



THE LONESOME GEORGE STORY

Where Do We Go From Here?

By Linda J. Cayot

DOES GALAPAGOS INSPIRE YOU?



HELP US PROTECT ITS FUTURE.



www.galapagos.org

This book was created and financed by Galapagos Conservancy to honor Lonesome George and to remind and inspire the people who read it to take action to preserve, protect and restore our planet.



Saving one of the world's great treasures

Galapagos Conservancy focuses exclusively on the preservation of the Galapagos archipelago, working to protect these special islands, their timeless landscapes, and the rare and wonderful animals that inhabit them. To learn more or to support our efforts, please visit us online at:

www.galapagos.org

o en español

espanol.galapagos.org

THE LONESOME GEORGE STORY *Where Do We Go From Here?*

By Linda J. Cayot



Published in 2014 by

Designed by Lori A. Ulrich





*We promise to tell your story
and share your conservation message.*

On the plaque at Lonesome George's corral in Galapagos

When Lonesome George died on June 24, 2012, the world lost the last of a species. Many who knew George well lost a friend. While species often disappear without a whisper, gone before anyone knows extinction is imminent, the plight of Lonesome George and the inevitable extinction of the Pinta Island tortoise was discussed, debated, and lamented around the world for 40 years before his death.

I first met Lonesome George in March 1981, when I arrived in Galapagos to study the ecology of giant tortoises for my PhD. Seven years later, I returned to work for the Charles Darwin Research Station as Head of the Herpetology Department and supervised both the giant tortoise and land iguana breeding and rearing centers for the next nine years. Throughout those years Lonesome George was a daily reminder of why we needed to work so hard to conserve Galapagos. Extinction is forever and so we strove to avert it.

Up until the moment that Lonesome George was discovered in 1971, scientists believed the Pinta Island tortoise had gone extinct, as had its sister species from Santa Fe, Floreana, and Fernandina Islands. Except for occasional unconfirmed reports from fishermen, no tortoise had been seen on Pinta for decades. In 1906, the adventurous men of the

California Academy of Sciences had collected the last three documented tortoises (all male) and an old shell. After the specimens were preserved in arsenic, they were added to the Academy's prominent and expanding collection. No one could have predicted that the killing and preservation of those last living Pinta tortoises — acts that would be unthinkable today — would enable modern molecular genetics to uncover tortoises to repopulate Pinta Island more than a century later.

After the California Academy of Sciences Expedition's collections, Pinta remained without tortoises. Or so we thought. Then one day in 1971, a Hungarian biologist from Harvard University named Dr. Joseph Vagvolgyi traveled to Pinta with his wife Maria to study land snails. Not particularly knowledgeable about tortoises, Joseph thought nothing of it when he saw one roaming the island. It was not until he returned to Santa Cruz Island and casually mentioned his observation to other biologists over dinner one night that the excitement began to grow. A tortoise had been seen on Pinta ... the species was not extinct!

Several months later a group of park rangers and a young student from the Charles Darwin Research

Station traveled to Pinta to hunt goats as part of an ongoing effort to rid the island of this destructive invasive species. On the previous goat-hunting trip they had found a large male tortoise that had been killed with a machete, evidence that if any tortoises still remained on the island they were in danger from occasional human visitors. After two of the men came across a healthy male tortoise, the very same animal that the Vagvolgyis had seen, the tortoise was transported to the Tortoise Breeding and Rearing Center on Santa Cruz Island for safekeeping. The Center, co-managed by the Charles Darwin Research Station and the Galapagos National Park Directorate, was established in 1965 to increase tortoise populations on islands where they were threatened by extinction. Park Service authorities and scientists hoped to find this rare tortoise a mate.

The Research Station and Park Service began to share the news of the discovery of a Pinta tortoise in international scientific circles and among the international press. Once the news was picked up by the Associated Press, the following text began to appear in newspapers throughout North America and Europe:



“Dr. Craig MacFarland, Director of the Charles Darwin Research Station in the Galapagos Islands, is searching for a female Galapagos tortoise, Pinta Island subspecies, to be paired with the only known male tortoise of the subspecies, which was discovered in 1971.”¹

¹ In 1971, tortoise biologists considered the different island populations of Galapagos giant tortoises to be subspecies of a single species. Today, they are considered separate species.

One of only a few photos taken of Lonesome George on Pinta Island in 1972.
© Ole Hamann

A copy of one of many "personal ads" placed in newspapers around the world, announcing that scientists were searching for a mate for Lonesome George. © CDRS files



Another rare photo of Lonesome George on Pinta Island in 1972, showing the group of Park rangers and scientists who carried him from the highlands to the shore and then by ship to Santa Cruz, where he remained for the rest of his life.
© Ole Hamann

Due to the isolation of Galapagos at that time (there were no telephones and mail arrived weekly at best), officials at the World Wildlife Fund in Washington, DC, helped to spread the word and took the liberty of naming the tortoise Lonesome George, the nickname of a popular television personality of the time, George

Gobel. The name stuck and Lonesome George the Pinta tortoise became an instant celebrity. Visitors to Galapagos began asking to see him. In February 1976, Johnny Carson used Lonesome George's story in his opening monologue on *The Tonight Show*.

My first reaction upon meeting the still nameless Lonesome George was — that tortoise is fat. His caretaker in the 1970s loved to feed him bananas. And though he liked bananas, he didn't much care for other tortoises, always running away from them. I tried to see the tortoise females with tortoise eyes and they looked pretty good to me.

Although our interminable search for a mate for Lonesome George never bore fruit, it resulted in another major coup for Galapagos conservation. While hunting for a Pinta female, we discovered a male Española tortoise in the San Diego Zoo. He was returned to Galapagos and became the main stud in the Española breeding group, fathering many of the young tortoises that roam Española today. So although we never found George a mate — the search proved serendipitous.

Dr. Craig McFarland first traveled to Galapagos to study tortoises in the 1960s, later became director of the Charles Darwin Research Station from 1974 to 1978, and then President of the Charles Darwin Foundation in the 1990s.

PINTA: LONESOME GEORGE'S ISLAND

At the northern end of the Galapagos Archipelago, Pinta Island encompasses only 23 square miles, much of it barren lava, and rises to just over 2,000 feet. The island is mostly arid with an abundance of *Opuntia* cactus trees, an important source of food, water, and shade for giant tortoises. There is also a small but important humid zone near the top of the island with lush vegetation year-round.

