GALAPAGOS NEWS

Fall-Winter 2015

NEW GIANT TORTOISE SPECIES NAMED!

Flamingo Origins Disappearing Opuntia Cacti

PROJECT UPDATES:

Tortoises on Santa Fe Plans for Tortoises in 2016 Education for Sustainability

> PHOTOGRAPHING GALAPAGOS

> > PHOTO CONTEST WINNERS!

GALAPAGOS GIFTS ON SALE: GALAPAGOS CALENDAR 2016



Saving one of the world's great treasures

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Johannah Barry and a Galapagos National Park ranger, Freddy Villalva, watch feeding time for baby tortoises that reside at the Tortoise Center on Santa Cruz.

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FROM THE **PRESIDENT** Johannah Barry

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Cover Image

A Great Blue Heron poses in front of a gorgeous Galapagos rockscape. Photo Credit: Eve Sohn of Toronto, ON and a winner in this year's annual photo contest Once again, we are delighted to share big news about big tortoises! With support from Galapagos Conservancy, our colleagues at Yale University have embarked on an ambitious program of genetic testing and identification of previously unidentified Galapagos tortoises. That painstaking work was rewarded with the discovery of a new species of Galapagos tortoise — the Eastern Santa Cruz tortoise. Dr. Gisella Caccone, the study's senior author, named the tortoise *Chelonoidis donfaustoi* after Fausto Llerena Sanchez, or "Don Fausto" as he is known by his friends. His 43-year history as a Galapagos National Park ranger also included a long relationship with Lonesome George as his primary keeper. This naming honors Don Fausto and celebrates the important work of the keepers and Park rangers whose work is indispensable to protecting and preserving Galapagos.

We are pleased to highlight the work of long-time Galapagos scientists, Frank Sulloway and Bob Tindle, whose seminal work on cactus ecology and flamingo population health have spanned four decades. We are also grateful to Pete Oxford for his timely article on photography in Galapagos. The winter is a particularly popular time to visit the Islands, and Pete's professional expertise will guide the most inexperienced of us.

Earlier this year, Galapagos Conservancy signed a formal agreement with the Government of Ecuador, allowing us to expand our work in the Islands to include our *Giant Tortoise Restoration Initiative* and our *Education for Sustainability* work. We are also pleased to report that we have formal relationships with the Galapagos National Park Directorate, the Galapagos Biosecurity Agency, and the Ministry of Education, and we will soon be signing a cooperative agreement with the Governing Council of Galapagos. While we have worked in the Islands for nearly thirty years, these formal contracts allow GC a closer level of program design and implementation. We will report on our collaborative efforts in the coming months.

Our annual membership photo contest did not fail to astound us once again. We feature Eve Sohn's stunning work on our cover and invite you to visit our website Gallery to view all the photo winners. And of course, being that time of year, we encourage you to give a gift of Galapagos to your friends and family. Ranging from our 2016 calendar and children's books to beer and wine glasses, caps and t-shirts, you can display your support of Galapagos with pride. And perhaps raise a toast to Lonesome George!

With the extraordinary discovery of a new tortoise species to the great strides being made to protect native flora and fauna, Galapagos still has the power to amaze us. Thank you for your support and friendship.



GALAPAGOS CONSERVANCY 11150 Fairfax Blvd., Fairfax, VA 22030 USA

Tel: 703.383.0077 Fax: 703.383.1177 member@galapagos.org www.galapagos.org



GOING GREEN: Help us help the environment by requesting to receive this newsletter by email instead of by mail. It's simple: email member@galapagos.org. Put "Galapagos News by email" in the subject line, and include your full name and address in the body.

 Galapagos News is a twice-yearly publication that is produced for Galapagos Conservancy supporters and friends.

 The information in this issue was obtained from various sources, all of which have extensive knowledge of Galapagos.

 The opinions expressed are those of the authors, and not necessarily of Galapagos Conservancy.

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GALAPAGOS CONSERVANCY

GALAPAGOS CONSERVANCY STANDARD MEMBERSHIP

Thanks to all of our members who make our work possible. We could not preserve, protect, and restore the Galapagos Islands without your generosity and commitment to conservation. Our annual membership levels are as follows:

Friend:	\$25	Advocate:	\$250
Family:	\$50	Protector:	\$500
Supporter:	\$100		

GALAPAGOS AMBASSADOR SOCIETY

With your gift of \$1,000 or more (or cumulative annual giving of \$1,000), we will welcome you to the Galapagos Ambassador Society. Many of our Galapagos Ambassadors are often willing to become closely and regularly involved in our programs. Ambassadors receive special updates and briefings; invitations to attend special member events; recognition in the GC Annual Report; and a special Ambassador welcome gift.

Española Society:	\$1,000 to \$4,999
Santiago Society:	\$5,000 to \$9,999
Fernandina Society:	\$10,000 to \$24,999
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GALAPAGOS GUARDIAN SOCIETY - Monthly giving

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.

To join, please see the mail-in form to the right or join online at **www.galapagos.org** or call **703-383-0077**.

GALAPAGOS LEGACY SOCIETY

Important strides are being made today to protect the unique biodiversity and landscapes of Galapagos, but the future of the archipelago will depend on the generosity and commitment of forward-looking individuals. Success in protecting Galapagos means preserving in perpetuity an example of how nature existed before humans.

The Galapagos Legacy Society is comprised of special friends of Galapagos who have demonstrated their commitment to the long-term conservation of the islands by making a planned gift through Galapagos Conservancy.

Please contact Meridith Bolado at (703) 383-0077 or email legacy@galapagos.org with any questions.

BECOME A Galapagos Guardian

When you join the **Galapagos Guardians Monthly Giving Program**, you provide GC with reliable support that allows us to establish long-term conservation plans. Plus, it's easier on your wallet (spreading your giving out over time), and it's easier on the environment and lowers our fundraising costs because we will no longer mail you paper renewals.

