



# GALAPAGOS *news*

FALL/WINTER  
2012

*Connecting people across the globe with conservation in Galapagos*

## *Goodbye, Lonesome George.*



*We dedicate this issue to you  
and honor your legacy in our work.*

Lonesome George © Tim Saxe

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## We Witnessed Extinction.

**L**onesome George was the last of his kind when he died on June 24th earlier this year. I was in Galapagos and remember seeing a local café put a hand-lettered sign out that Sunday morning saying, “Today we have witnessed extinction.” This was powerful language for a resident population that had not been uniformly strong about conservation. But that day, we all knew what losing George meant. A species was lost “on our watch,” and we needed to resolve that this would be the last.

For 50 years, conservation in Galapagos followed what I would call a “silo” mentality. It was species driven, population driven, and the science behind it — at least at the Research Station — was very compartmentalized. Over the years, as conservation management evolved, the concept of ecosystem restoration took a stronger hold. It would be a stretch to link this evolution in thinking to George, but it is true that as the likelihood of George’s natural reproduction ebbed, and conversations about cloning came and went, the virtue of looking at the health of whole systems, rather than an individual or a particular species, made sense.

It is fitting then that we contemplate the dramatic and very positive steps that science for conservation has taken in Galapagos over the last twenty years. Emerging from the larger Project Isabela, Project Pinta sought to bring back an island-wide ecosystem balance between plants and native herbivores. With the last Pinta tortoise removed from Pinta, the Galapagos National Park Service, after long debate and informed by good science, placed sterilized hybrid tortoises on Pinta in 2010 with the plan to add a reproductive population once it was confirmed that the resident population was thriving. What science was to learn from concurrent genetic work,

funded in part by Galapagos Conservancy, was that Wolf Volcano on the island of Isabela had some tortoises with Pinta ancestry. The potential yet exists to form a Pinta breeding program over the next decade. Wolf Volcano turned out also to be the home of even more Floreana hybrids, long thought to be extinct in the archipelago.

Not only has genetic work changed conservation dynamics, but advances in other technologies have changed the way we do island-wide eradications. Along with strong science on the management of target and non-target species, restoration efforts to eradicate introduced rodents will move forward this November on Pinzón Island and Plaza Sur. Deploying rat bait by helicopter, using techniques forged during Project Isabela, Pinzón will be the largest island in Galapagos from which rats will be eliminated, and its native tortoise and bird populations will once again thrive in the absence of introduced predators.

The challenges in Galapagos are real. The threats posed by the introduction of plants, animals, and pathogens pose an almost insurmountable problem. But with the collective work of the international scientific community, the academic community, the government of Ecuador, the Charles Darwin Foundation, focused NGOs such as Galapagos Conservancy and local organizations willing to push for stringent conservation measures, we stand an excellent chance of protecting this extraordinary place. Lonesome George’s legacy will live on.

  
**Johannah E. Barry**  
President



**GALAPAGOS**  
CONSERVANCY

*Saving one of the world's great treasures*

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## GALAPAGOS CONSERVANCY CRUISES: *Quality Unmatched*



**May 1-12, 2013**

**May 7-18, 2014**

**May 13-24, 2015**

Join GC's own Science Advisor, **Linda Cayot**, and naturalist extraordinaire, **Richard Polatty**, as they set sail aboard the *Integrity*, a 16-passenger, 141 ft. luxury yacht. Special guests, onboard lectures on research and conservation, and behind-the-scenes land tours set our trip apart from all the rest.

International Nature and Cultural Adventures (INCA at [inca1.com](http://inca1.com)) will flawlessly handle the planning and management of our tour aboard the *Integrity*.

**GC's 2013 adventure will focus on the eastern Galapagos Islands.** The eastern half of the Galapagos Islands contains some of the oldest islands and the most abundant populations of seabirds. Española to the south and Genovesa to the north provide some of the best opportunities in the archipelago to see Nazca, Blue-footed, and Red-footed Boobies, as well as Lava Gulls, Swallow-tailed Gulls, Frigatebirds, Yellow-crowned Night Herons, and many others; and, in the case of Waved Albatrosses on Española, the only opportunity in the world. El Junco, one of a few freshwater lakes in the archipelago, sits in the highlands of San Cristóbal, the oldest of the islands. Many satellite islands off the coasts of Española, San Cristóbal, Santa Cruz, and Santiago offer incredible opportunities for snorkeling and showcase beautiful landscapes teeming with Galapagos wildlife. Other highlights of this tour include a visit to the giant cactus groves on Santa Fé with the possibility of seeing the Santa Fé Land Iguana and a trek across an amazing lava field on the southern coast of Santiago, providing a glimpse at the origin of the islands. Our days on Santa Cruz will include giant tortoises and visits to other natural areas, as well as a look into the important role that humans play in protecting these extraordinary islands.

More details and a downloadable brochure can be found on our website at [www.galapagos.org](http://www.galapagos.org).

**Call our office at 703-383-0077 or email [rfuhrken@galapagos.org](mailto:rfuhrken@galapagos.org) with questions. A \$1500/person non-refundable deposit is required to reserve your spot.**

## GIANT TORTOISE RECOVERY FUND



**Lonesome George**, the last tortoise from Pinta Island, passed away in June 2012. George's legacy will live on through the Giant Tortoise Recovery Project to be conducted in Galapagos over the next 10 years.

**The Giant Tortoise Recovery Fund** has been established in memory of this special tortoise who became a symbol of the importance of conservation across the entire world. Now through December 31, 2012, for gifts of \$50 or more made through our website to the Giant Tortoise Recovery Fund, we will include your name on a special banner honoring the legacy of Lonesome George to be displayed at a new visitors' center to open in 2013 and named in George's honor.