Although Pinta tortoises are saddle-backed, the ancestral tortoise that first arrived in Galapagos was most likely a large, domed-shaped animal that fed primarily on grasses and other herbaceous vegetation. While domed tortoises were well adapted to the larger islands with greater plant and habitat diversity resulting from greater precipitation and soil development at higher elevations, they were not well adapted to the drier, smaller islands of the archipelago. When domed tortoises eventually dispersed to the arid, lower elevation islands, including Pinta, they eventually evolved into saddle-backed tortoises with longer legs and necks and a shell that rises in the front like an old Spanish saddle, allowing them to reach up for cactus pads,



Two photos of Pinta Island, taken on a 2010 expedition to return giant tortoises to the island for the first time since Lonesome George was removed in 1972.
© James Gibbs

practically the only food available during long periods of drought.

Historically tortoises on Pinta probably numbered in the tens of thousands. As throughout the archipelago, the Pinta tortoise population had been decimated in the nineteenth century, primarily by whalers. During the time of the pirates and buccaneers in the 1700s, it had been discovered that tortoises could live in the hold of a ship for many months without food or water. As this news became common knowledge, sea-goers, especially whalers who frequented the whale-rich waters of Galapagos during the first half of the 1800s, began to collect large numbers of live tortoises and store them in the depths of their ships as a source of fresh meat during their long voyages. A review of the logs of whaling ships resulted in an estimate of up to 200,000 tortoises having been removed by whalers in less than 50 years.

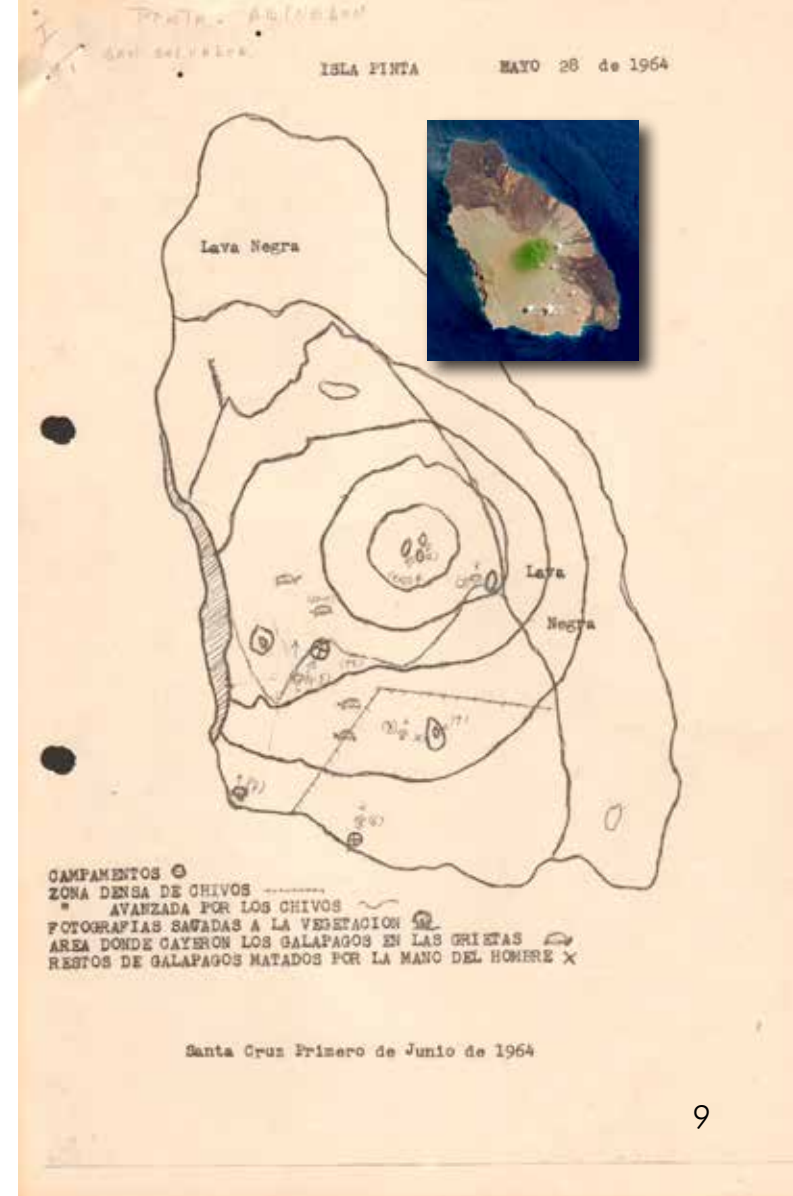
Of the three major islands in the north, Pinta was the only one with a tortoise population and so was targeted by any ships whaling in the northern waters. Its location and small size made it vulnerable to excessive tortoise collecting and it was not long before the tortoises were nearly extinct. After park rangers removed Lonesome George in 1972, the island was truly empty of tortoises.

This same scenario occurred on several of the other smaller, more arid and accessible islands. The four extinct species of Galapagos giant tortoises are all saddle-backed (Santa Fe, Floreana, Fernandina, and now Pinta). Other than Pinta, the saddle-backed tortoise populations on Española and Pinzón Islands were the closest to extinction when the tortoise breeding and rearing program began in 1965. The world came perilously close to losing all of these amazing lineages, so well adapted to the arid islands of Galapagos and their unusual climate of extremes.

In the early 1960s, Miguel Castro, a conservation officer with the Charles Darwin Research Station, carried out a review of the status of all of the tortoise populations in Galapagos. Over a week in May 1964, he searched for tortoises on Pinta but only found the remains of 28 tortoises that had fallen into crevices and a couple of tortoises that had been killed by humans, but no evidence of live tortoises. Miguel believed that the crevices acted as tortoise traps in

Right: Map of Pinta from Miguel Castro's report on his trip to Pinta in May 1964; indicates the advance of the goat (chivo) population, where he found tortoise remains in crevices, and where he found tortoises killed by hunters. © CDRS files

Inset, satellite image of Pinta © NASA



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.

Dr. Ole Hamann, a Professor Emeritus of Botany at the University of Copenhagen in Denmark, was one of just a few people to have seen Lonesome George on Pinta in 1972.

the rainy season when the vegetation was especially dense making the openings difficult to see.

