptied the rain gauge countless times over six months, recording nearly a meter of rain; we tracked daily changes in the growth of the vines creeping through camp; we tallied the cans of tuna eaten; and we watched our hair grow in the heat and humidity.

We also tracked the effects this monster event had on the Nazca boobies that call Punta Cevallos home. The warmer sea surface temperatures characteristic of El Niño in the eastern tropical Pacific drive fish deeper into the ocean where they are difficult for seabirds to catch. On Española, nests became murky puddles where booby chicks shivered unattended. Our daily records included the numbers of nests lost because the chicks starved or the nest was washed away by the rain or the tide. At night, we swatted the mosquitoes that swarmed into our tents and outside the boobies did likewise, slap-slapping their feet on the rocks to unsettle the insects. That year, nearly all the Nazca nests that we were monitoring failed.

Carlos Valle mingles with the flightless cormorants. © Joanne F. Avery



Martin Wikelski,
Max-Planck
Institute for
Ornithology

El Niño has always been a dramatic event

for marine iguanas. In the early 1990s, I lived through an El Niño on Genovesa in the northeast of the Archipelago. The sea temperature, normally around 18°C, rose to over 30°C, killing off the red and green algae that are the iguanas' main source of food. Some 90% of the population perished and only the smallest animals survived.

Many of these small iguanas made it through a subsequent El Niño in 1997–98, but I got the impression they were getting even smaller. But when I analyzed the data, it became clear that a marine iguana's skeleton does indeed become shorter during an El Niño year, lengthening again afterwards. It sounded strange at the time but we now know that other animals, like fish, tortoises, and even some mammals do the same thing. They shrink and regrow. ■

© Martin Wikelski



BIRDS ON THE BRINK

The Galapagos Islands are considered a paradise for birds, but many of the islands' native avian species face challenges caused by climate change and invasive species. Conservation efforts are always ongoing to protect these vulnerable birds and here we report on the status of a few of the birds recently studied.

GALAPAGOS PENGUINS: HANGING ON THROUGH EL NIÑO

Today's population of Galapagos penguins is likely less than half of what it was in the early 1970s, before a series of strong El Niños between 1972 and 1997 took their toll on these vulnerable birds that rely so heavily on the productivity of cold ocean water. Luckily, the El Niño of 2015–2016, although predicted to be more severe than 1997–1998, was less severe. The penguins, nonetheless, are still struggling, reports GC-funded penguin scientist, Dr. Dee Boersma. In February 2016, Boersma made a trip to investigate how the penguins were holding up. She noted, "No penguins were breeding, we saw no courtship, heard no brays, and saw only one juvenile among the over 200 penguins we counted. I have never seen penguins with as much green algae covering

their flippers and chests as I did on this trip.” The algae is caused by the penguins staying in the water to forage for fish longer than usual, and not spending enough time on shore to dry fully.

Boersma has been working with Galapagos penguins for 45 years, and her historical perspective confirms that the penguins are in better condition than they were during the severe El Niño of 1997–98. She believes that occasional pulses of cool, nutrient-rich upwellings have allowed the penguin population to make it through this rough time. Boersma will return to Galapagos in July to check on the penguins again, and she hopes she'll be able to report back that La Niña has arrived, breeding resumed, nests are being used, and penguin chicks are healthy. “The new zoning approved by the president of Ecuador should also help the penguins,” she said, “as the head of Elizabeth Bay and around Bartolome are now no-fishing zones.”



RED-FOOTED BOOBY RECOVERY

The colony of red-footed boobies (*Sula sula*) at Punta Pitt in the east of San Cristóbal has shown a remarkable recovery. Almost 20 years ago, the El Niño event of 1997–98 brought the population down to just 45 adults. Since then, careful conservation efforts to control invasive species and reduce the numbers of ants, rodents, feral cats, and goats helped foster increased growth of the booby population. Regular monitoring trips over the years have shown a steady increase, and in January, Galapagos National Park rangers counted 974 adult birds at this site. An additional 89 chicks and 252 juveniles were also recorded.

The red-footed booby is the smallest of the booby family and can be distinguished by its bright red feet. They share the area of Punta Pitt with Nazca boobies and blue-footed boobies, but their nesting sites differ: red-footed boobies nest in bushes, blue-footed boobies nest on the ground, and Nazca boobies nest in the cliff areas.