Visit [www.galapagos.org](http://www.galapagos.org) to make your donation.

## LONESOME GEORGE KEEPSAKE ORNAMENT



To honor the memory of Lonesome George, we created custom pewter ornaments in his likeness, with a special sentiment engraved on the back. All proceeds from the sale of these ornaments will benefit the Giant Tortoise Recovery Fund (see above). Other items on sale in our Gift Shop:

**2013 Galapagos Conservancy calendars**  
**Galapagos books for children and adults**  
**Organic Galapagos Coffee** (*while supplies last*)  
**T-shirts and caps for adults**  
**T-shirts and onesies for children**  
**Posters, Maps, and Notecards**  
**Totebags**

All items listed above are now on sale at:

[www.galapagos.org](http://www.galapagos.org)



# NEWS

## FROM GALAPAGOS



FROM



© GNP

### TIRED TIRES

**Ecuador's Ministries of Environment and Health** have conducted a massive effort to remove discarded tires from Santa Cruz in an effort to prevent the further spread of the Dengue mosquito *Aedes aegypti*. The rainwater that collects inside these rings provides the perfect breeding ground for the disease-bearing invasive insect. In early August, park rangers began the process of shipping more than 30,000 tires from the island. This follows a similar initiative on San Cristóbal earlier this year.



© Tim Saxe

### LONESOME GEORGE FOUND DEAD ON JUNE 24, 2012

**Lonesome George – the last remaining giant tortoise from Pinta Island** – has died and his species *Chelonoidis abingdoni* is officially extinct. It was Lonesome George's long-term keeper, Galapagos National Park (GNP) ranger Fausto Llerena, who found him in his enclosure at the Charles Darwin Research Station early on June 24th (see interview on p. 14). The following day, a team of vets and scientists carried out a thorough postmortem to preserve key tissues for future research and to determine the cause of death.

George was discovered on Pinta by Hungarian-born snail biologist Joseph Vagvolgyi in December 1971, recovered by rangers from the GNP the following year, and brought to Santa Cruz Island where he lived out his life at the Tortoise Center. It was hoped that a female of his species might be found or that he would reproduce with tortoises from a different island, but he died without leaving any offspring. During the 40 years he spent in captivity he became a dependable feature of the Galapagos landscape, much-loved by residents and tourists alike (see feature on pp. 9-11).

It was widely assumed that George was around 100 years old but if, as is currently suspected, he died of natural causes it could be that he was far older. A plaque has been erected on the platform above his enclosure, expressing a commitment to share his conservation message. His remains will be preserved and go on display at a new tortoise visitor center to be constructed by the GNP adjacent to the tortoise corrals in 2013.



LG's empty corral. © Charles Shelby

### EL MIRADOR ON HOLD

**All construction at El Mirador**, the controversial new development to the north of Puerto Ayora, has come to a standstill. Following a routine inspection, the GNP has begun administrative action against the local government on Santa Cruz over allegations that work has been proceeding without the appropriate environmental license. It is crucial that El Mirador, which contains more than 1,000 lots for houses and will nearly double the size of Puerto Ayora, be developed to the highest possible sustainability standards.



© GNP

## TOURISM STATISTICS

**According to the Park Visitor Entry Report** published by the Galapagos National Park, for the first half of 2012, tourism to the Galapagos Islands has increased by almost two percent from 91,761 visitors in 2011 to 93,364 visitors in 2012. While tourism by non-Ecuadorians has increased by more than seven and a half percent, Ecuadorian tourism has decreased slightly more than nine percent, falling from 32,072 to 29,167 between 2011 and 2012. Ecuador contributed the largest number of visitors overall, followed closely by the United States. Should the visitor numbers remain constant, it is likely that tourism in 2012 will increase over the 2011 totals of 173,000.

An interesting trend reported in this analysis is that more foreign tourists (40%) are choosing to stay at least one or more nights in the populated areas, choosing local hotels, hostels, and other private housing. This is in significant contrast to a 2005 study in which author Bruce Epler reported that only 24% of foreign tourists stayed in hotels. Today's Park data show that 57% of foreign tourists stay on boats, while as many as 76% were boat-based tourists only seven years ago.



© Zorica Kovacevic

## LOST TOURIST

**A large-scale search and rescue mission** tracked down a tourist reported missing on Santa Cruz in June. A party comprising rangers from the Galapagos National Park, a fireman and a policeman located the Chilean Felipe Bravo after five days lost in the center of the island. He had managed to survive by extracting water from the fleshy cactus pads growing in the region.

## SMUGGLED LAND IGUANAS

**In early July, Galapagos police arrested a tourist** allegedly attempting to smuggle iguanas out of the Archipelago. Routine x-ray imaging at Baltra airport led to an investigation of the German national's luggage and the discovery of four living specimens of the endemic Land Iguana *Conolophous subcristatus*. This species is listed as Vulnerable on the International Union for the Conservation of Nature (IUCN)'s Red List and protected under the Convention on International Trade in Endangered Species (CITES). Following a preliminary hearing, a judge agreed that Dirk Bender (far left, in photo below) should be detained in Galapagos to await trial. According to online reports, Fijian authorities arrested and prosecuted Bender in December last year for attempting to export a gravid female of another protected species, the Fiji Crested Iguana.