You choose the amount and frequency of your gift and can change your preferences by contacting us at any time. Monthly donations are automatically and securely charged to your credit card on the 15th of the month. You will continue to receive *Galapagos News*, *Galapagos E-News*, our bimonthly email newsletter, and invitations to lectures and other educational events in your area.

YES! I want to become a Galapagos Guardian!

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GALAPAGOS NEWS

NEW TORTOISE SPECIES NAMED

GOOD NEWS FOR GALAPAGOS PETRELS

Rangers with the Galapagos National

Park Directorate (GNPD) recently identified 231 new nests in the critically-endangered Galapagos petrel colony in the Cerro Pajas area of Floreana Island. These nests combined with the 330 nests already known to the staff of the San Cristóbal Technical Unit bring the total to 561.

GNPD technicians conducted a four-day monitoring trip that resulted in this discovery. As part of the trip, they geo-referenced each petrel nest in order to observe them every month to determine any possible impacts that may be caused by the climate phenomenon "El Niño" on this species.

The Galapagos petrel is the only endemic Galapagos seabird that nests in the upper regions of the islands of Santa Cruz, San Cristóbal, Santiago, Floreana, and Isabela. They make their nests in rocky areas in burrows or natural cavities like craters, sinkholes, or lava tunnels. The GNPD takes protective action to control invasive species like guava and blackberry plants that impact nesting sites, as well as rodents and feral cats. Fausto Llerena poses with a tortoise from the newly named Eastern Santa Cruz Tortoise species (*Chelonoidis donfaustoi*) named in his honor. © GNPD

See the full article on page 16.

FLAMINGO POPULATION IS STABLE

The Galapagos National Park Directorate (GNPD) is planning a study to determine how the population of flamingos in the Islands may be impacted by an El Niño weather event. Data will be collected through three monitoring surveys to be conducted before, during, and following the predicted climate event.

The initial assessment was made on October 17-18, 2015, when nearly 50 GNPD rangers conducted a partial census of the flamingos in 19 of the 42 registered lagoons in Galapagos. The rangers collected data on the number of birds, the nests of other birds, and water levels and turbidity in the lagoons.

According to scientists with the GNPD, this study will determine whether the presence of rains in the Archipelago affects the salinity of the ponds, which affects the presence of food for these birds and fosters the necessary conditions for them to nest. "Under optimum conditions of salinity and food, flamingos will nest and remain in place without migrating any further," said Christian Sevilla, head of the GNPD's Preservation and Restoration of Island Ecosystems Department.

The partial census showed that the population of flamingos in the Archipelago is currently stable, with 342 birds found in 19 ponds and lakes.

TORTOISES HAVE EXOTIC TASTE

Giant tortoises have a clear plants over native plants, according to a new study in the journal *Biotropica*. By tracking tortoises on the slopes of Santa Cruz, Stephen Blake and his colleagues have found that tortoises consumed at least 64 different plant species. Some 44% of these were introduced, but the tortoises spent almost 60% of their dedicated feeding time grazing on non-native species.



LESS PLASTIC & LESS NATURAL SOUVENIRS TAKEN

As of August 10th, the sale and distribution of certain disposable plastic products in Galapagos has been prohibited. Towards the end of last year, the Galapagos Governing Council issued a new resolution to phase out the use of plastic bags and other items made from extruded polystyrene foam. Leading up to the ban, the GNPD has been distributing reusable cloth bags to residents and conducting public education campaigns. It is hoped that the use of these plastic products will be phased out completely by 2017.

A downward trend in tourists trying to take sand, coral, stones and shells out of the Islands as souvenirs has been recorded by the GNPD in 2015 to date. In 2013, 377 packages were stopped by baggage and cargo controls at the local airports. The figure dropped by 20% in 2014, and in the first six months of 2015, rangers only detected 101 packages.

GALAPAGOS SYMPOSIUM

Scientists, conservation specialists, and gathered in San Francisco in June to attend a three-day symposium entitled, "Galapagos 2015: Science, Conservation and History in the 180 Years since Darwin." The meeting was organized by Matthew James, Galapagos historian and Chair of the Geology Department at Sonoma State University, as part of the 96th meeting of the American Association for the Advancement of Science Pacific Division at San Francisco State University and the California Academy of Sciences. GC's Richard Knab was among the presenters, sharing our work in the area of Education for Sustainability. According to Richard, "The symposium provided a terrific opportunity for professionals from dozens of institutions to share progress, make connections, and explore ideas for the future of Galapagos."

WOLF VOLCANO ERUPTION

On May 25th, lava began to pour down the slopes of Wolf Volcano, the first eruption of Isabela's northernmost volcano in more than 30 years. The spectacular event lasted about a week, and the lava flowed only down the southeastern flank of the volcano.

Galapagos Conservancy's Wacho Tapia participated in a helicopter flyover just days after the eruption to determine its environmental impact. Thankfully, the eruption does not appear to have affected the giant tortoises or the unique population of pink iguanas that live on the volcano's northern and western slopes.

IGUANA SMUGGLING

The Ministry of Environment of Ecuador reported that a man who tried to smuggle 11 marine and land iguanas from Galapagos was arrested in Puerto Ayora in September. According to officials, the man captured the iguanas while posing as a tourist on Santa Cruz Island. He was stopped in Puerto Ayora where the iguanas were found packed in a backpack.

Danny Rueda of the Galapagos National Park Directorate stated, "There are two individual (iguanas) who are under great stress, but their condition is good. The land iguanas were evaluated, measured, and weighed." The arrest is the result of a three-month investigation by the Environmental Ministry of an alleged international network of wildlife trafficking, an activity that is one of the world's most profitable on the black market, after drug trafficking and illicit weapons.

According to Ecuadorian authorities, the suspect is a Mexican citizen with a criminal record for wildlife trafficking. He faces up to three years in prison in Ecuador for attempting to smuggle a protected species under CITES, the Convention on International Trade in Endangered Species.

