

GALAPAGOS NEWS

Fall – Winter 2016

**RESTORING
FLOREANA
ISLAND**

**Sea Lion
Secrets**

Snail Trails

PROJECT UPDATES:

Local Education

Marine Sanctuary &
Shark Count App

TORTOISES
in the
GC **BLOG**

2017
Galapagos
Calendar
on sale

**Photo
Contest
Winners**

Holiday
Gift
Ideas



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CONSERVANCY

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FROM THE

PRESIDENT

Johannah Barry

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Cover Image
A Floreana Mockingbird. This critically-endangered species is no longer found on Floreana, but it survives in two small populations on the offshore islets of Champion and Gardner-by-Floreana.
© Luis Catedral-Ortiz

With the support and encouragement of our donors and friends, Galapagos Conservancy continues to build coalitions of institutions and individuals dedicated to the long-term conservation of the Galapagos Islands. As you will read in this issue of *Galapagos News*, our work lies along two very important axes — wildlife and ecosystem conservation and enhancing efforts to build a sustainable society. One cannot exist without the other in the Galapagos Archipelago — a place of extraordinary natural beauty which is also home to thousands of residents. Their livelihood depends on an economic system that provides meaningful and dignified work that also enhances and protects this priceless biological jewel.

We work with our partners to address these two realities. Our support of direct and applied science assists local government agencies and NGO partners to address significant conservation challenges facing the islands. These range from quarantine and control, to the science of invasive bot fly management, and the important and heartening efforts to rebuild the threatened mangrove finch population.

Equally part of the Galapagos community is the work we continue to undertake in partnership with the Ministry of Education to enhance the skills of all Galapagos teachers, not only to satisfy the Ministry’s high standards for formal education, but to provide alternative teaching methodologies which help students pose questions, problem solve, and dig deeper into the core curriculum in ingenious ways. In addition to being immensely satisfied at the very successful initial trainings and workshops, we are also having a great deal of fun!

Our magazine features blog post excerpts from our enthusiastic Giant Tortoise Restoration Initiative (GTRI) team in the Islands. We hear from two of our Galapagos old-timers, James Gibbs and Wacho Tapia, on their return to Española and Santa Fe Islands respectively to review and monitor earlier restoration efforts. But these “sabios viejos” (wise elders) are joined by the next generation of Galapagos scientists whose posts describe new adventures in conservation and management. We are grateful to have opportunities to provide training and mentoring for the talented young Ecuadorian professionals who enthusiastically join the GTRI team.

These initiatives would not be possible without the understanding and support of our donors who, for more than 30 years, have held this work in esteem and allowed us to make a small, but important contribution to protecting the Galapagos Islands.



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Galapagos News is a twice-yearly publication that is produced for Galapagos Conservancy supporters and friends. The information in this issue was obtained from various sources, all of which have extensive knowledge of Galapagos. The opinions expressed are those of the authors, and not necessarily of Galapagos Conservancy.
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GALAPAGOS CONSERVANCY MEMBERSHIP

GALAPAGOS CONSERVANCY STANDARD MEMBERSHIP

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

| | | | |
|-------------------|--------------|-------------------|--------------|
| Friend: | \$25 | Advocate: | \$250 |
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With your gift of \$1,000 or more (or cumulative annual giving of \$1,000), we will welcome you to the Galapagos Ambassador Society. Many of our Galapagos Ambassadors are often willing to become closely and regularly involved in our programs. Ambassadors receive special updates and briefings; invitations to attend special member events; recognition in the GC Annual Report; and a special Ambassador welcome gift.

| | |
|----------------------------|-----------------------------|
| Española Society: | \$1,000 to \$4,999 |
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| Fernandina Society: | \$10,000 to \$24,999 |
| Isabela Society: | \$25,000 and up |

GALAPAGOS GUARDIAN SOCIETY - Monthly giving

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

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

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**Please check with your employer,
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The tortoises thank you.

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

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

YES! I want to become a Galapagos Guardian!