MANGROVE FINCH HEAD-STARTING

For the third year in a row, Mangrove finches, the rarest of “Darwin's finches,” were successfully captive-reared at the Charles Darwin Research Station (CDRS). The Mangrove Finch Project team, led by the CDRS and the Galapagos National Park Directorate (GNPD), collected nests and young nestlings of the critically endangered Mangrove finch (*Camarhynchus heliobates*) in the wild at Playa Tortuga Negra on the west coast of Isabela Island in February for the 2016 head-starting program.

With an estimated population of only 80–100 individuals, inhabiting just 75 acres at two sites on western Isabela Island, all wild-hatched nestlings would have likely died in their natural habitat due to infestation by the introduced parasitic fly *Philornis downsi*. This year, weather conditions were dry on western Isabela, so Mangrove finch breeding was slower with many territories having no nests at all. After eight weeks of successful rearing in the laboratory, fifteen fledglings were returned to their natural habitat at Playa Tortuga Negra in March. The birds will be monitored by scientists and park rangers to determine their initial survival.

GOOD NEWS! During the initial egg collection, a chick found near fledgling age, yet older than ideal for head-starting, became the first wild-fledged Mangrove finch to be observed in February (during the early breeding season) in seven seasons. Also, two captive-reared fledglings released in 2014 and 2015 were observed in the wild, with both birds identified by their unique color bands. This is very positive news for the project, as no captive-reared fledgling observations had been made beyond three months following their release. ■

A thin and algae-covered Galapagos penguin, photographed in February 2016 © Dr. Dee Boersma

A red-footed booby perched, as usual, on the branch of a tree. © Sara Ellis, GC Member

THE GOLD RUSH AND THE TORTOISE

Three meters beneath the streets of downtown San Francisco lie the remains of a small inlet called Thompson's Cove, a thriving trading port that had its heyday in the middle of the 19th century during the California Gold Rush (1848–1855).

by **Cyler Conrad**, *Anthropology PhD student at the University of New Mexico at Albuquerque*

In 2011, I worked on the archeological analysis of this site. It was one of the first well-controlled and properly dated investigations of life in the early days of San Francisco. We uncovered thousands of objects – ceramic and glass bottles, part of a ship's mast and anchor chain, bricks and much more – but one of the most puzzling items was the forelimb of a Galapagos giant tortoise.

This bone was found in a cluster with several others, but it was strikingly distinct. At first, I thought it had to be from a sea mammal, perhaps a harbor seal. It was only after talking to a colleague specializing in Galapagos tortoise anatomy that I came up with a match. I began to research how and why a giant tortoise could have ended up in a major city, thousands of miles from its native home, more than 150 years ago.

The answer, I believe, is gold. In 1848, the discovery of this precious metal at Sutter's Mill in the nearby Sierra Nevada marked the beginning of the California Gold Rush. The news spread quickly. Between 1848 and 1849 alone more than 20,000 people from all around the world travelled to the region. But with the transcontinental railroad yet to be built, many of the gold-seekers came by sea. Thompson's Cove and neighboring coastal settlements became flooded with prospectors, new arrivals spilling into the vibrant and turbulent streets of San Francisco, drinking, gambling, shooting, and shouting. This was the American Wild West.

Ships reached San Francisco from all around the world. The most popular passage from the Atlantic was around the tip of South America. Just like the whalers in the first half of the 19th century, the travellers needed fresh food for their long maritime journeys and passed Galapagos on their voyage north. In the days before refrigeration, the hardy nature of a living Galapagos tortoise proved indispensable.

It soon became common practice for these vessels to stop in Galapagos and collect tortoises, colloquially referred to as "terrapin." It is not known how many thousands of tortoises

Below: Archeologists busy excavating Thompson's Cove in 2011.
© Kale Bruner & Archeo-Tec

Right, top: Whalers collecting sea turtles in the early 1800s, just as Gold Rush entrepreneurs harvested giant tortoises from Galapagos en route to California.
© National Library of Australia

Right, bottom: The Galapagos tortoise humerus bone excavated from Thompson's Cove.
© Cyler Conrad

Below, inset: An advertisement in the *Daily Alta California* from March 11, 1851 for Galapagos tortoises imported into San Francisco.
© California Digital Newspaper Collection



were transported to northern California to feed the burgeoning human population, but accounts of more than 500 animals in a single vessel indicate the extent of this activity. According to an eyewitness on board the *Canton*, which passed through Galapagos in 1849, if passengers and crew were unable to take tortoises near the shore they were prepared to venture far inland. The *Canton* left Galapagos with a total of 60 large reptiles, a mixture of tortoises and sea turtles.