THE MYSTERY OF THE DISAPPEARING OPUNTIA





by **Frank J. Sulloway**, *Evolutionary Psychologist at UC-Berkeley*

have spent an inordinate amount of time poring over thousands of old photographs from Galapagos. In some of them there are giant tortoises, others show Darwin's famous finches, and land iguanas also make the occasional appearance. But it's not the animal life I am principally examining. It's the giant tree Opuntia, or prickly pear cacti, whose life histories have drawn me into a considerable mystery.

I made my first visit to Galapagos in 1968 as part of an expedition to film the sites visited by Charles Darwin during the *Beagle* voyage. I returned in 1970 with three fellow students to explore unresolved questions about Darwin's conversion to the theory of evolution. In the process, I and my fellow expedition members accumulated more than 5,000 photographs documenting our work on 11 different islands. Over the next 30 years, I looked at these images only occasionally. But around ten years ago it occurred to me that this collection of photos, along with others taken in 1982, could form the basis of a "repeat photography" project. With enough images, perhaps they could act like a visual "time machine", providing a powerful way to reveal ecological changes that, although imperceptible from one year to the next, might be substantial over the longer run. I began to augment the collection, searching through archives and writing to dozens of scientists who might have similar photographs taken during the last 50 years.

The giant *Opuntia* trees are one of the Galapagos' most striking features. Botanists recognize six different species of these spine-laden plants, all of them confined to just one or a few islands. I decided to use the photographs to track the extensive loss of *Opuntia* in recent decades, and I began on the small and beautiful island of South Plaza just off the east coast of Santa Cruz.

By analyzing the photographs, I have been able to identify and follow the fates of more than 1,000 individual cacti on South Plaza. In order to develop such a comprehensive database, my research associates and I have had to find the precise spots from which hundreds of old photos were taken. In the field, our efforts resemble a treasure hunt. In some cases, it has taken several years of arduous searching to locate these photographic sites. With numerous recent images captured from

Left: A lone towering Opuntia stands tall on South Plaza Island. © Sarah Pain

Above: Frank J. Sulloway uses a laser-guided hypsometer to measure the distance of cacti from where a photograph was taken in 1967. © Eric Rorer

Above, right: This 1970 photograph from South Plaza shows 57 cacti. By 2006, when Sulloway returned to set up his tripod on the same spot, only 18 of these remained. There had been no new recruits. © Frank J. Sulloway.

Right: Hungry land iguanas converge on an *Opuntia* pad. Despite the numerous spines, a single land iguana can consume a large pad in less than 10 minutes. *Top:* © Alf Jacob Nilsen. *Bottom:* © Frank J. Sulloway.



1970

precisely the same places, and using image-processing software to line up the old and the new, we have successfully created a detailed record of the comings and goings of *Opuntia* on South Plaza.

This decade-long effort has revealed some surprises. Over the last 50 years, roughly 70% of the *Opuntia* on South Plaza (and on some other islands as well) have perished. It is known that the extreme rainfall during an El Niño year can cause older and larger *Opuntia* to collapse. In addition, some cacti inevitably die from old age and other causes, such as desiccation.

A steady stream of young cacti would normally compensate for such losses. Our photos, however, show that recruitment into the population virtually ceased in the 1950s. Indeed, we cannot find evidence of even a single new recruit that has survived past the juvenile stage. Using the height of each cactus as an indication of its age, we have determined that the age structure of the surviving *Opuntia* is dramatically skewed.

What is going on? By comparing cactus populations on South Plaza and elsewhere in the Archipelago, we think we may have the answer: an "ecological cascade" involving the demise of the Galapagos hawk on nearby Santa Cruz. By the 1950s, settlers had all but driven the hawks on Santa Cruz to extinction. In the absence of hawks – the main predator of land iguanas – the land iguanas on South Plaza had a field day, eagerly consuming all the fallen cactus pads and fruits, as well as seedlings, which are the three means by which these giant tree cacti reproduce. On other islands where there are both hawks and land iguanas, there has been no reduction in the recruitment rates of *Opuntia*.

This ecological cascade explains an otherwise puzzling fact about South Plaza. Although there is no evidence of new recruits in any of our old photographs, we have identified half a dozen cacti that have survived long enough to reach adulthood. All these specimens are growing in unusual places, typically on steep cliff faces, where land iguanas cannot reach them.

Now that the full extent of cactus loss on South Plaza has become clear, the Galapagos National Park Directorate and Charles Darwin Foundation, funded by a generous grant from the COmON Foundation in the Netherlands (comonstichting.org), have initiated an extensive reforestation program, with newly planted cacti being placed inside wire cages to protect them from hungry land iguanas.

These old Galapagos photographs have revealed far more than I ever could have imagined. Sometimes even the most ordinary images turn out to contain meaningful details of potential scientific value. I cannot help feeling that the study of such images – in Galapagos and elsewhere – has a whole lot more to tell us about the natural world and the impact we are having on it.



2006

"In some cases, it has taken several years of arduous searching to locate these photographic sites."

GET INVOLVED! If you have any photographs from South Plaza or Santa Fe, especially those taken before the year 2000, please send them to Frank Sulloway at **sulloway@berkeley.edu**





t balsa-wood raft across

Paddling a makeshift balsa-wood raft across Isabela's isolated Cementerio lagoon on a still, moonlit night is an eerie experience.

For three years in the late 1970s, Elizabeth Tindle and I spent as much time in the company of Galapagos flamingos as we did in human society. The Cementerio flamingos, which live in the middle of the lagoon, were one of several breeding colonies we studied. Camped among the thick mangroves that fringed the lagoon, we conducted 20 hours of observations every day, alternating shifts every four hours, each involving a paddle to and from the colony. To really learn what goes on in a flamingo colony, you have to 'live' with the flamingos as they go about their daily rituals of feeding, building nests, incubating eggs and raising young, and we soon found most of the activity at the colony occurred during the night.