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GALAPAGOS NEWS

LOST VERMILION



© Prof. W. G. Hale

VERMILIONS EXTINCT ON SAN CRISTÓBAL

The last time anyone saw a vermilion flycatcher on San Cristóbal was in 1987. Analysis of DNA from museum specimens suggests that this brightly colored bird, now assumed extinct on this island, was a different species from the Galapagos vermilion flycatcher, *Pyrocephalus nanus*, found elsewhere in the Archipelago. In addition, the scientists found evidence for clear differences between populations of *P. nanus*, suggesting an ongoing process of speciation. The rapid decline of many of these populations in recent years is therefore of considerable concern, as noted by scientists in *Molecular Phylogenetics and Evolution*.

RAT VARIATION

There are at least three different lineages of black rat in Galapagos, according to a fascinating study on the genetic makeup of this invasive species. Rats are thought to have first reached Galapagos in the last few decades of the 17th century, but analysis of DNA of rats from 15 different islands shows significant variation across the Archipelago. This suggests that the Islands were invaded “by at least three (if not four) separate colonization events from different source populations,” the scientists write in the journal, *Ecology and Evolution*. They also found that the dispersal of rats between islands is probably due to the movement of humans, rather than the rats going it alone.



© Celebrity Cruises

AWARD FOR CELEBRITY MS XPEDITION

During the Galapagos National Park anniversary celebrations this year, Celebrity Cruises MS Xpedition team received special recognition from the Ministry of the Environment for outstanding environmental contributions. Behind the scenes, the MS Xpedition meets the highest environmental standards as a result of its state-of-the-art solid waste treatment equipment, water quality equipment and processes, occupational safety records, and use of renewable energy. Many staff come from the Galapagos community, and local products, such as fish and vegetables, are served on board.

The Celebrity Xpedition Galapagos Fund, managed by Galapagos Conservancy and funded through gifts made by guests on board the ship, encourages local lifestyles and livelihoods that are in harmony with protecting the delicate Galapagos environment. Through the Fund, the generosity of MS Xpedition guests has provided substantial financial support for community-based conservation initiatives. MS Xpedition General Manager, Pablo Peña, underscored how this recognition affirms their enduring commitment to sustainable tourism and to care for and preserve the fragile environment that staff have the privilege to share with guests.

HAWK DIET CHANGED

The diet of Galapagos hawks has changed following the eradication of goats. Analysis of the food items that adult hawks brought to nests on Santiago Island before and after the removal of goats in 2006 suggests that the thicker vegetation has made it more difficult to hunt for reptiles, invertebrates, and land birds. Since goat eradication, the hawk's diet has been comprised mainly of introduced rats, report scientists in the *Journal of Raptor Research*.