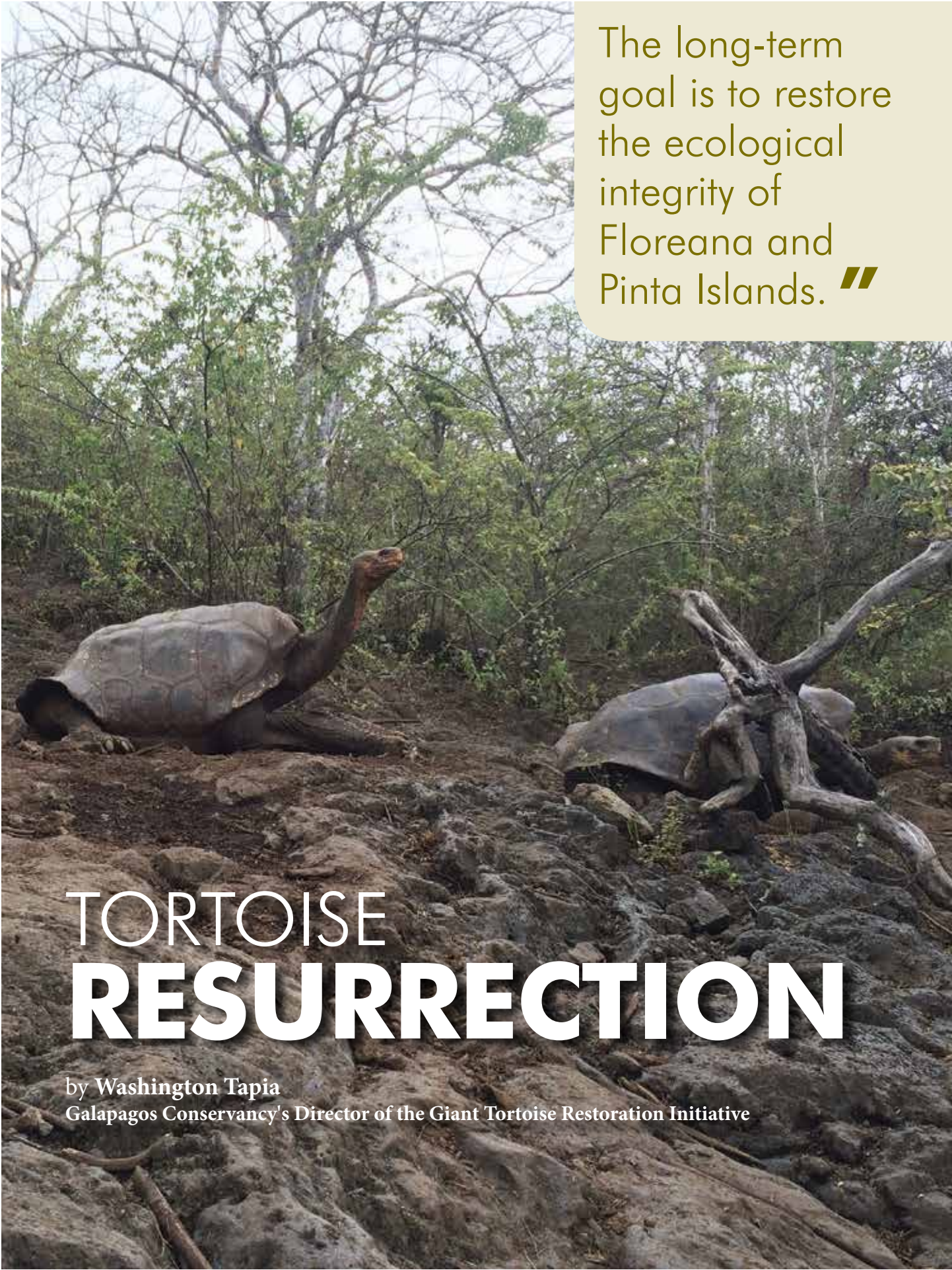
Once in California, the prospectors were able to sell the live animals for enormous sums. One man by the name of Franklin Mead reached San Francisco in 1849 and quickly sold 17 Galapagos tortoises for a fortune, roughly \$50,000 adjusting for inflation. Marine turtle racing became a popular pastime, with turtles being released from fenced enclosures behind restaurants onto the streets, providing the population with entertainment and followed by a hearty meal. The insatiable

demand drew these reptiles into cities closer to the gold fields and, for a time, Galapagos tortoises could be seen grazing along the banks of the Sacramento River while they were slowly consumed in Sacramento's saloons.