Flamingos frequent about 40 lagoons in Galapagos, and have bred at nine of these on five islands. We worked out that the flamingos move freely between these sites, their distribution strongly associated with the abundance of two important food items, the brine shrimp (Artemia salina) and the water boatman (Trichocorixa reticulata). In other parts of the world, flamingos will not breed until there are hundreds of birds displaying to each other. In Galapagos, things are different, with breeding seemingly triggered by much smaller group displays involving fewer than 20 individuals.

Galapagos flamingos breed when the conditions are right, with laying mainly occurring during the coastal dry season from August to January when the water levels in the lagoons are at their lowest and suitable nest sites become exposed. We found that around one in three adults incubates clutches every year, contributing enough chicks to maintain the population. These and other observations, made almost 40 years ago, seemed to suggest that the flamingos in Galapagos might be different from their ancestral stock, the American flamingo (*Phoenicopterus ruber*) from the Caribbean. But in the 1970s, DNA fingerprinting and gene sequencing had yet to be invented and, after several years in Galapagos, Elizabeth and I boxed up our notebooks on flamingos and I resumed my career in medical research and Elizabeth turned to clinical psychology.

Then, around 2010, two scientists — Roberto Frias-Soler from the University of Havana in Cuba and Michael Wink at the University of Heidelberg in Germany — got in touch to propose a possible collaboration. They were collecting DNA from flamingos in the Caribbean and Galapagos to look for genetic differences and help answer some longstanding questions: what is the relationship between the two populations, when did flamingos first reach Galapagos, and have there been repeated colonizations?

This study, which Elizabeth and I contributed to, suggests that in spite of the fact that the Caribbean and Galapagos are some 1,500 km apart, most of which is open ocean, flamingos from the Caribbean must have reached Galapagos just once, at least 70,000 years ago. The isolation that Galapagos provided for flamingos helps explain how they could have come to be significantly smaller birds with significantly smaller eggs than those in the Caribbean.





It remains to be seen whether the genetic, morphological, and behavioral peculiarities of the Galapagos flamingos means that they qualify as a distinct subspecies. In the meantime, these findings contribute to our understanding of the process of divergence and the origin of new species and underscore the need for continued management of this unique population. Although there are no major threats to the persistence of flamingos in Galapagos, their habitat the lagoons — do need protection to accommodate local fluctuations in food availability and nesting conditions.

I think back to the time Elizabeth and I spent with flamingos all those years ago. It is exciting to know that our work has played a part in enriching our understanding of this remarkable Archipelago.



Left page: Lagoon on Floreana © Henri Leduc

Above, top: Flamingo in flight. © Christopher Gegenheimer

Above, left: A flamingo family on Bainbridge Lake. © GNPD

Above, right: © Kevin McCarthy

Circle: Elizabeth Tindle paddles her way to the flamingo colony aboard the balsa wood raft, *Beagle III*. © Robert Tindle

Below, left: Chicks remain in the nest until they are at least 7 days old. © Robert Tindle

Below, right: Locations of lagoons in Galapagos where flamingoes breed.





A PHOTOGRAPHER'S VIEW FROM THE CRATER RIM

With a heavy backpack, extra water and special permission from the Galapagos National Park, I waded through the shallow, gin-clear waters onto Isabela and looked towards the summit of Alcedo, one of my favorite places on the planet. I had climbed this remarkable volcano on several occasions, but this was to be the first time I would camp inside it, setting up tent in the very heart of this still-active crater.

by Pete Oxford, British Wildlife Photographer and Galapagos Naturalist

Alcedo has been off-limits to tourism since the start of Project Isabela almost 20 years ago, the Herculean initiative that saw the successful eradication of goats from northern Isabela and several other Galapagos islands. Stepping ashore with three friends in 2008, I figured we were the first visitors for some time. With recent rains and an absence of herbivorous goats, the vegetation was more than a match for our single machete and we failed to make the summit before nightfall. We slept rough, cold and damp beneath some trees, pushing on at first light towards the crater's rim.

At more than 1,000 m above sea level, the view from the lip of Alcedo into the vast 6 km-wide caldera was simply breathtaking. Hundreds of giant tortoises lumbered, like gigantic ticks, deliberately over the terrain, while many concentrated in wallows, like animated boulders. Others grazed the tortoise lawns, whilst some wandered over the soft, sulphury muds of nearby fumaroles, presumably benefitting from the intake of minerals. Beside me, quietly enjoying the same view, sat a huge 300 kg reptile. I looked into the sparkling eyes of this Galapagos giant tortoise and I was enveloped by a true sense of wilderness, an incredibly rare and indefinable quality, one that I hoped to capture through photography.

On the crater floor we set up tents near an active wallow and I began a marathon of photography. Our time was extremely limited so I worked every angle I could think of and just kept shooting. At night, I hardly slept as tortoises, like bulldozers, cruised close by our flimsy tents, their audible flatulence and rhythmic thumping of coupling shells adding to the thrill. As with much about Galapagos, it was primordial, privileged, wild, unique.

THE PHOTOGRAPHER'S KIT

There are no camera shops in Galapagos, so I take as much photographic equipment as possible, around 25 kg (55 lbs) including spares. Before each landing, I select what to take ashore based on what I am likely to see (your guide can help with this). I am always careful to transport the kit to shore in a waterproof case.

THE BODY

I like to take two fairly high-end camera bodies to Galapagos, each fitted with a different lens. This avoids having to expose the sensors to the injurious influence of volcanic dust.

THE LENSES

I carry four principal zoom lenses, ranging from a wide-angle 12-24 mm f2.8 to a 200-400 mm f4.0 telephoto. The 12-24 mm lens is perfect for photographing animals up close in their environment. I use the longer lens to blur backgrounds, for details, flight shots of birds and longer shots in general. By fitting a 1.4x converter between the body and the big zoom, I can realize a focal length of 560 mm. It's widely assumed that because the animals have no fear of humans, a big lens is not necessary. But I beg to differ and I use a telephoto often. I also like to pack a dedicated macro lens, invaluable on some islands for photographing flowers, for instance.