Another serious problem for tortoises was the introduction into Galapagos of invasive plants and animals. Pinta remained relatively free of all introduced species until local fishermen released three goats there in 1959, ironically the same year that the Galapagos National Park was established. With the tortoises gone, the fishermen wanted a reliable supply of fresh meat for future fishing trips. Within just over ten years, that tiny population exploded to some 40,000 animals. Although three goats might not impact the vegetation, 40,000 created a massive mowing machine that took out everything in its path. By the time Lonesome George was discovered in 1972, the island had become an ecological disaster.

With no tortoises left on Pinta, Park Service and Research Station staff turned their attention to other islands and priorities. Park rangers continued to visit Pinta regularly to hunt goats to keep the population down. Botanists made occasional visits to monitor plant species in a series of open quadrats, most of which measured 10 x 25 m and were delineated with corner posts. These quadrats allowed resurveying of the same plot through the years to document the



impact of goats. They later used the same quadrats to measure vegetation recovery as goats were removed.

In March 1981, only weeks after I had met Lonesome George at his corral on Santa Cruz Island where he was cared for and protected, I had the opportunity to visit Pinta with Dr. Ole Hamann, a Danish botanist who had been on Pinta 10 years earlier when Lonesome George was recovered. As we hiked across the “saddle area,” prime tortoise country to the west of the volcano’s peak, I kept looking at my feet to ensure that I would not trip on the vines and rough lava terrain. There sitting on some dried grass

The view from Ibbetson Cove, the primary landing site on Pinta, in March 1981. The habitat in the saddle area between the peak and the hills to the left is prime tortoise country. Lonesome George was found there in 1972. © Linda J. Cayot

lay a small tortoise scat! During the rest of our trip, our conversations kept returning to the dried up scat. Could it be Lonesome George’s? Could it really be over nine years old? Was there another tortoise living on Pinta that no one knew about? I took the scat back to the Charles Darwin Research Station but we never discovered the answers to our questions.

When I returned to Galapagos as the Station herpetologist in 1988, I participated in a week-long workshop, *The Herpetology of the Galapagos Islands*, with some 70 participants from around the world. No matter the topic, every discussion seemed to end in a debate about Pinta and the fate of Lonesome George. Some of us thought the island needed tortoises to ensure the health of the Pinta ecosystem. Giant tortoises are not just curiosities; they play an important role in the ecosystem, dispersing seeds and creating openings and paths in the dense vegetation. However, some believed that if we didn't have Pinta tortoises, we should not put any tortoises there. For them, extinction and the absence of tortoises was preferred over the "biological impurity" of restoring Pinta with tortoises from another island. These positions were debated endlessly. No consensus was reached. Pinta Island continued to remain on the back burner of conservation.

All of this changed in 1997 with the start of Project Isabela, a multi-year, multi-million-dollar project to eliminate the more than 100,000 goats that were destroying northern Isabela Island. The much smaller island of Pinta was used as a training ground for hunters with the complementary goal of eliminating

the few remaining goats. By 2003, Pinta was declared goat-free. The absence of both goats and tortoises meant that the recovery of the vegetation would likely favor dense, woody vegetation, as had happened on Española Island. Restoring the island to its historical condition would require the return of giant tortoises.

Everyone involved continued to hope that Lonesome George would produce offspring or that we would find other tortoises with at least some Pinta genes to reestablish a reproductive population on the island. But that might take decades. Pinta's plants and animals couldn't wait. The island's ecosystem had been turned upside down by goats and its recovery required tortoises and all the positive impacts they have on ecosystems. We looked for a temporary solution and discovered one right in front of our eyes, living in the Tortoise Center on Santa Cruz.

When the National Park was established in 1959, many people in Galapagos and on the continent who had been keeping giant tortoises as pets returned them to the Park. Housed together during the first several years, these tortoises from different populations reproduced, resulting in a group of hybrid tortoises. Given the Park Service's commitment to ensuring genetic purity of tortoise populations in the wild,



Above: Park rangers carried 39 giant tortoises into the highlands of Pinta in May 2010. © Joe Flanagan



Several of the 39 tortoises rest on the boat along the way to their new home island of Pinta. © Francisco Laso

it was decided that the hybrid tortoises would remain in captivity for the rest of their lives — up to 200 years.

Then in the mid 1990s, a group of scientists from Yale University, initially led by Dr. Jeffrey Powell and then later by Dr. Gisella Caccone, began a study of the genetics of Galapagos tortoises. When they analyzed the captive tortoises, they discovered that the ancestry of most of the hybrids did not include any threatened species. Therefore, as they were not needed for recovery of any specific population, they were eventually incorporated into the restoration plan for the Pinta ecosystem. By sterilizing the hybrid tortoises, they could be released onto Pinta to act as ecosystem engineers without compromising the genetics of any future population. In addition to helping the recovery of Pinta, these otherwise life-long captive tortoises would be allowed to roam free. In May 2010, park rangers transported 39 sterilized hybrid tortoises into the highlands of Pinta. Within a year, they had all gained an average of 10 kilograms. They continue to thrive there to this day, dispersing seeds and opening the vegetation, all part of jump-starting the natural recovery of the Pinta ecosystem.

LIFE AT THE TORTOISE CENTER

For decades, we'd believed that for full restoration of the Pinta Island tortoise population we needed Lonesome George to reproduce. In 1992, we brought two female tortoises from Wolf Volcano on northern Isabela to accompany him. We built him a new corral at the Tortoise Center with nesting zones for the females and where visitors could finally see him. The tortoise genetics work would not begin for another two years and it would be many years later before we would know which species provided the best mates for Lonesome George. So we selected female tortoises that looked similar to Pinta tortoises. Unfortunately, perhaps because of years of living alone, Lonesome George showed no interest in his new companions.

In spring 1993, Dr. Gila von Hegel, a veterinarian from the Munich Zoo, passed through Galapagos and taught me a technique for stimulating male tortoises to produce semen. If we could get Lonesome George to produce semen we could then examine his sperm viability and possibly use artificial insemination as a way around his reluctance to breed directly. Sexual stimulation might also have the added benefit of enhancing his interest in the female tortoises.



In 1992, Lonesome George and the two female tortoises from Wolf Volcano move toward their new corral at the Tortoise Center, which they would share for nearly two decades.

© Linda J. Cayot

However, after sitting with George for over an hour, Gila was only able to touch his carapace and legs; he would not let her touch his tail. Apparently when she worked with Aldabra tortoises in zoos, she was successful in getting them to produce semen after a week of daily visits.