MANGROVE FINCHES RELEASED

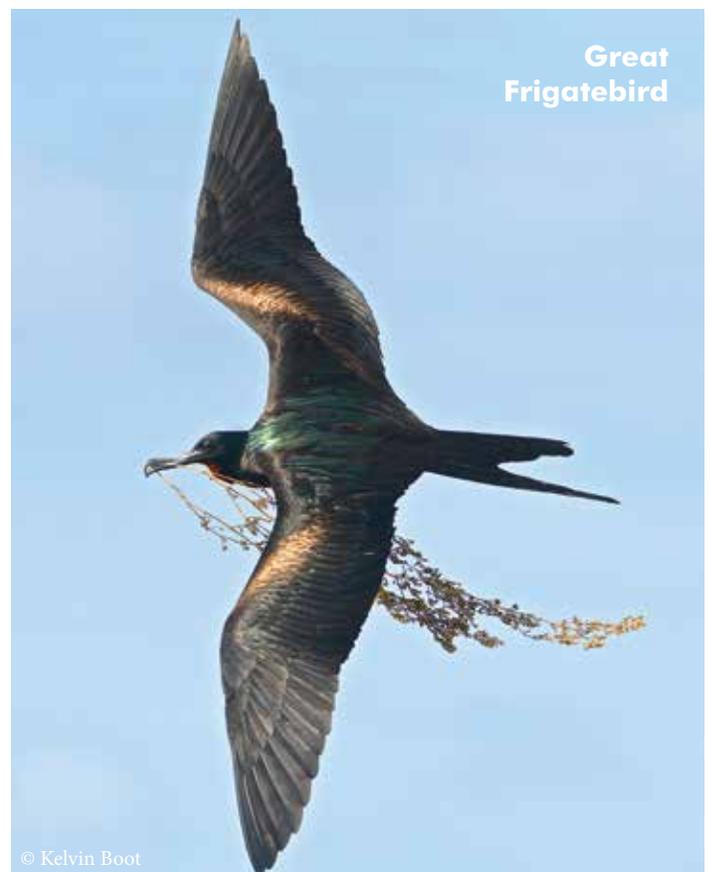
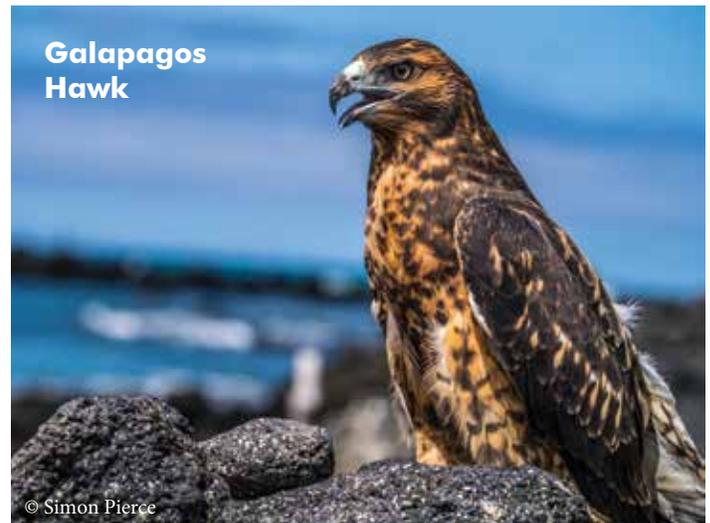
In May, researchers from the Mangrove Finch Project successfully released 15 captive-reared mangrove finch fledglings into the mangrove forest at Playa Tortuga Negra on Isabela. This is the third consecutive year in which eggs have been incubated and chicks reared in captivity — an intervention to counter the pressure that invasive rats and the parasitic fly *Philornis downsi* have imposed upon this species. It is estimated that there are just 100 individuals left, with fewer than 20 breeding pairs.

SLEEPING FRIGATEBIRDS

Great frigatebirds sleep for less than an hour a day when on foraging trips, researchers have found. The birds are known to be able to fly for ten days at a time, covering distances of up to 3,000 km. By fitting individuals with a small device that measures brain waves, the team found that when the birds are flying, they rest one brain hemisphere at a time, keeping the other active to avoid collisions with other birds. Once they returned to their nests, they were recorded sleeping for up to 12 hours a day.

SEA CUCUMBER SMUGGLER SENTENCED

A Galapagos resident who attempted to transport more than 3,000 sea cucumbers to mainland Ecuador was sentenced to three years in jail. In January, Galapagos National Park rangers and local police discovered over 80 kg of dry, salted sea cucumbers of the *Isotichopus fucus* and *Stichopus horrens* species in three storage boxes meant to leave the Islands. The offender was sentenced in July. The environmental authorities will continue to have a zero tolerance policy when the rights of nature are infringed upon, says GNPD Director, Walter Bustos.





ADAPTED TO CHANGE

by Stella Villegas-Amtmann, *Ecologist at the University of California at Santa Cruz*

After many days of radio silence, we suddenly heard a beep. It was the signal from a transmitter we had attached to a Galapagos sea lion ten days earlier. That is how we knew she was back from her foraging trip, returning to the island of San Cristóbal to nurse her hungry pup that had been waiting on the beach.