FLASH

The use of flash is prohibited in Galapagos. Usually this is not a problem. But where shadows cast by the harsh equatorial light would benefit from a fill-in flash, I often use a small collapsible reflector to bring in more light.

TOP 10 photography TIPS

The sun casts its most dramatic light at dawn and dusk, so don't miss an opportunity to shoot at the beginning and end of the day.

2 Take time to observe your subject. With careful observation you will begin to be able to predict behavior that will open up new and exciting photographic possibilities.

Be careful of distracting backgrounds, such as a very "twiggy" backdrop or overly bright areas. Moving the camera slightly can often eliminate such distractions. Keep the edges of your frame as clean as possible.

Get level with your subject. A low position can transform an image by giving the viewer a perspective as seen by the animal rather than the familiar human perspective from a few feet above. This can also increase the sense of drama.

5 Knee pads and elbow pads may not look cool but they are invaluable protection against the sharp lava when lining up a low-down shot.

6 You may think you have a steady hand, but a tripod will always give a sharper photograph.

A circular polarizing filter can be useful, particularly to make the clouds "pop" or when shooting over water. The effect works best when you shoot at 90 degrees to the angle of the sun.

Don't forget to include people – or a human element – in some of your photographs. These act as a reminder that you were actually there.

PTake an underwater camera of some sort. Galapagos is as stunning underwater as it is on land.

1O The longer the trip the better. Trips of a few days or even a week are frustratingly short. By the second week, however, visitors tend to shed their western stress mantle and begin to see the Galapagos landscape in new and creative ways.





TIP 1 *Left*: A lava cactus at dusk on Santiago.

TIP 4 Top: Getting level with your subject can increase the sense of drama.

TIP 8 *Middle*: A tortoise among tents is a powerful, personal image.

TIP 9 Above: A diamond stingray settles into a depression it has made, while bullseye pufferfish and sergeant majors seek out invertebrates that have been disturbed in the process.

All photographs in this feature are reproduced with the kind permission of Pete Oxford, **www.peteoxford.com**



GALAPAGOS UPDATES



Visit www.galapagos.org/gallery/ to see all of this year's winning photos!







CONGRATULATIONS to Steven M. Genkins, MD

("Seadoc") of Charlotte, North Carolina for his photo of a graceful underwater marine iguana (above). He took the grand prize with his photo gracing the cover of our 2016 Galapagos calendar. From more than 1,000 submissions, Genkins' photo stood out among the rest for capturing this amazing animal searching for food among the seaweed in the Galapagos Marine Reserve.

Other winners: Sally Lightfoot Crab by Tony Enticknap, Yellow Warbler by Peter Prevelige, and Giant Tortoise by Michael J. Haber

Bring Galapagos to your computer with **desktop wallpaper images**!

Nine wallpaper images were selected from submissions to the 2014 and 2015 Annual Galapagos Photo Contests, and we periodically add more. To download, visit:

www.galapagos.org/about_galapagos/ desktop-wallpaper/





GC President Johannah Barry (center) and SETECI Minister Gabriela Rosero (second from right) at the signing in Quito.

Galapagos Conservancy is pleased to announce that we recently signed a cooperative agreement with the Ecuadorian Technical Secretariat of International Cooperation, known as SETECI, its acronym in Spanish. SETECI is responsible for developing such agreements with international nonprofit organizations that operate in Ecuador.

The agreement, signed by GC's President Johannah Barry and SETECI Minister Gabriela Rosero, outlines broad areas of work in advancing research, science, and innovation related to conservation of the unique ecosystems and biodiversity in Galapagos. GC's two flagship programs, the Giant Tortoise Restoration Initiative (GTRI) and the Education for Sustainability in Galapagos Program (ESG), are both highlighted in the agreement.

The Government of Ecuador has long recognized the importance of preserving and protecting this extraordinary natural place, both for Ecuador and for the world. "Working more closely with the Government will allow GC and its partners to enhance Ecuador's important efforts to align the protection of Galapagos with the concept of *Buen Vivir*, living in harmony with these islands and their unparalleled natural resources," stated Johannah Barry.



BBB Features GC

GC President Johannah Barry participates in the Better Business Bureau's Wise Giving Alliance Building Trust Video Series.

Galapagos Conservancy's President Johannah Barry was bonored to be asked to participate in the Better Business Bureau's "Building Trust" Video Series earlier this year. The video was created as part of BBB's Wise Giving Wednesday online outreach series and can be viewed on the BBB website.

In the video, Barry commented on the important role of strong partnerships in a non-profit's success, crediting much of GC's effectiveness in Galapagos to powerful partnerships with other organizations. Barry says, "Without collaboration, conservation activities are not going to produce results. You need to work with others to achieve success." The BBB's purpose in creating the video was to provide a lesson for donors — it is important to consider charities, like GC, that collaborate with other organizations because they likely avoid duplication in their program efforts and may have a better chance of achieving their announced goals and objectives.

To see the video, visit: www.give.org/news-updates/ news/2015/08/wise-giving-wednesday-collaboration/



The most recent edition of Galapagos Report is now available for download online.

The Galapagos Report is a compilation of articles covering topics in Human Systems, Tourism, Biodiversity and Ecosystem Restoration, and Marine Management. The Report provides all Galapagos stakeholders — decisionmakers, scientists, natural resource managers, and the general public — with up-to-date information, analyses, and recommendations on a variety of issues that may inform policy and management of this special archipelago.