Enter Sveva Grigioni, a young woman from Switzerland who was arriving to volunteer in herpetology.

When Sveva arrived, I gave her the option of working with Lonesome George or studying introduced geckos. She chose Lonesome George and over the next three months she sat with him at least 30 times for an hour or two each time in an attempt to get him to produce semen. Sveva became known locally as “Lonesome George’s girlfriend.” She was able to get the other captive males to produce semen within 30 minutes, and although Lonesome George grew to like her and seemed to look forward to her visits, her three-month attempt to obtain semen from him was ultimately unsuccessful. Sveva’s work did seem to stimulate George’s interest in the two female tortoises in his corral but to our knowledge he never successfully copulated with them. When the



Sveva Grigioni works to sexually stimulate George in July 1993 in an attempt to get him to produce semen.

© Linda J. Cayot

When I was 17, I volunteered in the giant tortoise center, where I helped feed Lonesome George and studied his behavior. Many years later, after university and studying giant tortoises on southern Isabela, I began work with the Galapagos National Park, where I became the go-to guy whenever Lonesome George had a problem. For instance, one weekend a cactus tree fell in his corral and by Monday morning, he'd eaten so much of the fibrous trunk he had digestive problems. I helped excavate the nests of the Wolf females — only to later be disappointed when the eggs were found to be infertile. When Fausto came to get me the day Lonesome George died and we returned to confirm his death, I felt as though I'd lost a close friend. I immediately embraced Don Fausto as we mourned our loss.

Washington (Wacho) Tapia (pictured at right) has worked in Galapagos conservation for decades and is the current director of Galapagos Conservancy's Giant Tortoise Restoration Initiative.

two females finally nested in 2008 and 2009, there was much excitement about a possible future for the Pinta Island tortoise. Over the next few months that excitement turned to frustration and finally disappointment when it became apparent that all the eggs were infertile. Tortoises, like chickens, can lay eggs without ever having copulated.

In the early 2000s, the Yale University team studying tortoise genetics pronounced that the Española tortoise was the closest genetic match among living tortoises to Lonesome George. They came to this conclusion after sampling not only the blood of Lonesome George but also tissue samples from the Pinta tortoise specimens collected by the 1905-06 expedition of the California Academy of Sciences. The females from Wolf that had been companions of Lonesome George for nearly two decades were actually from one of the populations most unlike the Pinta tortoise. The two Wolf females were eventually removed from George's pen and two of the adult females that had been repatriated to Española Island in the 1970s were recaptured and brought back to Santa Cruz Island to live with Lonesome George. Unfortunately he never showed much interest in them either.

Beyond his reproductive issues, Lonesome George was not well suited for life in captivity. At times he suffered from skin problems, goiters, and, unlike the other adult tortoises in the Tortoise Center, George got fat. Dr. Olav Oftedal, an animal nutritionist from the National Zoo in Washington D.C., was enlisted to help us improve the condition of our captive land iguanas. After also examining Lonesome George, he recommended a special diet. By regularly monitoring Lonesome George's weight and adjusting his diet when necessary, he maintained a healthy weight for the rest of his life. We studied his behavior, adjusted his diet, carried out fecal and thyroid sample analyses, and worked to ensure Lonesome George's good health. But he continued to have occasional periods when he was not well.

We tried many things over the years that Lonesome George remained in captivity. We provided him with female tortoises, improved his diet, looked after his health and even tried to stimulate him sexually, but nothing seemed to work. A number of herpetologists suggested putting him with other males for a while to see if they might stimulate him to become more sexually active. Circumstances in Galapagos in the 1990s provided us with the opportunity — or



Above: Lonesome George trails one of the female Española tortoises that was relocated to his corral in 2009, once genetic analyses revealed that Española tortoises are more closely related to Pinta tortoises than those from Wolf Volcano.
© Barbara Kirschner

Below: Fausto Llerena (left), the park ranger responsible for Lonesome George, and the Park's Director of Science Wacho Tapia excavate the eggs from a nest in Lonesome George's corral, only to later find them all infertile.
© Galapagos National Park





Lonesome George in 1992 with one of the Wolf Volcano female tortoises. © Linda J. Cayot

Lonesome George in 1995. © Godfrey Merlen

perhaps the need — to do just that. The increasing conflict between fishermen and the conservation sector over sea cucumber fishing intensified to the point that fishermen held multi-day protests often closing down the Research Station and the National Park headquarters. Some even threatened to kill Lonesome George. Although I didn't believe they would, I had to respond to the threat. We moved George to one of the corrals with mixed males and females of unknown origin and replaced him with a large female that looked a bit like him. I believed that if the fishermen attempted to carry out their threat, they wouldn't know the difference.

An attack on Lonesome George never happened but his time in the corral with the males and females provided a window into his behavior. Never very social with either humans or tortoises, Lonesome George co-opted a quarter of the large corral and the other tortoises stayed away and let him be. Even in the midst of a group of tortoises he lived up to his name; he was a confirmed bachelor.

As the years passed, Lonesome George's fame grew. Letters continued to arrive at the Park headquarters and the Research Station, expressing interest and concern about his fate and that of his species. Photos

of captive Galapagos tortoises in other parts of the world arrived with expressions of hope that they might include a Pinta female. Some recommended cloning George. Letters from children, teenagers, and entire school classes gave suggestions for his future with some calling for his return to Pinta where he could live out his life and die with dignity in the wild. Others thought he should be bred with female tortoises from one of the other islands. Even two years after his death these letters still arrive.

Additional searches were carried out on Pinta to ensure that no live tortoises were missed. During Project Isabela goat hunters hiked all over the island, including areas that had probably never been visited before. In 2008, the Park Service carried out the last massive search for any evidence of tortoises on Pinta. After a week scouring every inch of the island, the many park rangers and their collaborators had only found a few tortoise carapaces at the bottom of crevices, similar to what Miguel Castro had found more than 40 years earlier. A separate project by the genetics team at Yale University searched the world's zoos and private collections for another Pinta tortoise. None was ever found — no female, no male. Lonesome George was indeed alone.

I 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.