The signal was strong but its direction was hard to determine. We searched all the beaches where sea lions haul out, but this female was nowhere to be found. It was crucial to locate her as she was carrying an instrument with highly valuable information about her foraging trip, and we needed a sample to help us to determine the metabolic rate of this species for the first time.

As we walked through town, searching for higher ground to scan, the signal became stronger. How could this be? There was no beach nearby. The sea lion surprised us. Eventually we found her lying in the middle of town, sleeping in a children's playground beneath a water slide. We transported her down to the beach and recovered our instruments.

The Galapagos sea lion poses a conundrum. Of all six extant sea lion species, this one is the smallest. Adult females have a mass of around 75 kg compared to California sea lions, the next smallest species, with an approximate mass of 95 kg. There is a limit, then, to the amount of oxygen

they can carry, which should constrain their ability to make long, deep dives. Yet all evidence to date suggests that the Galapagos sea lion is a more proficient diver than many of its closest relatives.

As the Galapagos sea lion lives in less productive, unpredictable and warmer waters than other species, it could have evolved the ability to operate at a lower metabolic rate. In order to explore this idea, we studied the behavior of ten female Galapagos sea lions that were suckling pups and yearlings. We focused on lactating females, given that lactation is the most energetically expensive period in the life of mammals.

We fitted them with time-depth recorders to inform us about the depth and duration of their dives and VHF radio transmitters to help us locate them on land. Before release, we injected them with a small dose of isotopically labeled water and took a blood sample. A second blood sample collected soon after each animal returned from a foraging trip would allow us to calculate their metabolic rate.

“ We found the sea lion sleeping in a children's playground beneath a water slide. ”

Interestingly, we found that the age of the pups had a strong effect upon the foraging behavior of these mothers. Those with the youngest pups around one-month old travelled to the north of San Cristóbal, while females with older yearlings headed west, suggesting the two groups may be targeting different prey types. Females going north are probably hunting fish in the water column, both close to the surface and at great depths, while females going west are likely after those nearer the sea floor.

The data from the time-depth recorders confirmed just how impressive this species is at diving, with events often lasting well over ten minutes and reaching depths of almost 600 m below sea level. This far exceeds the reported duration and depths of the New Zealand sea lion, the species formerly considered to be the sea lion with the longest, deepest dives. Our calculations of metabolic rate hint at how they might be achieving such feats. The Galapagos sea lion has the lowest metabolic rate of any sea lion measured to date.

All these traits — the flexibility of foraging patterns, the extreme dives and the low metabolic rate — may help the Galapagos sea lion to survive in an environment where the waters are frequently warm and the productivity low and unpredictable. In spite of these adaptations to change, however, Galapagos sea lion pups commonly face higher nutritional stress than sea lions living at higher latitudes. The concern, therefore, is that the ocean continues to warm, causing still further declines in productivity. For the Galapagos sea lion, a species that might already be operating close to its physiological limit, this may prove to be a change too far. ■



ON THE TRAIL OF **THE SNAIL**

by Christine Parent
Evolutionary Biologist
at the University of Idaho

A photograph of three snails with patterned shells clinging to a dark, thorny branch. The branch has small, reddish-pink leaves. The background is a soft, out-of-focus green. The snails are positioned vertically along the branch, with one near the top, one in the middle, and one near the bottom.

These snails have been hiding away from tourists and scientists alike. ”

If you ever have the chance to stroll along the well-marked paths of the Galapagos National Park, you will quickly be greeted by animals that make up some of the most extraordinary fauna in the world. Darwin's finches, land iguanas, and giant tortoises are the vivid result of millions of years of natural selection on isolated populations. Even more extraordinary is that the most diverse group of species in Galapagos will likely escape your attention. Alongside the more charismatic fauna, a group of rather small and inconspicuous species has been hiding away from tourists and scientists alike.