The Galapagos Report is jointly published by the Galapagos National Park Directorate, the Governing Council of Galapagos, the Charles Darwin Foundation, and Galapagos Conservancy. Publication schedules vary, but a new Report is typically published every two years. Five Galapagos Reports have been published since 2006, with the most recent **2013-2014 edition released earlier this year**. All reports can be downloaded on our website at: www.galapagos.org/about_galapagos/aboutgalapagos/library/galapagos-reports/



TORTOISES ON SANTA FE ISLAND PROJECT UPDATE

by Wacho Tapia, Galapagos Conservancy's Director of the Giant Tortoise Restoration Initiative

During all my years working for Galapagos

conservation, I've had the opportunity to develop many important and successful projects — but the release of giant tortoises onto Santa Fe Island was one of the most challenging and thrilling. Besides returning tortoises to an island where they went extinct 150 years ago, this project established a new management model for ecological restoration of an entire island.



Wacho Tapia inspects one of the 201.

After an intensive and complex learning process over many years, we began the final step in this journey at 4 AM on June 27, 2015 at the Fausto Llerena Tortoise Breeding Center, where we placed 201 young Española tortoises in plastic boxes, loaded them onto a truck, drove them to the municipal dock, passed through the Galapagos Biosecurity Agency's review, placed them on a barge, and — after a 10-minute journey — transferred them to the *Sierra Negra*, a research vessel of the Galapagos National Park Directorate (GNPD).

Nearly two hours later, as the Sierra Negra approached Santa Fe, we admired a rainbow over the northeastern end of the island. We offloaded the tortoises to a beach filled with nearly 60 sea lions — silent witnesses to this historic event. Within minutes, each Park ranger and volunteer had 8–12 tortoises on their back and we started the climb to the interior of the island, following a trail marked only with rocks and ribbons placed in the branches of trees to guide our way.

After one hour for the strongest, expert hikers and nearly two for the most novice, we reached the release site. The tortoises began to explore as soon as they were released, but mostly started feeding — appearing as if they had lived there their entire lives. It was clear that their adaptation process would be easier than we'd thought.

The decision to repopulate Santa Fe with tortoises was one of the results of the 2012 International Tortoise Workshop, which resulted in research and management plans for the next 10–20 years. But even with the decision made, it was difficult to achieve.

The ecological status of the island was evaluated, as was the status of the tortoise population on Española Island — the species (*Chelonoidis hoodensis*) selected to repopulate Santa Fe due to its similar genetic makeup and morphology. Prior to the release, we also established permanent plots and built exclosures (fenced areas in which the tortoises *cannot* go) on Santa Fe in collaboration with the GNPD to allow us to measure the effects of tortoises in the ecosystem over time. Finally, we selected and prepared the tortoises, and refined the logistical details for the release to ensure their welfare.

Many people have been involved over the years, but I am particularly grateful to the 30 Park rangers and volunteers who carried the tortoises, as well as the participation of the Director of the Galapagos National Park and the directors of Ecosystems and Environmental Education and Social Participation, who joined us on this momentous occasion.

5 WEEKS LATER

Just five weeks later in early August, I returned to Santa Fe to monitor the tortoises and the vegetation. I had so many questions. Had the tortoises stayed near the release site? Did they all survive? How were they doing in their new home?

Using the signals emitted by the radio telemetry tags we had placed on 30 of the 201 tortoises, my team and I were able to locate many of the new residents of Santa Fe and evaluate their first effects on the ecosystem and the evolution of their adaptation process.

From my previous experience working with repatriated juvenile tortoises on other islands, I did not expect these tortoises to have moved very far from the release area. However, on Santa Fe they showed much greater dispersal. On the first day of monitoring, we were surprised to find a young tortoise nearly one kilometer from the release site. This tortoise had, in six weeks, walked a distance that a similarly aged tortoise might walk after several years. At first, I thought that this tortoise was an exception, an adventurer out to explore, but over the next several days we found nearly a dozen tortoises had done the same. If they continue at this pace, within a few years we could expect to find tortoises across the entire island — and the goal of ecological restoration of Santa Fe will be achieved much more quickly than expected.

During our week on Santa Fe, we located 142 of the 201 released tortoises. All were in excellent physical condition and had gained weight. Although small in size, they are already dispersing seeds and shaping the landscape, which will positively impact the island's ecosystem dynamics in the future.



WHAT'S <u>NEXT</u> FOR TORTOISES IN 2016? GIANT TORTOISE RESTORATION INITIATIVE (GTRI)

by Linda Cayot, Galapagos Conservancy's Science Advisor

Wolf Volcano Expedition

From November 18-28, 2015, team members will collect hybrid adult tortoises with partial Pinta and Floreana ancestry from Isabela Island's Wolf Volcano and additional blood samples will be taken from unknown tortoises. Following the expedition, breeding programs for both islands will be established at the Tortoise Center on Santa Cruz.



San Cristóbal Tortoise Census

In early 2016, this major expedition will count tortoises, collect blood samples, and gain a greater understanding of this population, one of the lesser known tortoise populations in the Archipelago.

Eastern Santa Cruz Tortoise Census

This census will focus on the small, less well known population of tortoises on Santa Cruz — the Eastern Santa Cruz tortoise — to determine population size, distribution, and threats. See article, page 16.

Santa Fe Tortoise Monitoring

Follow-up monitoring trips will be carried out on Santa Fe every 3-4 months for the next two years. Trips will focus on locating and determining the status of the young tortoises and measuring impacts on the vegetation in the established exclosures and guadrats. See *article at left*.

Tortoise Centers

Based on last year's center-wide evaluations, GTRI staff will work with the GNPD to develop an operations manual and an open-access database for the three Galapagos Tortoise Centers. They will conduct additional training and education for all Tortoise Center staff.