Dr. Gisella Caccone, a geneticist at Yale University's Department of Ecology and Evolutionary Biology, is an expert on the evolutionary genetics of Galapagos tortoises

LONESOME GEORGE'S CARETAKER AND FRIEND: FAUSTO LLERENA

In 1954, Fausto Llerena, a young man of fourteen, arrived in Galapagos from the Ecuadorian mainland with his parents and five brothers. After a night in Puerto Ayora they moved up to the highlands of Santa Cruz Island to a farm owned by a friend of Fausto's uncle. Although they knew no one in Galapagos, they had come to stay.

In 1971, after working as a field assistant for scientists at the Charles Darwin Research Station, Fausto joined the Galapagos National Park Service as a park ranger. Unsure he would like the work, he only agreed to a one-year contract. By the end of that year he had apparently found his calling! He remained a park ranger until retirement, more than 40 years later.

I first met Fausto in 1981 while I was a graduate student. Later I had the opportunity to work closely with him from the late 1980s through most of the 1990s, when I supervised the work at the Tortoise Center. Over the course of that decade we also made regular trips to other islands to survey tortoise populations, search for nests, and repatriate juveniles from the Center.



Right, Fausto Llerena shares a quiet moment with his longtime pal, Lonesome George. Photo taken in 2010. © Galapagos National Park

Left and below, a younger Fausto works with juvenile tortoises at the Tortoise Center, where he worked for decades and which is now named in his honor. © Galapagos Nat. Park (left) © David Sutherland (below)



He was never aggressive, always friendly. He always came to say hello to me. He would come up to the gate, 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 gate. 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.

Fausto Llerena, one of the Galapagos National Park's longest serving and most dedicated employees, was Lonesome George's longtime caretaker and best friend.

Fausto knew Lonesome George from the start. He'd participated in the goat hunting trip to Pinta in March 1972 when Lonesome George had been brought to Santa Cruz. Although the park rangers had not been told that a tortoise had been seen the year before by Dr. Vagvolgyi and his wife, they had been instructed to bring any tortoise they encountered back to the Tortoise Center for safekeeping. On the previous goat-hunting trip, Fausto had been the one who had found the large male tortoise killed with a machete.

In 1972, with its vegetation destroyed by goats, Pinta's terrain was open and hiking was relatively easy. If there were tortoises, they would likely be seen. After several days Manuel Cruz, a student studying the food habits of introduced goats, came upon Lonesome George near the place where I would find a tortoise scat nine years later. With much difficulty, the rangers carried the large male tortoise to the beach so that he could be taken by boat to the Tortoise Breeding and Rearing Center on Santa Cruz Island.

Five years later, Fausto began working in the newly developed Land Iguana Breeding Center adjacent to the Tortoise Center. In 1983, he started working directly with the captive tortoises, including

Lonesome George. Three years later he took over the management of the two centers for the Park Service, continuing to work in collaboration with staff from the Research Station.

Along with his work in the breeding centers, Fausto most enjoyed the long field trips to tortoise islands, first to identify tortoise areas and later to monitor tortoises and search for nests. His knowledge of the natural history of Galapagos tortoises far exceeds that of all of us who have studied them for years. Once when Fausto and I were on Pinzón hunting for tortoise nests, we hiked to the southern nesting zone together. Well before arriving at the main nesting zone, Fausto pointed to a muyuyo (yellow Cordia) tree about 10 feet below the trail. He had not been there for several years but remembered that a tortoise used to nest under that tree. We scrambled down to the muyuyo and found a nest within a few feet of where he had indicated.

For more than 25 years Fausto worked closely with Lonesome George, feeding him, managing his weight, taking care of health problems, and participating in our efforts to get the old tortoise to reproduce. Eventually the two developed a special relationship. Each morning when Fausto arrived at the gate to the

corral, Lonesome George would be there waiting for him. And when it came time for Fausto to leave, Lonesome George would follow him back to the gate. The tortoise never did this with anyone else.

Fausto is one of the Park Service's longest serving and most dedicated employees. In 1999, the Director of the Galapagos National Park named the Tortoise Center the Fausto Llerena Tortoise Center to honor him. Fausto retired in November 2014 at 75 years old.



Fausto Llerena and Lonesome George under the shade shelter in his corral. © Galapagos National Park



THE DEATH OF LONESOME GEORGE

On Sunday morning, June 24, 2012, Fausto arrived at Lonesome George's corral. The old tortoise was not waiting for him at the gate. When Fausto entered the corral and approached the apparently sleeping tortoise, Lonesome George did not move. Then Fausto reached out to touch him and immediately felt light-headed. He didn't want to believe what he knew to be true. He hurried to the home of Wacho Tapia, Director of Research for the Park Service, and rang the bell. The two immediately returned to confirm what Fausto already knew in his heart: Lonesome George was dead.

Within hours of this discovery, the word began to spread. Several of us dedicated to giant tortoise conservation in Galapagos were in Puerto Ayora preparing for two international workshops. The purpose of the second workshop was, appropriately, to develop plans for the next 10-20 years of giant tortoise research and conservation. The Park Service's Wacho Tapia, Dr. James Gibbs of the State University of New York, and I were leading both workshops. And, as luck would have it, Dr. Eleanor Sterling from the American

Museum of Natural History had come to help.

As we were preparing for the first workshop that Sunday morning, Wacho called to inform me of Lonesome George's death. The news struck all of us deeply. Within a short period of time I began to hear rumors in town of Lonesome George's death. It was not long before the Park director tweeted the news to the world and the media frenzy began.

On Monday, Dr. Marilyn Cruz, a local veterinarian who often collaborated with the Park Service, completed a necropsy of Lonesome George, with a second veterinarian with extensive experience with tortoises, Dr. Joe Flanagan, participating by phone from the Houston Zoo. Their conclusion: Lonesome George died of old age, that is, natural causes. Most of his organs appeared healthy except the liver, which showed signs of advanced age. Samples of fresh tissues were salvaged as a result of a valiant effort by many, including Dr. Oliver Ryder from the San Diego Zoo who leads their "Frozen Zoo." He flew two staff members down to help ensure the process according to their protocols. The endeavor included moving tanks of liquid nitrogen from the continent to the Islands, boats breaking down, a flurry of emails and

phone calls, and a massive coordination effort among many people and organizations within a very short time frame. These samples currently remain frozen in Ecuador awaiting some unknown future. Cloning Lonesome George may yet be a possibility. One surprise was that it appeared that the tortoise's sperm duct was incomplete, ending some four centimeters sooner than it should. Perhaps Lonesome George was physically incapable of reproducing, which might partly explain his rather solitary nature.