With 82 currently known species, Galapagos land snails belonging to the genus *Naesiotus* are by far the most species-rich group on these Islands. These snails are small, their shells never reaching more than 3 cm in length. The color of their shells often matches the substrate the snails are found on, helping them to blend in with their environment. Although most Galapagos visitors will not see a single live snail during their stay on the islands, they might notice the piles of bleached shells along some of the paths. A closer look at these piles will quickly reveal one of the most remarkable aspects about these snails — the many forms and shapes their shells can take. In the same way that Darwin’s finches evolved different types of beaks adapted to a range of available diets, thousands of years of natural selection have fashioned *Naesiotus* shells into dozens of different shapes and sizes. Unlike Darwin’s finches, however, it is still unclear why and how these many snail forms arose.

Naesiotus snails are found throughout South America, but all Galapagos *Naesiotus* species are unique to the Islands and not found anywhere else in the world. Once they arrived in Galapagos, *Naesiotus* snails wandered off their beaten path: whereas their mainland relatives are almost exclusively found at the base of grassy vegetation in open habitats, the Galapagos *Naesiotus* have expanded their comfort zone and are found under rocks and logs in the arid zones, clinging under leaves, on twigs and on tree trunks in the humid zones, and at the base of patches of grass at the summit of most Galapagos volcanoes. This expansion into novel habitats could well have contributed to the diversity in snails we see today.

At lower elevations, the snails tend to have bright white and elongated shells, perhaps because these features allow them to reflect heat from the sun and minimise water loss through the tiny opening in the shell. In wetter and cooler habitats further up, where the snails do not have to worry about drying out in the sun, their shells are much larger, rounder and thinner, accommodating their larger bodies without having to pay the

Below:

At low elevations where water is scarce, the *Naesiotus* species tend to have elongated shells with tiny openings (4, 7). At higher altitudes, where desiccation is less of a problem, the species often have rounder and thinner shells with larger openings (1, 2, 3).

costs associated with producing a lot of calcium carbonate material to build their shells.

Our research team has accumulated months of field data to map the distribution of the snails on the Islands and collected precious data regarding their preferred habitats and ecology. We have collected shells from the ground and used them to characterize the morphological variation of each species. Using a small sample of DNA from some individuals, we have been able to establish the genealogy of the different species and uncover the sequence of species formation and colonization from one island to the next.

It appears that as they were changing and adapting to the different environments, the snails were also hopping from older to younger islands multiple times. Indeed, *Naesiotus* snails have been closely tracking the geological formation of the Islands and colonizing them practically as soon as they were formed.

We have now described a great deal of the diversity observed in this remarkable lineage. In doing so, we have also established that more than half of the species are currently *critically endangered* according to the IUCN Red List criteria for threatened species, and the great majority of the other half are either *endangered* or *near threatened*.

A lot of these species have experienced sharp declines in the last 40 years, and numerous species have not been seen alive since the 1970s. As we continue expanding our island explorations, we have rediscovered live populations of species we feared were extinct, and discovered species completely new to science. This has encouraged us to continue monitoring known populations to understand the factors responsible for population declines in some of the species. Snails don’t need very much to survive; a small patch of well-preserved habitat might suffice. Our most pressing challenge is to find these patches and make sure the snails found in these areas remain well protected. ■



Champion is the islet in the middle distance, one of two refuges for the Floreana mockingbird and Floreana racer. In the foreground is Punta Cormorant, one of the most popular visitor sites on Floreana Island.

THE SNAKE AND THE MOCKINGBIRD

by Luis Ortiz-Catedral, *Conservation Biologist at Massey University in New Zealand*

I am standing on a rocky promontory some 36 m above the turquoise waters of the Pacific Ocean. I am counting cacti.

After a morning's work, covering this and other vantage points on this small island in the south of the Galapagos Archipelago, I have recorded 887 cactus trees with a height of one meter or more. This is good news for cactuses, but also for the Floreana mockingbird (*Mimus trifasciatus*) and the Floreana racer (*Pseudalsophis biserialis biserialis*), a type of terrestrial snake. For I am on Champion, one of just two tiny islets that act as a refuge for these charismatic and endangered denizens of Galapagos.