© GNP

## GIANT TORTOISE WORKSHOP

**A "tortoise summit"** held in Puerto Ayora in early July and dedicated to Lonesome George's memory began to map out a detailed plan for the management of each of the 10 remaining tortoise species. "One species is very important, but most important are the ecosystems," says Washington Tapia, director of conservation and sustainable development at the Galapagos National Park Service. The delegates addressed each of the ten tortoise species in turn. From a management perspective, "Each island is totally different," says Linda Cayot, science advisor for Galapagos Conservancy and the organizer of the workshop. "Pinzón has rats. Santiago had pigs and goats. Pinta had goats, but only for 20 years. Española had goats for probably 100 years," she says. The aim was to synthesise the different perspectives of ecologists, geneticists, and conservation managers into a single set of recommendations that will help shape GNP's protection of tortoises over the coming decade.



© GNP





# The Enchanted Highlands

by Godfrey Merten

**O**ceanic volcanic islands have a dreamy look to them and the imagination explodes as the eye darts from the white water rolling onto the shores to the distant highland greenness with its unknown contents.

Galapagos is no different. On Santa Cruz we see the army of cacti fringing the beachhead, seemingly standing guard over the hinterland behind. Our eye roams to the horizon where 25 green-clothed volcanic cones form the central ridge or “Sierra”, the backbone of our volcanic home. Nearer by, silvery trees are marching up the lesser hills, glittering along the edge of a cliff. Frigatebirds, arching black wings defying the wind, soar as the advanced guard of this rare and eminently curious world.

Tempted by sight and urged by expectation, a journey to the highland ridge is full of danger, thirst and frustration, yet wonder, enchantment and deep reflection are the inescapable rewards. Darwin, in his Victorian garb and boots of leather, would have felt just the same as he clambered over

rough, black lava and followed in the steps of tortoise hunters along tight trails marked by stones lodged in the grey-barked trees.

There is one unforgettable memory and lesson as we struggle through the silence of the thorny coastal cactus land into the silvery world of Palo Santo trees, and higher into the lichen-bearing endemic guavas of a Japanese painting. That is to stop and wait, even if parched, sweating and perhaps with bleeding cuts. Within a few moments, the nearby bushes are no longer a menace but an ecosystem of incomparable rarity.

Mockingbirds, million-year residents, settle on branches a foot or so from your face, bright eyes searching out every detail of this new opportunity, pecking onto your backpack or grabbing hold of shoelaces as if they were worms. It seems so quiet, but then you hear more fluttering – every beat – of small wings. A Galapagos Flycatcher, another long-term resident, has landed on your hair and is urgently tugging to loosen building material for a nest tucked into an old collapsing tree. Ground Finches, even more ancient settlers, arrive in a shower of differing beak sizes, cracking seeds, digging into the scarce soil,



walking over the toes of your boots, for you dare not come here in sandals!

Pushing higher, the wind starts to cool and the once-blue sky is being replaced by an intermittent greyness. The sound of silence is supplemented by a slight whispering of gentle breezes, which start to budge the butterfly-winged leaves of the endemic passion vine clambering up mossy boughs. Moisture adorns the orchids with bright drops and the tight-



fitting leaves of *Tillandsia* (related to the pineapple) form little cups of water for a thirsty bird or our own dry throats.

Now, there is a sight! A brilliant red-breasted bird has landed a few yards away, his black crest flaring as his black eyes pick up on invisible insects. He vanishes but just as you long to see this Vermilion Flycatcher again he is back, a few feet from where you sit. Now he preens and you are caught totally by the contrast of the soft greens of the vegetation and the brilliant colors of this plumage. Quick as a wink he is gone but just a few yards away to a perfect lichen-lined nest tucked among the vines and mosses. The female sits silent yet attentive, for short-eared owls patrol these woodlands. In the soft greenness she is safe.

Overhead the crowns of the low trees are growing so close they form a canopy that almost totally fills the sky, lending a softness to the green light. This is the *Scalesia* forest at 2,000 feet, perhaps the most enchanting of Galapagos environments, a place that seems to captivate and hold your mind and sight. The understory of endemic coffee, ferns, orchids and mistletoe, the snails between the moss-covered stones and the birds amongst the daisy-like *Scalesia* flowers is a construction of millions of years, an ecosystem of waifs and strays sculpted to their unique situation.

The sound of small objects falling on the leaves brings you back to the present. A pale bird with a powerful beak is hammering at a branch blanketed in moss, sending a shower of wood chips earthward. For this habitat is a favorite of the Woodpecker Finch, related to those Ground Finches near the coast but, in the absence of true woodpeckers, highly specialized to his forest trade. With a stem of a fern grasped in his bill, he works it into a hole in the tree to extract a fat grub.

Before our enchantment is over, a tiny bird appears. From the look of its fine bill and the darting nature of its flight, it must be a warbler of some sort. But no. This is yet another of Darwin's Finches – the Warbler Finch – that has taken up the position that on the continent would be occupied by true warblers.

A churring song brings our attention to a well-rounded, parrot-billed bird. The Small Tree Finch spends its time rootling among the mosses, plants, and fruits for caterpillars and soft seeds.



The Galapagos Passionflower, *Passiflora colinvauxii* (above, left), is a fast-growing endemic vine with boomerang-shaped leaves and small white flowers with a purple center. Found only on Santa Cruz, the International Union for the Conservation of Nature (IUCN) considers it Vulnerable. The moisture that pools in the tightfitting leaves of the endemic *Tillandsia insularis* (above, right) provides a unique microhabitat.



The Woodpecker Finch (left) boasts the rare talent of using a twig or cactus spine to weedle out grubs from beneath the bark of trees. The Black-billed Cuckoo (right) is a vagrant to Galapagos that is only known on Santa Cruz and Española.



The stunning Short-eared Owl (above) can be seen on most islands in Galapagos. The female Vermilion Flycatcher (above, right) is not as conspicuous as the more colorful male (right). This species is now very scarce on Santa Cruz and is probably already extinct on San Cristóbal and Floreana.