Throughout the week Park Service staff and those of us who had worked with Lonesome George began the task of responding to requests for interviews from both national and international media. After receiving many emails offering taxidermy services or freeze-drying for Lonesome George, the Park Service decided to follow Dr. Sterling's advice and work through the American Museum of Natural History in New York City to ensure that the taxidermy work was completed by a world-renowned professional. With the necropsy completed and Lonesome George frozen, we packed him up to await the paperwork needed to transfer him to New York.

Within a day or two of his passing, thousands of news items appeared on the internet announcing

his death. Hundreds of e-mails, many with photos and drawings of Lonesome George, poured into the in-boxes of the Park Service, the Charles Darwin Research Station, and many of us who knew and had worked with Lonesome George. The most heartfelt message I received was from Sveva Grigioni, Lonesome George's girlfriend:

Dear Linda,

I've heard today from the Swiss press that Solitario Jorge [Lonesome George] died on Sunday! I always thought that I could come again to Galapagos to allow the meeting of my husband and my daughter with my old boyfriend. Sadly it is from now impossible! I'm now living in Lausanne with my family and I'm a teacher in a secondary school and in a high school for training teachers. Many many things happened in my life since my experience in Galapagos, but Jorge always had a big place in my thoughts.

*Kind regards from Switzerland.
Sveva*

But of all the various tributes to Lonesome George, perhaps the most fitting took place a couple

of weeks later. The gathering of tortoise experts, scientists, park rangers, and others at the tortoise workshop, coordinated by Galapagos Conservancy in partnership with the Galapagos National Park Directorate, took on powerful new meaning in the shadow of Lonesome George's death. The loss of the Pinta tortoise fueled our discussions and planning for a long-term program to ensure the conservation of all Galapagos tortoises in perpetuity. The underlying threat of future extinctions ultimately drove us to enlarge our dreams, broaden our scope, and increase our creativity.

An international group of tortoise experts gathered for the workshop, Giant Tortoise Recovery through Integrated Research and Management, in July 2012, two weeks after Lonesome George's death.

Above: Work session including Fausto Llerena and Linda J. Cayot, among others. © Ole Hamann

Below: Group photo at the close of the workshop. © Ole Hamann



I had the privilege of serving as courier for Lonesome George on his long journey from Galapagos to New York City. During the humid, hot hours of pre-dawn in Puerto Ayora we packed the frozen tortoise, wrapped tightly in Pink Panther insulation, into an elegant wooden box built especially for his transit. Several people we encountered on the way to the airport cried when they touched his box. Late that night, the Customs Officers in Guayaquil professionally and efficiently hastened the tortoise's passage through their vast warehouse of frozen fish, fresh fruits, and flowers. Arriving at dawn on a cold, rainy day in New York City, we traveled the congested streets to the American Museum of Natural History, where we unlocked the box and lifted Lonesome George onto the table to begin the long process of preserving this remarkable tortoise. If I learned anything on this journey, it was the magnitude of affinity the world feels for Lonesome George. I can imagine the elation upon his return to Ecuador.

Dr. James Gibbs of the State University of New York has worked closely with the Galapagos National Park Service for many years on tortoise conservation and acted as George's personal escort on his journey from Galapagos to New York.

PRESERVING AN ICON

Lonesome George remained in a freezer at the Park headquarters in Galapagos for nearly 8 months before he and his courier, Dr. James Gibbs, made the complicated journey to New York City. Lonesome George then underwent over a year of extremely detailed taxidermy by George Dante, a world-renowned professional, at his studio Wildlife Preservations in New Jersey. After a three-month exhibit at the American Museum of Natural History in New York City, Lonesome George will return to Ecuador where he will be on display for future visitors.



James Gibbs stops for a rest at the tortoise release site on Pinta Island where 39 adult tortoises were returned to the wild in May 2010. © Linda J. Cayot

Below, Galapagos children accompany the box containing Lonesome George on the way to the airport. © James Gibbs



George Dante, above, poses with the artfully preserved body of Lonesome George in his studio in New Jersey. © Robert Clark of Robert Clark Photography LLC

Right, children stare in wonder. © JargaPix Photography

Far left, Lonesome George's foot, still covered with ice crystals from his trip to New York City from Galapagos, minutes after being removed from his box at the American Museum of Natural History in March 2013. © James Gibbs



This has been the most emotional project I have ever undertaken. From the sadness of what his loss meant to the scientific community, to the people who cared and worked with him directly for so many years. As we began to plan the approach it was immediately apparent that this was going to be the most important piece of taxidermy of our time, this was the highest honor anyone could bestow on a taxidermist and there was absolutely no room for error. My goals were not only to create the most accurate representation of a saddleback tortoise for science, but to essentially resurrect "George" for the people who new and loved him. Finally, to create a piece of artwork which will allow us not only to celebrate George's life but one which will move us in such a way that we become more conscious of the challenges faced by all of the life on our planet.

George Dante was the world-renowned taxidermist who painstakingly worked on the preservation of Lonesome George for more than a year in 2013-14.

A FUTURE FOR THE PINTA ISLAND TORTOISE?

During the last years of Lonesome George's life while the search for Pinta tortoises in zoos and on Pinta Island continued, something was quietly happening in a laboratory at Yale University that would change the course of conservation on his island — Pinta — as well as for tortoises on other islands in Galapagos. Based on the genetic identification of Pinta tortoises through analysis of museum specimens from Pinta, as well as Lonesome George himself, the genetics team was able to determine that a tortoise sampled during difficult fieldwork on remote Wolf Volcano at the northern end of Isabela Island was a hybrid. The young tortoise had a full-blooded Pinta tortoise parent who might well still be alive. The search was on.

In December 2008, an ambitious expedition organized by the Park Service was carried out on Wolf Volcano to search for more Pinta Island hybrids or perhaps the elusive pure Pinta Island tortoise. After collecting blood samples from more than 1,600 tortoises, the Yale team began the slow process of genetic screening of the samples. Not only did they find 17 hybrid tortoises with some Pinta ancestry,



Right: Tortoises on top of Wolf Volcano in December 2008.

© Galapagos Nat. Park



Top, left: The view of Wolf Volcano from Banks Bay near the northwestern end of Isabela Island.