In the past, both mockingbird and racer could be found living on nearby Floreana. The disappearance of these species from this large island is a consequence of their close association with cacti: the mockingbirds feed on nectar from their flowers, sap from their trunks and invertebrates living in the rotting pads that surround them; the snakes depend on the moist, cool, gecko-rich habitat that these plants provide.

But by the early 1900s, introduced mammals like cows, goats, and donkeys had decimated Floreana's cacti, a change

that ultimately led to the local extinction of the mockingbird and the racer. The only place these species managed to survive was on Champion and Gardner-by-Floreana, offshore islets that have never seen large mammals and where there are still plenty of cacti.

Last year, on Gardner-by-Floreana, my team and I witnessed an extraordinary event that underscores the intricate ecosystem that exists in the understory of these cacti. Reaching up to 30 cm long, Darwin's Goliath centipede (*Scolopendra galapagoensis*) is one of the largest centipedes on earth. There, amongst the cactus debris, was a particularly large specimen of this formidable predator with a racer skewered on its venomous pincers. Then, within a few seconds, a mockingbird entered the fray and the predator suddenly became prey.

Whenever I visit the town of Puerto Velasco Ibarra on Floreana and I share my stories of snake-eating centipedes and centipede-hunting mockingbirds, some locals look at me as if I were telling stories from far-flung lands rather than from islets less than 20 km away. This might soon change. Project Floreana aims to reestablish the ecological functions that once shaped the island's lowlands. Part of this venture is already complete.



By 2009, the dedicated staff of the Galapagos National Park had succeeded in the removal of nearly 1,600 goats and 400 feral donkeys from Floreana. The next step is the eradication of introduced rats from the 173 km² island, which are predators of young birds and snakes.

We also need to see a recovery of Floreana's cacti. On Champion, where there are hundreds of cactus trees, the racket of gulls, boobies, shearwaters, noddies and mockingbirds is impossible to ignore. On the beaches of Floreana, across just 700 m of water, the density of cacti is far lower and the contrast is striking. There is just the lapping of waves on the shore and the sound of our footsteps on the lava. The occasional finch or yellow warbler is the only indication that there is a place for birds in this landscape at all.

Yet there are promising signs that Floreana's plant community is coming back. The density of trees, though low, is on the increase. Two of the cactus trees are flowering, with bees buzzing around them and cactus finches gorging on nectar and pollen.

With the eradication of rats, hopefully within the next few years, and the further recovery of cacti, it will be possible to think about bringing mockingbirds and racers over from Champion and Gardner-by-Floreana.



A mockingbird entered the fray and the predator suddenly became prey. ”

PROJECT FLOREANA

by **Karl Campbell** of *Island Conservation*

In Galapagos, there have been 64 successful eradication projects to date on 39 different outcrops or islands. But on Floreana, the local community, the Ecuadorian government, and NGO partners have a vision that will set a new bar for such conservation interventions.

Project Floreana aims to remove invasive rodents from this island, the sixth largest in the Archipelago. The community has embraced this initiative because they recognize it will lead to increased food security, household income, and strengthen community tourism. For conservationists, the project is a crucial step in the recovery of some 55 threatened species and a further 13 species — like the Floreana racer and Floreana mockingbird — that have vanished from the island but still survive elsewhere. Others believe that Ecuador should continue to be a world leader in the field of ecological restoration. Never before has an invasive species eradication project held such promise for a local community and so many threatened species.

The Floreana mockingbird is symbolic of the project as a whole. It's one of the world's rarest birds, locally extirpated from Floreana, due in-part to predation from invasive rodents. In dry years, the total number of remaining individuals eking out an existence on the two off-shore islets dips below 400.