All photos © Godfrey Merlen, unless specified otherwise.

## Scalesia Forest

There are at least 15 different species of *Scalesia* in Galapagos and, as with Darwin's Finches, each is adapted to its own particular ecological setup. All are single-stemmed evergreens, but they range from small shrubs to impressive trees up to 15 meters tall and can be found in a range of habitats, from the very driest sites to the most humid upland forests. These species have an unusual life cycle, living fast and dying young. Within a matter of years, a tree will have reached around 7-8 meters tall, flower and fruit, and by the time it's 15 or 20, it will have died.

It is highly mobile and often hangs upside down during forays for food. A bigger version, the Large Tree Finch, has just moved into the canopy above and is sending a shower of old flower parts from the composite heads of the *Scalesia* tree; this species is very rare and not often seen. The deep strong bill is used in a twisting fashion to open seed cases, although it is omnivorous and consumes insects and grubs.

Now, for a moment, the sun has broken through the low-lying clouds and the pointed leaves in the canopy turn into silhouettes. The drops of water on the leaves really are jewels. The birds too are backlit, bringing into clear relief the curves and forms of their beaks. Santa Cruz boasts nine of the 14 species of Darwin's Finch, a remarkable diversity within a single group of birds and a clear demonstration of the power of natural selection to use its one tool – genetic variability – to suit the scenery on hand.

We are lucky now for a cuckoo flashes his white tail band and we have a glimpse of the soft greys and buffs of his throat and breast. We are lucky too for I know that a little higher we can find the endemic *Miconia* bushes below which another endemic bird, the Galapagos Petrel, quietly burrows its nest during the drizzling nights and surrounded by the bubbling brooks. Let's go!

## Invasive Threats

The introduction of non-native species is the greatest threat to the songbirds found largely in this highland habitat and to the long-term future of the Archipelago as a whole. In addition to the obvious devastation caused by introduced mammals like rats, pigs and goats, a major threat to native flora and fauna comes from invasive plants like raspberry, Cuban cedar, the quinine tree and guava, invertebrates like fire ants, fruit flies, and the botfly *Philornis downsi* (right) and microorganisms like avian pox virus, avian malaria, and West Nile virus.

## Songbirds in Decline

A recent study of the abundance of Darwin's Finches on Santa Cruz revealed that six of the nine species that occupy this Island underwent a dramatic decline from 1997 to 2010. This trend was most obvious on insectivorous species and in the highlands. It is likely that a combination of factors are involved, including a reduction in *Scalesia* forest, changes in plant and invertebrate communities, the increasing abundance of invasive species and fluctuations in climate. The Vermilion Flycatcher appears to be suffering a similar fate on all four inhabited islands. Several urgent steps are needed, including: raising awareness of the impact invasive species are having on native flora and fauna; determining the causes of songbird decline on Santa Cruz and the other inhabited islands; and developing methods of controlling the most damaging introduced species, such as the blackberry and the botfly *Philornis*.



The botfly *Philornis downsi* lays its eggs in the nest of birds. When they hatch, the larvae feed off the nestlings, frequently killing the entire brood. This devastating species, known to occur in Trinidad and in Brazil, is now present on all islands, with parasite intensity greatest in the highlands.

**Godfrey Merlen** has lived in Galapagos for more than 40 years. He has worked for many Galapagos institutions, including the Galapagos National Park, the Charles Darwin Foundation, and WWF. He is currently working with SICGAL – the quarantine inspection agency – to prevent the arrival of invasive species.





## Lonesome George on Pinta Island

This photo of Lonesome George was taken in 1972 and is one of only a few photos of him on his home island of Pinta. © Ole Hamann

# Goodbye, Lonesome George

by Linda Cayot

**As the days and weeks pass since the death of Lonesome George I find myself spending time thinking about the years with the last of the Pinta Island tortoises and of the future for all of Galapagos' other tortoises. Lonesome George was and remains, in death, the icon of what saving Galapagos is all about. He is with us in our memories and in our planning for the future of the islands and its tortoise populations.**

I first met Lonesome George in March of 1981 on my second day in Galapagos. I had traveled to these isolated islands to do my PhD research on giant tortoises. Dr. Bob Reynolds, the resident herpetologist at the Charles Darwin Research Station (CDRS), took me on a tour of the Station with the majority of our time visiting all of the tortoises in captivity — the 15 Española tortoises brought into captivity to rebuild that population, the numerous young tortoises getting ready to be returned

to their islands of origin, a number of tortoises of unknown origin, and finally Lonesome George. He was housed alone in a very large corral down near the sea. To reach his corral we passed through two locked gates. He was truly alone.

Back in Bob's office, we talked about all of the tortoise populations. When it came to Lonesome George and Pinta, we discussed the need to rebuild a tortoise population on Pinta to fulfill the giant herbivores' role in the ecosystem. It was only my second day in Galapagos. Nearly 30 years later, I would see that dream come true — the first tortoises stepping onto Pinta 38 years after George had left.

When I returned to the CDRS in early 1988 and took up the post that Bob Reynolds had held back in 1981, I ended up supervising the work in the tortoise center for the next nine years, working closely with Fausto Llerena, the park ranger in charge, and all of the other staff, and of course with Lonesome George. During my first years we left George (LG) in his corral by the sea. But visitors kept asking to see him — so when we had time, one of the keepers or I would accompany them down to the

coast, through the two locked gates, and into George's corral to say hello to our conservation icon. It was time to bring Lonesome George to the public.