It was not until the California Academy of Sciences expedition to Galapagos in 1905 that the world began to realize the substantial impact of human activity on all aspects of life in the Islands and especially on the tortoises. It is now clear that the argonauts exploited giant tortoises as much as, if not more than, the whalers had done before them. While whalers collected tortoises solely for their own consumption, commerce took the Gold Rush exploitation to a new extreme. It is only with future research that we will begin to understand just how abundant and damaging this process was to Galapagos during the mid-to-late nineteenth century. ■



**Turtle racing
became a popular
pastime. //**



The long-term goal is to restore the ecological integrity of Floreana and Pinta Islands. //

TORTOISE RESURRECTION

by Washington Tapia

Galapagos Conservancy's Director of the Giant Tortoise Restoration Initiative

I was ascending the craggy, rugged slopes of the volcano, alongside a canyon. In the distance, I could see the distinct shape of a tortoise neck at full stretch. It had to be a saddleback, but it was not just any saddleback. As I got closer, I realized I had come face to face with Lonesome George's twin. It was November 24th last year, my birthday. I could not have wished for a better present.

Several days earlier, the Galapagos National Park's research vessel, *Sierra Negra*, had dropped anchor off the northeast coast of Isabela. We were there to search for giant tortoises on Wolf Volcano, the highest in Galapagos, its capricious topography made more unpredictable by several days of intense rain.

Thanks to genetic analyses carried out by researchers at Yale University over the last two decades, we knew that Wolf is home to many hybrid tortoises, some with genes of the long-lost tortoises of Floreana and others with genes of the Pinta lineage, a species that went extinct with the death of Lonesome George in 2012. These revelations gave us hope. The expedition's goal was to search for, locate, and remove as many of these hybrid animals as possible, bringing them into captivity to participate in a carefully planned breeding program.

The *Sierra Negra*'s onboard helicopter began to transport expedition gear, food, and water onto the volcano, and small field teams of rangers and scientists set off on foot, each group heading for one of ten different sites covering a combined area of over 70 km². The next morning, at 5:30 am, each team began its daily routine, crawling out of tents, preparing breakfast and then heading off in search of tortoises.

It was almost one week into the expedition that I came across the Lonesome George-like saddleback. As I took measurements of him, I became even more excited. His



carapace was the same size as George's. It was a great moment that provided an injection of encouragement to push on and find still more hybrids.

At 3pm every day, each team would radio in to the *Sierra Negra* to report the GPS location of any tortoises of interest. The helicopter would then travel back and forth, ferrying tortoises from the island to the vessel in a hanging net. By the end of the two-week-long expedition, we had recovered 32 hybrid tortoises from Wolf, two with Pinta ancestry, five of Floreana descent, and the rest with saddleback shells — a good indication that they may be animals of conservation value.

The *Sierra Negra* shipped all these tortoises to Santa Cruz, where they were airlifted into the Fausto Llerena Tortoise Center near the headquarters of the Galapagos National Park. The geneticists at Yale will run detailed genetic analyses of all these animals, information that will inform the captive breeding. The long-term goal is to restore the ecological integrity of Floreana and Pinta by repopulating these islands with tortoises that carry the same genes as their long-dead ancestors.

Each day, as I review these hybrids as part of the quarantine procedure, I take some moments to contemplate the male twin of Lonesome George. Watching him strengthens my conviction that we are on the right road to recover not only Lonesome George's lineage but the ecosystem of his native island. ■



Left page:
The Lonesome George-like tortoise (left tortoise) on the slopes of Wolf Volcano in November 2015.
© Washington Tapia

Top:
The helicopter airlifts giant tortoises from Wolf Volcano onto the waiting *Sierra Negra* in Banks Bay.
© Galapagos National Park

Left:
Tortoises arriving at the Fausto Llerena Tortoise Center on Santa Cruz Island.
© Galapagos National Park