© Galapagos Nat. Park

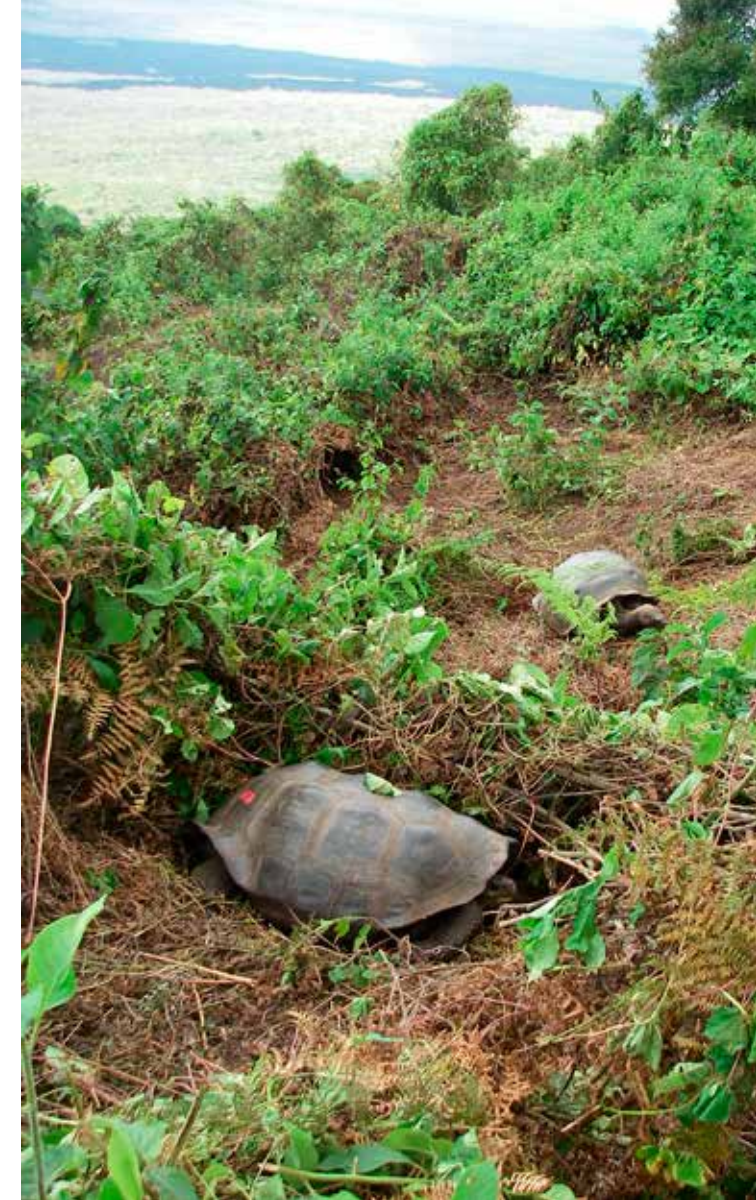
Left: Scott Glaberman and Gisella Caccone take a blood sample from a tortoise on Wolf Volcano in 2008.

© Yale University



Below, left: One of the young hybrids found on Wolf Volcano in 2008 with half Pinta ancestry.

© Yale University



they also found 84 with partial Floreana tortoise ancestry. The Floreana tortoise had gone extinct in the wild in the mid-1800s. These exciting discoveries provided an unexpected opportunity to restore tortoise populations on both islands.

But why had Wolf Volcano become home to such a surprising variety of tortoises? For decades scientists had found it difficult to describe the tortoise population on Wolf. Both saddle-backed and domed tortoises shared the mountain and the resulting variation was far beyond any other Galapagos tortoise population. No wonder. According to the Yale geneticists, a process of hybridization began on Wolf Volcano some 200 years ago. It included not only Wolf, Floreana, and Pinta tortoises, but also tortoises from Española, San Cristóbal, and southern Isabela Island.

It turns out that Banks Bay on the western side of Wolf Volcano provided a good anchorage and one that might have been used by many whaling vessels. It is probable that whalers abandoned tortoises there to make room for more whale oil. Or they might have determined they had more than enough meat for the homeward journey and removed the excess tortoises from their holds. In one case during the War of 1812, a US Navy captain onboard the *USS Essex* recorded

chasing three British whaling ships into Banks Bay. To lighten their load, the whalers threw all of the tortoises still on deck overboard. Although tortoises can't swim, they float well. A few days later the *Essex* crew discovered some fifty still floating in Banks Bay and collected those they could from the water. Certainly some of the tortoises, perhaps from several different islands, eventually drifted to the rocky coast at the base of Wolf Volcano and clambered ashore.

These occurrences 200 years ago on northern Isabela Island resulted in a treasure trove for conservationists. When combined with the genetic reference point obtained from tortoise specimens collected by scientists more than 100 years ago, we had the ingredients for an ambitious plan to restore tortoises to both Pinta and Floreana. The plan involves recovering the hybrid tortoises with Pinta and Floreana ancestry from Wolf Volcano to establish captive breeding groups. Their offspring will then be released on Pinta, where tortoises were absent for nearly 40 years and on Floreana where they haven't been seen for more than 150 years! Although the project requires hard work and many resources, the possibility of "re-tortoising" Pinta and Floreana is too exciting and important not to strive to achieve it.



A sign displayed outside a storefront in Puerto Ayora in Santa Cruz on the day of Lonesome George's death. Photographer unknown.

LONESOME GEORGE'S LEGACY

For 40 years Lonesome George was a living symbol of extinction — the last of his species. In less than 200 years humans had reduced the number of Pinta Island tortoises from tens of thousands to a single individual. Although we hoped to save his species by finding him a Pinta mate, he remained alone, an icon for all who care about conservation of the natural world.

In the humble but profound words of Fausto Llerena, who knew Lonesome George best, "We must take care of Galapagos to ensure that no other species goes extinct." The death of Lonesome George and the loss of his species call on all of us to increase our efforts to conserve biodiversity everywhere.

We will continue to tell Lonesome George's story. It compels us to constantly push the envelope of conservation science, to look for new solutions for previously unsolvable challenges, and to ensure that not only his legacy but our own will be a natural world full of diverse ecosystems and wondrous creatures.