It was also time to see about getting him some female companions. After exhaustive searches, no one had found a second Pinta tortoise — on the island or in the world's zoos. Genetic analyses were not yet being used on Galapagos giant tortoises so we focused solely on morphology. The tortoises that appeared closest morphologically to George were found on Wolf Volcano at the northern end of Isabela. Two female tortoises were brought from there to the center. As part of a major improvement of the visitor experience at the Tortoise Center, we built new corrals for the juveniles and a corral for Lonesome George — all visible from a new trail that passed the juveniles and then followed a wooden walkway to the Lonesome George viewing platform and then on to the Española tortoises. In LG's corral, we put in nesting zones for the females. Lonesome George and his two females were transferred to the new corral in 1992.

Unfortunately George was never very interested in his companions. Not

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In March 1972, we were on our way to Pinta on a small fishing boat and we had radio contact with the Galapagos National Park people who were already on the island and they told us that they had just found a great, live tortoise. When we arrived they had brought him down to the beach and tied him up with a rope and there he was. His death marks the end of an era. He developed into a sort of icon for conservation in Galapagos. Everybody knew about the story of Lonesome George.

**Ole Hamman**, professor Emeritus of Botany at the University of Copenhagen in Denmark and one of just a few people to have seen Lonesome George on Pinta.

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Lonesome George's native Pinta is one of the smaller islands in Galapagos. Although it takes up less than 1% of the Archipelago's land area, it is home to almost one third of all native Galapagos plants.

The plaque raised outside Lonesome George's corral following his death in June.

It says, "We promise to tell your story and to share your conservation message."



© Henry Nichols

“

I found out that Lonesome George had died on Sunday night (24 June). I thought it was a mistake. It's like when you lose a family member and say "It cannot be. It's impossible. It has to be an error." But it wasn't. On Monday, the Galapagos National Park asked me to carry out the necropsy. I felt a confusion of emotions. It was not something I wanted to do but it was something that had to be done.

**Marilyn Cruz**, coordinator of Agrocalidad in Galapagos, the institution responsible for agricultural standards and biosecurity in the Islands and the veterinarian who led the necropsy on Lonesome George.

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only did he not mount them, we weren't even sure that he could produce sperm. In March 1993, I consulted Dr. Gila von Hegel, a German veterinarian who was in the islands working with Dr. Fritz Trillmich on marine iguanas. She recommended I try sexual stimulation and taught me the technique with the exhibition tortoises. This would help us determine if he produced sperm and also might get him more interested in the females. However, doing sexual stimulation with Lonesome George would require more time than I could spare, so I looked for a volunteer. Sveva Grigioni, a volunteer who arrived shortly after from Switzerland, agreed to work with George.

Sveva worked closely with Lonesome George from late April to mid July 1993. During that period she attempted sexual stimulation with Lonesome George 30 times, often for up to two hours at a stretch. Although Sveva was never able to obtain sperm from Lonesome George, he did become more active and interested in the females. However, his attempts at copulation were unsuccessful. While never successful with LG, Sveva was able to stimulate the exhibition tortoises (males in the corral open to tourists) to produce sperm the first time out in an average of 27 minutes of manipulation.

Lonesome George was also the only tortoise in captivity that periodically became severely overweight. Dr. Olaf Oftedal, an animal nutritionist from the National Zoo in Washington, D.C. who was working with us on improving the nutrition of the captive land iguanas, also helped us improve LG's diet. From then on, we kept him on a fairly strict feeding regime to maintain a healthy weight.

We had provided him with females, improved his diet, and tried to stimulate him sexually. But nothing seemed to work. A number of herpetologists had suggested putting him with other males for a while to see if they might stimulate him to become more sexually active. Unfortunate circumstances in Galapagos gave me that chance in the early 1990s. The increasing conflict over sea cucumber fishing intensified to the point that some fishermen threatened to kill Lonesome George. Although I didn't believe they would, I couldn't take any chances. We moved George to one of the corrals with mixed males and females of unknown origin and replaced him with a large female of low conservation value that looked a bit like him. I figured the fishermen, if they really made the attempt, wouldn't know one tortoise from another.

The attempt to kill George never occurred, but I got a chance to observe his behavior with a mix of male and female tortoises. Never a very social animal, George co-opted a quarter of the large corral and all of the other tortoises left him alone. He certainly lived up to his name.

When I left the CDRS in the fall of 1998, I left George in the very capable hands of Fausto Llerena who had been looking after him for more than a decade. Over the next 14 years, the two Wolf females would lay infertile eggs, results from tortoise genetics would show that the Wolf tortoises were not the correct females for George and they would be replaced by two female tortoises from the Española population, George would have a book written about him by Henry Nichols (*Lonesome George: The Life and Loves of a Conservation Icon*), and we would continue to argue about what to do on Pinta Island.

Finally in May 2010, we released 39 sterile adult tortoises onto Pinta to begin the ecosystem restoration work with these giant ecosystem engineers. A group of geneticists from Yale



University, under the direction of Dr. Gisella Caccone, would eventually find a few hybrid Pinta tortoises on Wolf Volcano, bringing new possibilities to the restoration of Pinta Island.

To determine the next several years of research and management to ensure the complete recovery of all of the giant tortoise populations of Galapagos, we organized a workshop convened by the Galapagos National Park (GNP), to be held in Galapagos July 9-13, 2012. I arrived in Galapagos June 22 to facilitate another workshop on the development of a Citizen Science Program for Galapagos, June 25-29. A group of us were gathered together Sunday morning, June 24th, to finalize the plans for the Citizen Science Workshop. When I called Wacho Tapia, Director of Conservation and Sustainable Development at the GNP, to discuss the workshop, he told me that Lonesome George had died only hours before. Our planning session was put on hold.