From the GC BLOG



The Galapagos Conservancy blog is full of amazing stories about our efforts to conserve these treasured islands. We simply cannot showcase all of our hard work in print, but we do strive to cover the best conservation stories, from a variety of perspectives, in our blog. Here, we share with you a few excerpts from recent posts and encourage you seek out the full stories online:

<http://www.galapagos.org/blog-listing/>

The Genetics, posted December 28, 2015
Excerpted from *The 2015 Expedition to Wolf* series

"Once we realized the DNA of extinct tortoise species could be mined from living individuals, we started planning an expedition to see how many tortoises with mixed ancestry we could find. In 2008 we returned to Wolf and took blood samples from 1,667 tortoises. Subsequent genetic analyses identified 17 with genetic material from the extinct Pinta species and over 80 with genetic material from the extinct Floreana species. This led to the proposition that it might just be possible to bring the tortoises from Pinta and Floreana back from extinction through selective breeding."

Author: Gisella Caccone is an evolutionary biologist at Yale University, where she is a Senior Research Scientist and director of the Center for Molecular Systematics and Conservation. Gisella has been studying the genetics of Galapagos giant tortoises since 1994 and has led the tortoise genetics team for the last decade.

A Return to Galapagos, posted January 8, 2016
Excerpted from *The 2015 Expedition to Wolf* series

"From the moment we embarked on the Sierra Negra on November 18, 2015, my sense of wonder increased. Onshore we had the possibility of finding a tortoise that could be related to Lonesome George, the last Pinta Island tortoise whose death marked the first extinction in Galapagos in the 21st Century. If we could find several tortoises closely related to Lonesome George, the Pinta legacy would survive — the extinction of this species could be reversed!"

Author: Milton Yacelga is a native of Ecuador with a background in animal behavior. He is a co-founder of Kaminando: Habitat Connectivity Initiative, which aims to preserve the cloud forest in Panama. Milton completed his thesis on Galapagos marine iguanas in the early 1990s under GC's Science Advisor, Dr. Linda Cayot.

A First-Time View of Galapagos, posted January 11, 2016
Excerpted from the *The 2015 Expedition to Wolf* series

"Over the next six days we find many small tortoises among the scrub. They transform my perception of Wolf's lower arid slopes. Beneath the brush I begin to see mats of moist soil that sound hollow when I thump them: nests dug by females laying their eggs in these lowlands before moving upslope. Soon I see nests everywhere; it's like learning a new word. These unstable piles of lava, those ankle-grabbing vines and arm-stabbing thorns are protecting a gigantic tortoise nursery. What seemed hostile to me represents safety for tortoises by evolutionary design. Here the second cousins of Lonesome George will hatch; some will survive to mature and eventually mate. A few may play their part in restoring the species of their ancestors."

Author: Jane Braxton Little writes about science and the environment from California's northern Sierra Nevada. Her work has appeared in *Scientific American*, *National Geographic*, *Discover* and *Audubon*, where she is a contributing editor.



Above: The Sierra Negra, docked in Banks Bay in 2015 © Jane Braxton Little
Top, left: A tortoise on Wolf Volcano © Milton Yacelga
Top, right: Carlos Espinosa Proaño with a teacher in April © Richard Knab, GC



From the GC BLOG

Thirty-Five Years of Galapagos and Still Loving It, posted March 14, 2016

"On March 5, 2016, I celebrated the 35th anniversary of the day I first arrived in Galapagos. I had no idea when I stepped off the plane onto the reddish soil of Baltra Island in March of 1981 that my life had just changed forever. Many people speak of their transformational journey to Galapagos. My two-and-a-half years studying giant tortoises on Santa Cruz and Pinzón in the early 1980s slowly morphed into a lifetime of passion, dedication, and hard work for the conservation of these amazing giants and the islands they call home."

Author: Dr. Linda Cayot is GC's Science Advisor and has played an important role in Galapagos conservation for more than 30 years.

An Educator's Checklist: Teacher Professional Development in Galapagos, posted May 12, 2016

"For five days on the islands of Santa Cruz and San Cristóbal, a very committed group of nearly 300 educators — local teachers and national and international trainers — collaborated in an extraordinary event: the first week of teacher professional development offered in Galapagos in many years, and the first week of a five-year teacher training effort in the Islands! We were all

united by the goal of making a positive and a lasting difference in the social and environmental development of this unique natural paradise through the power of K-12 education."