GIANT TORTOISE RESTORATION INITIATIVE

Giant tortoises have played an essential role in the Galapagos Islands since their arrival more than a million years ago, shaping the biological landscape to the benefit of the Islands' extraordinary creatures and plants. **Of the more than 200,000 tortoises that once roamed the Islands, only 10% remain.**

Overexploitation by whalers and pirates in centuries past followed by predation and habitat destruction by invasive species such as rats, pigs, and goats caused the extinction of tortoises on some islands and greatly reduced their numbers on others. Fifty years of successful research and conservation that included refining tortoise breeding and rearing methods, controlling and/or eradicating some of the most impactful of the introduced species, and genetic analyses of both wild animals and museum specimens have successfully brought many tortoise populations back from the brink of extinction.

We now have the opportunity to go even further: returning tortoises to three islands where they are extinct, improving tortoise habitat where it was degraded by goats and other introduced animals,

and rebuilding all of the tortoise populations toward their historical numbers.

During the next several years, Galapagos Conservancy plans to invest more than **\$1,000,000** in the Giant Tortoise Restoration Initiative. Building on current knowledge and conservation successes, the intensive planning workshop coordinated by Galapagos Conservancy in partnership with the Galapagos National Park Directorate in July 2012 provided the blueprint for the Initiative. The leaders of the Initiative include Galapagos Conservancy's Linda J. Cayot and Wacho Tapia, director of the Initiative in the Galapagos Islands, and Dr. James Gibbs of the State University of New York College of Environmental Science and Forestry. The tortoise conservation work is conducted in close collaboration with the Galapagos National Park Directorate, which provides technical expertise, logistical support, personnel, infrastructure, and the authority needed to carry out the work.

Baby tortoises hatch at the Fausto Llerena Tortoise Center on Santa Cruz as part of the ongoing breeding and rearing program. Hatchlings remain at the Center for nearly 5 years, at which point they are predator-resistant and returned to their island of origin. © Joe Flanagan, Houston Zoo

Giant Tortoise Restoration Initiative Leaders



Dr. Linda J. Cayot, Galapagos Conservancy's Science Advisor, has spent several decades working on behalf of Galapagos tortoise conservation and will supervise the Giant Tortoise Restoration Initiative (GTRI). She completed her PhD on giant tortoises, supervised the Tortoise Breeding and Rearing Center (including caring for Lonesome George), and led much of the tortoise field work from 1988–1997. She played a major role in Project Pinta and organized the tortoise workshop in July 2012, when the initial GTRI plans were developed.

Washington (Wacho) Tapia is the Galapagos-based Director of the GTRI. A Galapagos native and reptile expert with decades of field experience, Wacho has been working for Galapagos conservation since volunteering at the tortoise and land iguana rearing centers at the Charles Darwin Research Station following high school. He completed his graduate thesis on the giant tortoises of Cinco Cerros on southern Isabela Island under the supervision of Dr. Cayot. He then worked for the GNPD for 15 years, leading their science program and technical group.

Dr. James Gibbs, GTRI collaborator and professor at the State University of New York College of Environmental Science and Forestry, has been working on giant tortoises for more than a decade and on Galapagos ecosystems for more than three decades. He is currently the principal investigator on the tortoise-cactus-woody vegetation research and helped lead the return of tortoises to Pinta Island. Dr. Gibbs has been a long-term science partner with Galapagos Conservancy and the GNPD.

HOW YOU CAN HELP RESTORE GIANT TORTOISE POPULATIONS

Thanks to the commitment and vision of donors, scientists, and conservation managers over the past decades, the possibility now exists to restore giant tortoise populations throughout Galapagos. Your gift to the **Giant Tortoise Restoration Initiative** will help ensure a new era for the iconic Galapagos giant tortoises and will leave a lasting conservation legacy in the Islands.

To make a donation, visit:
www.galapagos.org

Or mail a check to the following address:

GTRI
Galapagos Conservancy
11150 Fairfax Boulevard, Suite 408
Fairfax, VA 22030

Please contact our office at 703-383-0077 or email comments@galapagos.org with any questions.

ACKNOWLEDGEMENTS

On behalf of Galapagos Conservancy, we would like to thank the many personnel of the Galapagos National Park Directorate and the Charles Darwin Research Station, as well as the scientists, students, and volunteers, who worked with Lonesome George and for the benefit of Galapagos conservations over these last six decades. This book is based in part on field trip reports, letters, conversations, and shared knowledge. Wacho Tapia interviewed Fausto Llerena to provide new insight into his relationship with Lonesome George. Thank you to all those who provided quotes about their personal experiences with Lonesome George and to the Galapagos National Park Directorate and many individuals for providing photos. For assistance with review, special thanks to Richard Knab, James Gibbs, Wacho Tapia, Ros Cameron, Gisella Caccone, Judy Cayot and the Quincy Writing Group under the leadership of Margaret Elysia Garcia. And a huge thank you to all of the donors through the years who helped support the tortoise work and Galapagos conservation in general.



ABOUT THE AUTHOR

Dr. Linda J. Cayot is Science Advisor for Galapagos Conservancy. She first studied giant tortoise ecology for her PhD in the early 1980s and then continued to work for Galapagos conservation, first as the Head of Herpetology at the CDRS, where she worked for ten years, and later with Galapagos Conservancy. She has dedicated more than thirty years to Galapagos conservation, with a special emphasis on giant tortoises.

Linda J. Cayot poses with Lonesome George.
© JargaPix Photography



Galapagos Conservancy is a US-based conservation organization whose mission is to advance and support the conservation of the unique biodiversity and ecosystems of the Galapagos Archipelago through ecosystem restoration, knowledge management, education, and public policy. Galapagos Conservancy connects people around the globe to conservation efforts in the Islands, while working in partnership with local communities to build a sustainable future for this world treasure.

GALAPAGOS NATIONAL PARK DIRECTORATE

The Galapagos National Park (GNP) was established in 1959, followed by the creation of the Galapagos National Park Directorate (GNPD) in 1968. The GNPD is the government agency responsible for the administration and management of the GNP, to ensure the conservation of the ecological integrity and biodiversity of the terrestrial and marine ecosystems of the protected areas of Galapagos, as well as the rational use of the goods and services that these areas generate for the community.

PHOTO CREDITS:

Front cover background: © Alexandra Cearnas

Front cover inset: © Tim Saxe

Title page: © Tom Pattee

Page 2: © Tim Saxe

Back Cover: Lonesome George, his preservation completed, at George Dante's studio shortly before being transported to the American Museum of Natural History in September 2014.
© Robert Clark of Robert Clark Photography LLC