At Island Conservation, we are deeply engaged in a process with the local community and all the partners to realize the vision of this project. Together, we have secured the promise of millions of dollars in funding, but need to find millions more. We are testing methods of eradication and helping landowners and partners develop plans for their part in the operation. We share an optimism for the future of this community and for that of the emblematic Floreana mockingbird. ■



A Floreana mockingbird on Champion looks out towards the main island of Floreana across a 700-m stretch of water.



(Above) A Galapagos racer snake, and (below) a snake-eating centipede. Pictured, from left to right: Luis Ortiz-Catedral, Fidelino Gaona, Joshua Guilbert, Rebecca Hamner, Alizon Llerena and Josue Ortiz-Catedral.

All photographs are © Luis Ortiz-Catedral.



THANKS! Research on Floreana mockingbirds and Galapagos racers is possible thanks to the support of the Galapagos National Park, Massey University, Mohamed bin Zayed Species Conservation Fund, Galapagos Conservation Trust, Auckland Zoo Conservation Fund, Galapagos Conservancy Canada and the University of Zurich.

From the GC BLOG



Campsite on Santa Fe Island in July 2016 © Ellen Smith

The Galapagos Conservancy blog is full of amazing conservation stories. We simply cannot showcase all of our hard work in print, but we do strive to cover the best stories, from a variety of perspectives, in our online blog. Here, we share with you a few excerpts from recent posts focusing on our **Giant Tortoise Restoration Initiative**. Full stories can be found online at:

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

A Return to Española Island to Understand its Ecosystem Dynamics, posted July 21, 2016

"It's been a year and 24 days since I fell on my final trek from the interior of Española Island to the shore after a week of monitoring the interactions among cactus, tortoises, albatross, and woody plants. Heavy rain had converted the rough lava trail to a slippery trap; my subsequent fall resulted in two broken ribs, one shattered tooth, and another four teeth nearly knocked out of my mouth.

I return this year with a bit of dread and taking extra precautions (uncommon for me) while walking with my nearly 100-pound backpack, climbing that same lava trail up to camp. We are here to continue our research to help answer a series of questions about the island and its inhabitants."

Author: A Galapagos native and reptile expert with decades of experience (with 15 years at the GNPD), Wacho Tapia is the Galapagos-based Director of the Giant Tortoise Restoration Initiative.

A Return to Santa Fe Island, posted July 26, 2016

"Today is the first anniversary of the release of Española tortoises on Santa Fe, and I am delighted to be here, one year later. We're here to understand how these tortoises, new to Santa Fe, are doing, where they've wandered, and what they're eating. We're also looking at food habits of the endemic land iguanas and how much overlap there might be with the tortoise diet."

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

Completing My Thesis Amongst Giant Tortoise Scat posted September 1, 2016

"Everything became more complicated when 32 adult tortoises arrived from Wolf Volcano. My task was to collect all scat produced by these tortoises, separate out the seeds, and determine the species of each — until there were no seeds left. Our aim was to ensure that no plants from Wolf Volcano were deposited in the soil of Santa Cruz where they might become established. In Galapagos, it's important that species not be transported among the islands, as each island has its own composite of species."

Author: Jennifer Vásconez, a native of Galapagos, is 23 years old. She studied biology at the Galapagos campus of Central University of Ecuador and is currently completing her senior thesis on the diet of the giant tortoises of Wolf Volcano, Isabela Island.

A Leap from Natural Paradise to Mega-development posted September 21, 2016

"It was my first time leaving Ecuador. The trip was long, taking two days to reach Denver, our final destination. When we landed, I had my first and strong impression of this different world. The airport was huge and confusing (at least to me). We even had to take a train to reach the luggage claim area. Once making our way out of the airport, we were driven to Estes Park, a place surrounded by pine forests and snow-covered mountains. On our drive there, we saw deer and elk — incredible for me, having never seen such animals in person before."