Search for Tortoises on Fernandina Island

Only one giant tortoise has ever been seen on Fernandina Island, the westernmost island in Galapagos. This tortoise was collected by the California Academy of Sciences during their 1905-06 expedition. Since then, tortoises have been considered extinct, most likely due to volcanic activity. However, tortoise scat was found in 1964, a possible sighting of a giant tortoise was documented during an aerial survey in recent years, and additional scat and tracks were observed on a recent botanical expedition. A thorough search is needed to determine if these sightings are, in fact, evidence of an existing Fernandina tortoise population.



Visit Galapagos Conservancy's YouTube Channel and click on "The Return of Tortoises to Santa Fe" to watch what unfolded on June 27, 2015 when tortoises were released on this island.



A young tortoise released on Santa Fe Island explores his new surroundings and ponders the meaning of this metal fence, or exclosure, which is meant to keep him and other tortoises out. Scientists will use these temporary fenced areas to periodically monitor vegetation growth in the absence of tortoises. © Tui De Roy/Galapagos National Park

GIANT TORTOISE SPECIES IS NAMED

On Santa Cruz Island in the center of the Galapagos Archipelago, two populations of giant tortoises occur one on the west side of the island in an area known as the "Reserve" and one on the lower eastern slopes near a hill named "Cerro Fatal." Until now, it was assumed that these groups belonged to the same species of tortoise. Genetic analyses, conducted by an international group led by Dr. Gisella Caccone at Yale University, have now clearly identified these two populations as separate species: the Western Santa Cruz Tortoise (Chelonoidis porteri) and the newly named Eastern Santa Cruz Tortoise (Chelonoidis donfaustoi).

While the Western Santa Cruz Tortoise population has a few thousand individuals, the newly named Eastern Santa Cruz Tortoise population numbers in the hundreds. Its distribution, nesting zones, abundance, and potential threats are not well known. As a distinct species and not simply a segment of a more abundant species, the Eastern Santa Cruz Tortoise warrants much closer attention from conservationists.

"The naming of this new species will increase efforts to protect and restore the Eastern Santa Cruz Tortoise," said Dr. Caccone. "Its low numbers, limited geographic range, and reduced genetic diversity make it vulnerable. As a newly recognized species, it will now receive the attention needed to ensure its survival."

Giant tortoises were devastated throughout the Galapagos Islands due to human exploitation over the centuries, introduced species, and habitat degradation. The Giant Tortoise Restoration Initiative (**www.galapagos.org**/ Little is known about the newly named Eastern Santa Cruz Tortoise. Don Fausto poses (left) with the new species named in his honor. All photos on this page. © GNPD

conservation/tortoise-restoration/), a collaborative project of the Galapagos National Park Directorate, Galapagos Conservancy, Dr. Caccone's group at Yale University, and others, is focused on the long-term restoration of all Galapagos tortoise populations to historical numbers. Special emphasis will now be placed on the Eastern Santa Cruz Tortoise.

"This is an exciting moment in the history of Galapagos giant tortoises," said Dr. Linda Cayot, Science Advisor for Galapagos Conservancy. "Over the last several years, the ever-growing role of genetics in guiding development of conservation strategies for Galapagos tortoises continually requires us to think in new ways."

The new Eastern Santa Cruz Tortoise was named in honor of Fausto Llerena Sánchez, known to his colleagues and friends as "Don Fausto." Don Fausto dedicated 43 years of service (1971–2014) to giant tortoise conservation as a park ranger for the Galapagos National Park Directorate. He was the primary caretaker at the Tortoise Breeding and Rearing Center on Santa Cruz, which bears his name. The restoration of several tortoise species is due in large part to Don Fausto's dedication and efforts.

"The description of a new Galapagos tortoise species, the result of long-term collaboration between natural resource managers and scientists, constitutes a challenge for us to intensify the efforts of the Galapagos National Park Directorate to ensure its protection and long-term conservation," said Alejandra Ordoñez, Director of the Galapagos National Park.

TRANSFORMING K-12 EDUCATION in GALAPAGOS PROJECT UPDATE: EDUCATION FOR SUSTAINABILITY IN GALAPAGOS

by Richard Knab, Galapagos Conservancy's Director of Strategic Partnerships and Education Team Leader

Education has historically been a missing piece of the conservation puzzle in Galapagos. While important science has been conducted over the years and unprecedented conservation programs are underway, the long-term impact of these investments depends on a society of local residents who understand and appreciate what makes Galapagos unique. Those advocates need the skills, attitudes, and dedication to preserve and protect the delicate ecosystems of the Islands. Galapagos Conservancy believes that high quality formal education — that makes meaningful connections between what students learn in the classroom and their unique surroundings — is one of the essential steps in building such a society in Galapagos.

The Education for Sustainability in Galapagos (ESG) Program is a public-private initiative through which program partners (Ecuador's Ministry of Education, the Galapagos Governing Council, the Galapagos-based Scalesia Foundation, and Galapagos Conservancy) will improve the quality of education in the islands by means of an intensive, five-year professional development program that will strengthen the content knowledge and classroom skills of every teacher (470 total) in every school (22 total) in Galapagos.

Working closely with the Ministry of Education and experts in teacher professional development programs in different parts of the world, we have developed what could become the most intensive and comprehensive teacher training program ever implemented in Latin America. Key components of the program include:

The establishment of a Galapagos-based Education Support Team comprised of highlyexperienced educational coaches in core subject areas (science, math, language arts, social studies, and English Language) who will live in Galapagos and who will provide year-round training and one-on-one coaching and mentoring for local teachers.

Advisory Teams in each subject area, whose members include expert educators from Latin America, the US, and beyond, who will support the coaches and who will assist in program design and the delivery of intensive "teacher institutes" — full-day, weeklong workshops held twice a year, when teachers are in school but students are on vacation.

Special attention to developing the educational leadership skills of Galapagos school directors, so that they have the tools necessary to promote quality teaching and effective learning within their schools.

Our goal is to ensure that over the course of the program, outstanding Galapagos educators will be trained to replace the externally-hired education coaches and will continue training and coaching their counterparts well into the future. We envision Galapagos becoming a "seedbed" of enlightened, effective educators and school leaders.