Author: Karla del Rosal is the Assistant Professor in the Department of Teaching and Learning at Southern Methodist University.

Engaging Teachers and Students as Problem-Solvers, posted May 16, 2016

"I was very pleased to be invited to join a team of professionals to conduct professional development for social studies teachers in Galapagos. I must admit that at that time I really didn't know much about the situation in Galapagos, its teachers, or their training. Our goal was to share techniques that engage children in the classroom and make learning more meaningful. In other words, we sought to offer alternatives to more traditional approaches and heavy emphasis on memorization ... A comment made by teachers on the last day keeps ringing in my head: 'You must come back.' Many teachers have felt abandoned by the system, and these five days of professional development showed them that they are important."

Author: Carlos Espinosa Proaño is the former Head of Elementary Education at Colegio Terranova in Quito. Carlos has decades of experience as a classroom teacher, working with elementary grade students in Ecuador and the US.



The Implications of Climate Change for Galapagos, posted April 21, 2016

"Galapagos is not like where most of us live. Galapagos climate experiences unusually complicated interactions between the marine environment — primarily the altering predominance of different ocean currents — and the land. How changing global climate will play out on the complicated topography of these isolated islands is unclear. So we need to get a reliable prognosis for the climate in Galapagos before any specific prescription can be made."

Author: Dr. James Gibbs is professor and Associate Chair of the Department of Environmental and Forest Biology at the State University of New York. He has partnered with Galapagos Conservancy for many years in efforts to restore giant tortoise populations through the Giant Tortoise Restoration Initiative. ■

Above: Linda Cayot (right) hunts for invasive snails © Thomas Heller
Top, left: A happy sea lion basks in the warm sun © JJ LaBella
Top, right: Teachers participate in a training workshop © Richard Knab, GC

Can K-12 Education Save Galapagos?

by **Richard Knab**, *Galapagos Conservancy's Director of Strategic Partnerships*

In 2007, when UNESCO considered placing Galapagos on the list of World Heritage Sites in Danger, its Mission Report identified 12 areas, including education, in need of urgent attention. The report noted the local education system's failure to address issues related to conservation and heritage preservation and lack of attention to preparing Galapagueños for employment opportunities that were often filled by non-residents. In its 2010 Mission Report, UNESCO noted progress in many areas. But it could not point to any significant improvements in the area of education.

Local residents and external observers have long expressed concern about the weak education system in Galapagos. Teachers have received little training in effective teaching strategies or the content of areas they teach. Instruction has relied heavily on rote memorization, and teachers have not been trained to take advantage of their physical surroundings to focus their lessons and to strengthen the connection between young people and their natural environment.

This lack of connection with the environment should not come as a surprise. Much of the current population of Galapagos arrived during the 1990s and 2000s, in response to poor economic conditions on the mainland and employment opportunities related to tourism. While migration to Galapagos is regulated much more closely than in previous decades, 74% of those living in Galapagos are migrants and 35% of children under the age of 11 were born outside of the Islands (INEC, 2010). Consequently, many observers agree that there isn't a strong "sense of place" in Galapagos or a deep understanding of or connection to what makes Galapagos special.

The bottom line: Galapagos education has failed to arm its youths with the basic skills needed to join the local labor market, enter and complete college, or to fill important leadership roles in conservation, science, and sustainable tourism.

The Power of Education for Sustainability

Given this situation, where should we begin to improve education in Galapagos? And perhaps more importantly, can K-12 education prepare Galapagos youths for the local workplace and empower them to become engaged members of a sustainable society? The concept of education for sustainability has become commonplace in public and private education in the US and other countries, both at the K-12 level and in higher education. Definitions vary, but at its core, education for sustainability helps young people to understand the inter-connectedness of the social, environmental, political, and economic issues affecting their communities and the world beyond. It also increases the connection students feel with the natural environment and brings relevance to their daily lives. But beyond developing knowledge and understanding, education for sustainability prepares young people to act on their knowledge to make a positive difference in their communities.

This isn't just wishful thinking. A growing body of research shows that this approach, when implemented effectively, improves students' content knowledge across subject areas and develops the critical thinking and problem-solving skills they need to be successful in an increasingly complex world.

How Do We Get There in Galapagos?