Over the next several days, Lonesome George was up front and center in all of our work. James Gibbs of the State University of New York's Environmental School of Forestry, Eleanor Sterling of the American Museum of Natural History, and I worked closely with Wacho. Unfortunately, we were also the four responsible for the Citizen Science Workshop — so we divided our efforts, facilitating and moving the workshop ahead, ensuring that Lonesome George's necropsy was carried out as best as possible, participating in the organization of efforts to preserve his tissues, and making sure the decisions regarding where to send his body for taxidermy would ensure the best specimen for Ecuador. James maintained phone communication with Dr. Joe Flanagan, the Director of Veterinary Services at the Houston Zoo, throughout the three-hour necropsy, performed by Marilyn Cruz, Coordinator at Agrocalidad in Galapagos, to provide suggestions and recommendations. The flurry of emails was unending — on the necropsy, tissue collection, and future taxidermy, not to mention the focus of the world's media on the death of Lonesome George.

The grieving was not only for Lonesome George but for the loss of a species — the Pinta Island tortoise. Usually when a species goes extinct, we never know when the last individual dies. We had watched Lonesome George for more than 40 years, worked to achieve his reproduction to carry on the Pinta Island tortoise genes, searched the world for more Pinta tortoises, and, for the most part, we failed. We had fought and lost. We were all determined that this would not happen again on our watch.

The tortoise workshop proceeded as planned in July with exciting outcomes defining research and management for tortoises for at least the next 10 years. Lonesome George was a constant force behind the energetic discussions, and his legacy and our own will be not only the ongoing recovery of all tortoise populations, but the enhanced restoration of many of their home islands in Galapagos.



**Linda Cayot** is Science Advisor to Galapagos Conservancy and one of the first people to research the behavioral ecology of giant tortoises. During the 1990s, she was Head of Protection at the Charles Darwin Research Station. She has worked for more than 30 years in Galapagos conservation.

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*My first professional contact with Lonesome George came in the early 1990s, when I had the honor of drawing blood from George for the first analysis of his genetic makeup. Since then I've kept my eye on him. The last time I saw George he looked great. He had a little bit of flabbiness around his arms and the base of his neck but then so do we all. He was active and alert. I was very surprised that he just died.*

**Joe Flanagan**, director of Veterinary Services at the Houston Zoo in Texas and an advisor to the Galapagos National Park on matters of tortoise health.

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## TIMELINE of LONESOME GEORGE's LIFE

Early

1900s Lonesome George is born on Pinta Island.

1959 Three goats are released on Pinta. Over the next decade, they multiply into the tens of thousands.

1971 Lonesome George is discovered by a snail biologist working alone on Pinta.

1972 Park rangers and scientists relocate Lonesome George and move him to Santa Cruz.

1982 Fausto Llerena of the Galapagos National Park is made responsible for the care of giant tortoises at the breeding center.

1992 George is joined by two female tortoises from Wolf Volcano on Isabela.

2008 After 15 years together, the female tortoises lay eggs but they are all unfertilized.

2011 The Wolf females are replaced by more closely related females from Española.

2012 Fausto Llerena finds Lonesome George dead in his corral on June 24, 2012.

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*I first met Lonesome George when I first went to Galapagos in 1994. It was a very emotional moment. With my interest in genetics, the obvious thing was to use genetic methods to try to find a mate for Lonesome George. I looked around in zoos and in private collections and amongst the animals of unknown origin at the Charles Darwin Research Station but without success. When George died it really hit me very hard. He was like a family member. As when you grieve for a person who was close to you, I grieved and I thought of the things I could have done that I did not do. I thought I had more time.*

**Gisella Caccone**, geneticist at Yale University's Department of Ecology and Evolutionary Biology who works on the evolutionary genetics of Galapagos tortoises.

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# GALAPAGOS CONSERVANCY

*Saving one of the world's great treasures*

## Member Support in Action

### 2013 GALAPAGOS CALENDARS ON SALE



**Galapagos Conservancy's 2013 Calendars are now on sale at [www.galapagos.org](http://www.galapagos.org).** Many thanks to our loyal and talented members, who submitted more than 1,200 photos to our annual photo contest. This year's winning shots are spectacular and sure to delight all Galapagos enthusiasts. Please see the back cover of this issue for more winning photos!

This year's calendar also pays special tribute to Lonesome George. Photos of him are featured on the front and back covers, as well as in an extra two-page spread inside that includes a short biography of this iconic tortoise.

Throughout the calendar are 50 photos showcasing the best of Galapagos' biodiversity, from tortoises and iguanas, to albatrosses, frigatebirds, and boobies, to sea lions and other underwater marvels, and many more.

Proceeds from the sale of the calendar will benefit the conservation work of Galapagos Conservancy and our partners in Galapagos.

### GALAPAGOS LEGACY SOCIETY

While important strides are being made to protect the unique biodiversity and landscapes of Galapagos, the future of the archipelago will depend on the generosity and commitment of forward-looking individuals who understand what is at stake. 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 archipelago by making a planned gift through Galapagos Conservancy.

**Visit: [www.galapagos.org](http://www.galapagos.org) in our DONATE section.**

## DONOR SPOTLIGHT: *Michael & Denise Dan*

In 2011, Michael and Denise Dan traveled to Galapagos aboard the *Integrity* with Dr. Linda Cayot, Galapagos Conservancy's Science Advisor and long-time friend and caretaker of Lonesome George.

Having worked in Galapagos for three decades, Linda enthusiastically (and unapologetically) talked throughout the week on *Integrity* about tortoise conservation and plans to create a tortoise action plan with a ten-year horizon. The Dans responded with great enthusiasm and were eager to help Linda and her colleagues at the Galapagos National Park move tortoise conservation forward, using George as a natural and very appropriate figurehead.