Math advisory members observe an elementary school class at the Tomás de Berlanga School, which is being developed into a demonstration site. © T2T-I

After several years of networking, an intensive needs assessment, and extensive dialogue involving a wide range of stake-holders and experts, this past September I caught an exciting glimpse of what our ESG Program will look like, once it is in full swing during the 2016–2017 school year.

The purpose of this particular trip was to help our Math Advisory Team — a talented group of math specialists from Teachers2Teachers International (T2T-I) — to gather information needed for program implementation. In the course of 10 days, we exchanged ideas with high-level officials at the Ministry of Education in Quito and school directors in Galapagos, observed math teachers at work, modeled proven teaching approaches, and offered intensive professional development workshops for all of the high school math teachers on the Island of Santa Cruz and most of the elementary school teachers who teach math as part of their duties. Our days in Galapagos were divided into morning school visits, during which we met with school directors to exchange ideas related to the program and to observe math teachers at work. Afternoons were spent providing teacher professional development workshops.

We discovered that the enthusiasm of school teachers and directors is greater than imagined. During one of the workshops, a Ministry official commented that he had never seen so many happy teachers. One group of trainers was approached by a teacher after a workshop who exclaimed, "Thank you for helping me fall in love with math again!"

We plan to fully implement teacher training in April 2016. In the meantime, we are identifying additional program funding to ensure complete implementation in the program's first year. We are also recruiting instructional coaches in math, science, literacy, and educational leadership — please visit the Careers section of GC's website at www.galapagos.org.

If you would like to consider funding this program or would like more information, contact GC's Richard Knab at rknab@galapagos.org



Carol Townsend & Jay Cole

Ms. Carol Townsend and Dr. Charles "Jay" Cole may very well win the prize for most visits to the Galapagos Islands, having made more than 25 trips! Carol and Jay, both biologists with the American Museum of Natural History (AMNH), made their first trip to the Islands with the AMNH in 1981 and returned most recently with their family in 2014. According to Carol, "We never think of a visit as the last one!"

Carol and Jay learned of Galapagos Conservancy a few decades ago while visiting the Charles Darwin Research Station and have been impressed with the success of tortoise conservation efforts over the years. "It is wonderful to think of tortoise populations being restored to historical numbers – a Galapagos we will never see, but something exciting to support!" They also believe that the future of Galapagos conservation depends on local education. "Galapagos Conservancy's educational program to inform Galapagos residents will help develop local and national interest in conserving the islands."

Carol and Jay are long-time supporters of Galapagos Conservancy, having been loyal donors since 1993. In addition to making annual gifts, they also have been generous monthly contributors in our Galapagos Guardians Society since 2008. And as the ultimate demonstration of their commitment to Galapagos conservation, they have joined our Legacy Society, designating a portion of their estate to Galapagos Conservancy in their will.

According to Jay, "Watching Galapagos Conservancy at work over many years, we wish all members would double their annual contributions. Their money would be put to good use!" Galapagos Conservancy is grateful for their unwavering financial support and vote of confidence. A special thank you to Carol and Jay for their continued commitment to the conservation and preservation of the wild and wonderful Galapagos Islands!



BirdsEye Galapagos helps users identify birds they may see on a trip to the Galapagos Islands, as well as learn about the conservation work to protect them

BirdsEye Galápagos: New Galapagos Bird ID App Unveiled

BirdsEye Galápagos, a new free app for Apple and Android mobile devices, has been launched to help users identify birds they see while visiting the Galapagos Islands. The app provides key information about the unique avian fauna in the Islands and relevant conservation efforts, and can be used without an internet connection. It was created by Birds In The Hand, LLC, the Charles Darwin Foundation (CDF), and the Galapagos National Park Directorate (GNPD), with support from Galapagos Conservancy.

Birgit Fessl, the Charles Darwin Foundation ornithologist who led the app's content development, stated, "This will be a key instrument for monitoring through 'Citizen Science,' encouraging everyone to pay close attention to the small land birds, and to identify and report their observations with more confidence. Undoubtedly, it will become a very important tool for monitoring bird populations, the basis for developing conservation measures for native and endemic bird species in the Galapagos Islands."

BirdsEye Galápagos includes photographs and descriptions of each bird species in Galapagos, and the information will be frequently updated. It uses GPS technology to show users where to find a particular species or when the last sighting occurred.

The app also includes a bar graph that displays seasonal variations of all birds, which comes from the well-known observations database eBird, part of the "Citizen Science" platform of Cornell University's Laboratory of Ornithology.

Look for this app icon when downloading!



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Galapagos Tote Bag, \$16 Eco-friendly shoulder bag is made from recycled plastic bottles.



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THANK YOU, GC MEMBERS! \$32,736 Raised Online in September

Nearly 240 GC members helped make this year's Online Membership Challenge a major success — we surpassed our \$30,000 goal and raised a total of \$32,736!

The Membership Challenge took place online during the month of September, and we are thrilled with the enthusiastic response from so many of our dedicated members — as well as the new supporters who joined Galapagos Conservancy for the first time. Gifts from the Challenge will be used to support important conservation projects like our Giant Tortoise Restoration Initiative and Education for Sustainability in Galapagos. From everyone at Galapagos Conservancy, and on behalf of all of Galapagos' spectacular wildlife, thank you for your support!





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Order online at: www.galapagos.org/shop/ This beautiful 2016 Galapagos Conservancy Calendar was created exclusively for our Friends of Galapagos.

More than 40 stunning photographs (taken by our members!) celebrate Galapagos' amazing biodiversity. Perfect for the home or office, the calendar reminds us daily of the importance of protecting our fragile earth. It is printed on recycled paper with soybased ink, making it a perfect gift for your favorite conservationist or animal lover.

Visit our website at www.galapagos. org for information on next year's photo contest.

See page 12 for more on the photo contest winners.