Over the past five years, Galapagos Conservancy has worked closely with the Galapagos-based non-profit *Fundación Scalesia* and Ecuador's Ministry of Education to identify opportunities for improving education in the islands in ways that reinforce long-term sustainability. Despite the remarkable success of the Ministry's 10-Year Education Plan in transforming education on the mainland, national exams had revealed that the performance of Galapagos students lagged behind national averages in core subject areas and critical-thinking skills. The isolation of Galapagos, among other factors, represented a significant barrier to education reform.

In 2014, the Ministry of Education, Galapagos Conservancy, and *Fundación Scalesia* coordinated a participatory needs assessment, conducted by a team of





Above, left: High school biology teachers learn to make low-cost microscopes using smart phones and the focal lenses of inexpensive laser pointers. **Above, right:** Arthur Powell works with elementary math teachers on the use of manipulatives to teach fractions. **Left page:** Teachers gather at the end of their weeklong workshop on Santa Cruz Island.

All photos © Jonathan Drake, T2T-I

education experts who collected and analyzed the ideas and concerns of teachers, school directors, students, parents and community leaders.

The assessment recommended intensive professional development in Galapagos (workshops and ongoing coaching), the establishment of a local demonstration school, and focused training for school directors to empower them as leaders of educational change. The report also stressed that it can take up to five years of intensive professional development for teachers to significantly change their practice, and that it can take up to a generation of students (12 years) to see the kind of deep change that will transform Galapagos in positive ways.

Ideas in Action

In April 2016, Galapagos Conservancy, the *Fundación Scalesia*, and the Ministry of Education launched the Education for Sustainability Program, a five-year teacher training program comprised of intensive workshops (weeklong Teacher Institutes conducted every April and October) and continuous mentoring from full-time Galapagos-based coaches. We were assisted by a new partner, the Galapagos Governing Council, which is the coordinating governmental entity in Galapagos.

The program is designed to help Galapagos educators shift away from traditional teaching methods that rely on lectures and rote learning. The focus is “student-centered instruction” — an approach that changes the role of the teacher from “giver of information” to “facilitator of student learning.” Student-centered strategies engage students in problem solving activities, collaborative team projects, hands-on experimentation, independent projects, and out-of-classroom learning. The program will also help teachers strengthen their content knowledge in the areas they teach, develop lesson-planning skills, and to use Galapagos (its most pressing social and environmental issues, real data collected by scientists, and the natural environment) to teach their classes and to facilitate learning beyond the classroom.

How was all of this manifested during the April Institute? Here are a few examples.

On San Cristóbal, joint literacy and social studies sessions introduced problem-based learning (PBL), an approach

that helps students develop problem-solving strategies and disciplinary knowledge through their engagement in real-life problem solving. Elementary teachers developed a plan to address population growth in the islands. High school teachers used the PBL approach to tackle an issue related to the Galapagos Special Law.

On Santa Cruz, math teachers learned to use “manipulatives” for teaching fractions. Manipulatives are small objects that can be handled by students, which can help demonstrate or model abstract concepts.

While visiting natural areas in close proximity to schools, biology teachers learned to help their students formulate simple research questions based on observations made at these sites, and to answer these questions through practical experimentation.

All of the lessons modeled by the trainers connected directly to the curriculum teachers will need to teach during the current school year.

Moving Forward

While the first Institute was a great success, the heavy lifting has just begun. Even the best teacher training will have limited impact without intensive and strategic follow-up.

Fortunately, we have two exceptional Ecuadorian educators on the job — Miriam Chacón on Santa Cruz and Lilliana Garcés on San Cristóbal. Both have extensive experience as instructional coaches. They are working 1:1 with teachers, observing classes, providing feedback, and helping them to implement what was presented during the Institute. Miriam and Lillian both report that teacher enthusiasm remains very high following the Institute and that many teachers have already implemented a number of the lessons modeled by the trainers.

None of this work would be possible without a talented group of education specialists from the US and Latin America, the full support of Ecuador’s Ministry of Education, and the generosity of a growing number of donors who share our conviction about the importance of quality education in the islands. Galapagos Conservancy is extremely grateful for the commitment of these essential partners. We look forward to sharing our progress over time. ■



GALAPAGOS
CONSERVANCY

Saving one of the world's great treasures

GALAPAGOS UPDATES



Galapagos Conservancy is proud to announce some recent updates and enhancements to the **Travel Section** of our website at www.galapagos.org. While most of our Galapagos News readers know GC primarily as an environmental conservation organization, many people come to us for insider advice on traveling to the Galapagos Islands. In response to our viewers' most common needs and questions, we revamped this area of our website with an emphasis towards green-minded, sustainable travel. If you are considering a trip to Galapagos, we invite you to click around! If you think we missed something, we invite you to share your thoughts on improvements with us by email at comments@galapagos.org.