Michael's creativity in fundraising and problem-solving are not relegated to Galapagos. As former Chairman, President, and CEO of The Brink's Company, Michael sought ways to bring the corporate and non-profit communities together in innovative ways. His work on the Business Roundtable's Partnership for Disaster Response led to creating new protocols on disaster response among business, the federal government and the American Red Cross. As a Corporate Board Member for The Kennedy Center for the Performing Arts, Michael played a leadership role in fundraising for more than 13 years. Michael also served on the University of Richmond's Robins School of Business executive advisory group and hosted students globally. He continues to serve on the Board of the Principal Financial Group, a global financial services firm. He has spoken at several business schools throughout the past few years.

But Lonesome George's plight intrigued both of them, and they worked with staff at Galapagos Conservancy to think through ways George could be an even more effective conservation spokesperson/tortoise. Perhaps a world tour to inspire others? All ideas were brought to the table.

We were all devastated when Lonesome George died in June, and yet Michael and Denise saw an opportunity to ensure that George did indeed fulfill his ambassador role. Shortly after George's death, he and Denise made a very generous contribution to underwrite the Galapagos National Park's request to have George professionally preserved and mounted to form the central part of a new visitor center in Puerto Ayora. As part of that initiative, George will be allowed a short stay at the American Museum of Natural History in New York in 2013, and the Dans will be there to help tell George's story and ensure that his legacy lives on.



© Linda Cayot



## TORTOISE WORKSHOP:

### The Next 10 Years of Tortoise Conservation

AN UPDATE BY LINDA CAYOT, PHD

In July 2012, the Galapagos National Park Service (GNPS), with support from Galapagos Conservancy, held a week-long workshop to discuss recent research findings, results of ongoing management, and status of the giant tortoises of Galapagos. International scientists (ecologists, herpetologists, geneticists, botanists) met with GNPS personnel and other Galapagos-based researchers to review the status of all of the tortoise populations and to share their knowledge to identify priorities for the next several years to secure the future of giant tortoises.

The primary goal of the workshop was to develop plans for the next decade to ensure major advances in the long-term conservation of giant tortoise populations and their islands. One major effort, scheduled to begin in 2013, aims to remove non-native tortoises found on Wolf Volcano (hybrids from many of the other populations in Galapagos) and re-establish tortoise populations on both Pinta and Floreana (extinct on the island since 1850s). The potential re-establishment of a giant tortoise population on Santa Fe is also being considered. Tortoises went extinct on Santa Fe in the 1800s due to exploitation by whalers and others. More intensive genetic studies will be carried out on both southern Isabela and San Cristóbal.

Outputs from this workshop will also include: 1) status review of Galapagos giant tortoises for updating the IUCN Red List; 2) a taxonomy position paper approved by the full workshop; 3) series of maps (in digital form based on the Google Earth platform) of all islands with tortoise populations, including tortoise distributions and place names; 4) recommendations for changes and improvements in the tortoise breeding and rearing centers on Santa Cruz, Isabela, and San Cristóbal; 5) field protocols for tortoise monitoring and genetic sampling; 6) detailed plan for a tortoise-cactus-woody vegetation research project; 7) review of health status of tortoises; 8) plans for a workshop to examine anti-poaching issues; 9) list of priority research and management projects (populations surveys/genetic sampling, migration studies, tortoise-human interactions on human-inhabited islands, etc.); and 10) methods for capturing all of the historical and recent knowledge about giant tortoises to make it accessible to all parties concerned with conservation of giant Galapagos tortoises.



© Sandra Carlson

## CITIZEN SCIENCE WORKSHOP:

### Developing a Public Data Collection Program

AN UPDATE BY LINDA CAYOT, PHD

**Citizen science**, or participatory monitoring, seeks to involve members of the public as vital partners in the scientific research process, generating data to inform conservation management and decision-making. Although citizen science is currently used in many areas of the world with impressive results, it has yet to gain widespread use in the Galapagos Islands with either the local community (~25,000) or the community of tourists (nearing 200,000 per year), where it could be extremely valuable in creating a nexus among scientific research, management, and social-ecological sustainability.

Participatory monitoring programs have the ability to provide large amounts of data that can produce results that identify emerging trends or serious issues that need to be responded to in the short term. Such programs typically use a cyber-infrastructure that enables data to flow quickly from community observers to researchers over the internet. Trends in the data can be identified, helping scientists to focus their investigation.

Besides collecting valuable data, this process gives citizens a sense of ownership in the overall health of the environment through participation and will also increase scientific literacy, knowledge of the Galapagos Islands, and enhance a collective sense of environmental stewardship.

Outlining the elements of a successful citizen science program for Galapagos was the overall goal of a workshop convened by the Galapagos National Park on June 25-29, 2012. Participants in the workshop included international experts in citizen science, park managers, scientists, naturalist guides, fundraisers, local community members, and other stakeholders. Attendees discussed: 1) priority questions, environmental indicators, and protocols; 2) how to engage the public; 3) how to reach new audiences; and 4) how to integrate informal and scientific knowledge. These categories highlighted the ecological and social aspects to be integrated into the proposed program.

The workshop results will include a plan for developing a Citizen Science Program for Galapagos including project leadership, design, program development, and funding. The Galapagos Citizen Science Program will be implemented in three phases: 1) program development; 2) initiation of pilot projects, and 3) expansion of the program. The workshop was funded by Galapagos Conservancy.



© GNP



# Galapagos Islander



© GNP

## Fausto Llerena . . .

**is one of the Galapagos National Park's longest serving and most dedicated employees. The tortoise breeding center at the Charles Darwin Research Station in Puerto Ayora is named after him in acknowledgement of his lifelong dedication to the tortoises and iguanas held in captivity.**

**Soon after you joined the Galapagos National Park in 1971 you traveled to Pinta. The point of the expedition was to help eradicate goats from the island but what else did you find?**

We were on a 20-day trip and on the first day we found Lonesome George. He was found at around 10 am by a park ranger and a student from the University of Guayaquil. They didn't touch him; they just saw him and left him there. In the afternoon I went with four others to bring him back to camp. It wasn't very far: about a 15-minute walk. George remained in the camp for three days until a tourist boat passed by and took him to the center (at the Charles Darwin Research Station on Santa Cruz). The rest of us stayed on the island.

**Over the last four decades caring for Lonesome George, you knew him better than anyone. What was he like?**

He was never aggressive, always friendly. He always came to say hello to me. He would come up to the door, raise his head and look me in the eye. It was as if he was asking, "What's on the menu today?" to which I would reply "Well, it's the same menu as every day." While I carried out my work, he would stay with me and then follow me to the door. We have

1,160 small tortoises and 58 adults at the breeding center and among them all – over 1,200 tortoises – he was my best friend.

**It must have come as a great shock to have found him dead in his enclosure in June.**

I don't remember how I reacted at that exact moment. I think it took me a few minutes to react and I felt sadness. Then I recalled the day we first found him and how excited and happy everybody was. I received many condolences from people who visited him and also from national and international media. There were many calls.

**What did Lonesome George mean to Galapagos?**

From the moment he arrived at the breeding center he was an idol. The whole world would come to visit him. Obviously I didn't want him to die, but these things happen and we have to keep fighting. There are still so many species to restore, so many other tortoises that need us.



© David Sutherland

*Lonesome George (top photo) greets his best friend and caretaker, Fausto Llerena. A young Llerena (bottom photo) weighs a juvenile tortoise at the breeding center where he has worked for decades.*



### More Change

*Stephen J. Walsh and Carlos F. Mena are co-directors of the Galapagos Science Center on San Cristóbal in Galapagos.*

**The world is changing rapidly and much of this change is driven by humans. In our global efforts to prevent extinctions and conserve fragments of the natural world before they are lost forever, it is all too easy to imagine that we are trying to prevent change, keeping the natural world in some perfect, bubble-wrapped state. Yet, this ignores the simple fact that change is a fundamental, necessary process of all life.**

This is especially true for Galapagos, islands that have become inextricably linked to the idea of evolutionary change. Forged of fire, Galapagos is defined by volcanic processes that continue to shape the Islands in both subtle and conspicuous ways. Tectonic uplift and subsidence, for instance, change the three dimensional landscape, with profound consequences for particular habitats like coastal mangroves. This affects the species that live in the immediate vicinity. It also alters the protection that mangroves afford the land from ocean swells and destructive tsunamis.

Yet it's not just natural forces that drive change. In the coastal communities and agricultural highlands of the four inhabited islands in Galapagos, the actions of human visitors and settlers have brought about dramatic change. Invasive species, for example, either



introduced intentionally by settlers seeking the comfort of familiar plants and animals or arriving unintentionally as “hitch-hikers” on products and materials arriving from the mainland, are clearly an unwanted part of the landscape mosaic in Galapagos. The appearance of settlements, the development of towns and the urban infrastructure to accommodate a growing residential population and international tourism has also caused dramatic change to coastal communities. Direct changes like these demand yet more change in the shape of ports, airports, energy consumption, waste generation, movement of cargo ships and the support services meant to accommodate the expanding human imprint.

In addition, there are also the impacts of global climate change. El Niño and La Niña Southern Oscillation events can cause weather extremes in local places. Major El Niño events like those in 1982-83 and 1997-98 can result in conspicuous change, disrupting ocean currents, curtailing local

upwellings, diminishing the availability of phytoplankton and devastating marine-dwelling species like Galapagos Penguins, Sea Lions and Marine Iguanas. Conversely, La Niña events generally bring a strengthening of cold, nutrient-rich waters but terrestrial flora and fauna struggle with reduced rainfall and even drought. There are signs that with climate change, such natural fluctuations are becoming more frequent and severe. If this turns out to be the case, this would have important implications for species, populations, invasive flora and fauna and, possibly, international tourism.

In short, change is fundamental to life in Galapagos. It is ongoing and perpetual. We humans must work harder to understand the balance of natural and anthropogenic forces currently shaping Galapagos, their origins, and their linked effects. We must adapt our behavior, radically and soon, if we are to realize the dream of social and ecological sustainability.



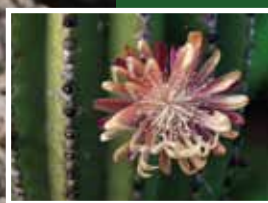
*Humans must adapt our behavior if we are to realize the dream of a truly sustainable Galapagos.  
Top photo, © Richard Blake. Bottom photo, © James Pistole.*



**Congratulations to  
Fabrizia Cataneo of  
Milan, Italy — winner  
of our 2013 Galapagos  
Conservancy Photo  
Contest!**

Her photo of Lonesome George, the last Pinta Island tortoise, graces the cover of our 2013 GC Calendar, which also includes a special 2-page tribute to our fallen conservation icon.

**Calendars are on sale now  
in our online store at  
[www.galapagos.org](http://www.galapagos.org)**



Other winning photos by GC Members featured above and in the calendar: Sea Lions by Chris Harter, Waved Albatrosses by William Reno, Cactus Flower by Sukumar Balachandran, and Creolefish by Michael Barrow.