2017 GC Cruises: Booking Now

In 2017, Galapagos Conservancy will lead two cruises in conjunction with our travel partner, International Nature and Cultural Adventures (INCA).

February 8 – 19, 2017: Western Route

June 7 – 18, 2017: Eastern Route

You can download cruise brochures and itineraries at:
www.galapagos.org/travel/travel/annual-gc-cruise/

To reserve a cabin or for more information,
please email Meridith at mbolado@galapagos.org
or call 703-383-0077 X 204

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Brighten your home (or yourself) with a colorful sea turtle throw pillow, shower curtain, or women's tee from our friends at **Sharp Shirter!** For a limited time, they will generously donate 20% of proceeds from the sale of these items to Galapagos Conservancy.

Shop: www.sharpshirter.com/collections/galapagos-conservancy



MEMBER SPOTLIGHT



Randy & Sally Knight

Randy and Sally Knight first visited the Galapagos Islands in 2004 and were so enchanted by the Islands and their animals that they decided to return in 2016 – on Galapagos Conservancy’s annual cruise!

According to Randy, “Like most people, we initially had the idea that the Galapagos were remote and largely untouched. But between our observations, the guides on our first trip, and reading *Plundering Paradise: The Hand of Man on the Galapagos Islands* (by Michael D’Orso) we realized that the islands face many challenges and will endure only if individuals and organizations actively tackle those challenges.”

The Knights learned of Galapagos Conservancy while at the Charles Darwin Research Station in 2004, and they have been loyal, generous donors to our efforts ever since. Randy and Sally cite their reason for supporting GC is its long track record of success, coupled with “GC’s holistic approach to working with government agencies, key players, and especially the people who live in the islands. Trying to solve environmental problems such as invasive species or illegal fishing, without also dealing with the social and political conditions that led to the problems is simply a Band-Aid with little chance for lasting impact. Long-term success requires working with all the stakeholders to change the underlying conditions so that everyone sees a positive benefit from conservation.”

Galapagos Conservancy is proud to have members like the Knights who understand the complex nature of conservation and the need to involve and support the residents of Galapagos while also protecting the unique environment in which they live.



2016 GC Online Survey Results

More than 1,600 people responded to our online survey in February 2016, and 15 of you scored a nifty Galapagos gift! You told us that we’re meeting your needs for communications overall, but you asked for more tips on Galapagos travel, information about wildlife, details on our blog and social media, and more. We’ll do our best to accommodate — thanks to everyone who gave us valuable feedback!



GC Now on Instagram

Love Galapagos wildlife? Our new Instagram account features some great photos and information on flora and fauna in Galapagos! Follow us on Instagram and get your daily dose of Galapagos!



4 Stars for GC!

For the second consecutive year, Galapagos Conservancy has earned the coveted 4-star rating from Charity Navigator for “sound fiscal management and commitment to accountability and transparency” — the highest rating a nonprofit organization can receive! According to Charity Navigator, “Receiving four out of a possible four stars indicates that your organization adheres to good governance and other best practices that minimize the chance of unethical activities and consistently executes its mission in a fiscally responsible way.”



We’re proud to be among the 21% of charities reviewed by Charity Navigator that have received at least two consecutive 4-star evaluations. This “exceptional” designation from Charity Navigator is an honor that differentiates GC, and we hope demonstrates to the public that Galapagos Conservancy is worthy of their trust.





GALAPAGOS CONSERVANCY

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GC PHOTO CONTEST for 2017 CALENDAR ENTER BY 7.25.2016

Sea Turtles
© GC Member, Michael Haber

Blue-footed Booby
© GC Member, Burt Finkelstein



Please email no more than 5 photos, one per email, to photo@galapagos.org. Include your name, subject of the photo, and location (if known) in the email subject line. Include your full contact information in the body of the email, with any other descriptive details about the photo. Visit www.galapagos.org/travel/travel/photo-contest/ for rules, permissions, and to view last year's winners.