Author: Freddy Villalva Sánchez, pictured here at Yellowstone National Park, arrived in Galapagos 14 years ago. Over the past 13 years, he has worked as a park ranger for the Galapagos National Park and currently manages the Santa Cruz Tortoise Center, where he ensures the care of more than 1,200 giant tortoises. Freddy has been a long-term collaborator of GC's Giant Tortoise Restoration Initiative (GTRI). GC recently provided support for his participation in the park ranger course on management of protected areas at Colorado State University. ■



BUGS, BARBIE DOLLS, & QUESTIONNAIRES



© Adrián Vásquez

Mercedes Carrasco, literacy trainer and one of the program's architects, facilitates an exchange of ideas among teachers at the closing ceremony on San Cristóbal Island.

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

At the Tomás de Berlanga School on the island of Santa Cruz, 80 elementary science teachers explored their surroundings with journals and magnifying glasses in hand, taking notes and making sketches of insects they observed, as part of a lesson on the lifecycle of insects.

Meanwhile, at the Colegio Galapagos in Puerto Ayora, teams of middle school math teachers stood on chairs and dropped Barbie™ dolls fitted with rubber band “bungie cords” of different lengths, while their peers measured the length of each fall and later graphed their results and learned to calculate linear equations.

And on the island of San Cristóbal, swarms of teachers roamed Puerto Baquerizo Moreno, conducting interviews of long-term residents and members of different ethnic groups as part of a project-based exercise in social studies and language arts.

These are just a few examples of the student-centered learning modeled during the October Teacher Institute — the second 40-hour training event conducted during the first year of our Education for Sustainability in Galapagos Program (ESG Program) — which took place from October 3-7, 2016.

The five-year ESG Program is carried out under a tripartite agreement among Galapagos Conservancy, the Galapagos-based Scalesia Foundation, and Ecuador's Ministry of Education. Other partners include the Galapagos Governing Council, a team of educators from the Simmons School of Education and Human Development at Southern Methodist University, and Teachers2Teachers-International.

The ESG Program is helping Galapagos teachers to shift away from traditional teaching methods that rely on lectures and rote learning, in favor of strategies that engage students

in problem-solving activities, hands-on experimentation and collaborative team projects connected to local and global environmental and social themes.

The October Institute involved all 300+ K-12 teachers in Galapagos in full-day, intensive professional development workshops designed by grade level and subject matter, delivered by a team of 28 education specialists from Ecuador, Colombia, the Dominican Republic, and the United States.

During each of the 185 two-hour workshop sessions conducted during the week, trainers modeled lessons based on the Ecuadorian curriculum and demonstrated “high-impact” teaching strategies that have been proven to promote student inquiry and critical-thinking skills. In many cases, lessons were based on local environmental issues, such as invasive species, and social issues, such as migration. In all cases, trainers engaged teachers in reflection on the design and delivery of the lessons and assigned individual and group projects during the evenings through which teachers developed additional lesson plans that they later reviewed with the trainers.

Miriam Chacón, former Sub Secretary of Education in Ecuador and lead instructional coach and program coordinator in Galapagos, is pleased with the progress to date. “We know from experience that the kind of deep change we believe is possible in Galapagos schools will take time. However, most teachers in Galapagos are hungry for the kind of training provided by the ESG Program, and we have already observed many cases of teachers replicating and adapting what they experienced during the Teacher Institutes.”

Program coaches continue to observe and provide feedback to teachers and facilitate weekly work sessions, called “learning circles,” through which teachers working with the same grades and subjects exchange ideas and experiences. The third Teacher Institute will take place in mid-April 2017. ■

Contact **Richard Knab**, GC's Director of Strategic Partnerships, at rknab@galapagos.org for more information about the Education for Sustainability in Galapagos Program.

SHARK HAVEN

© Jonathan Green

SHARK & GNP APPS

The waters around the islands of Darwin and Wolf in the north of the Galapagos Archipelago boast “the largest fish biomass ever reported,” say scientists. In 2013 and 2014, researchers at the Charles Darwin Foundation and visiting scientists from the USA used a diver-operated stereo-video system to collect data on fish abundance around Darwin and Wolf. They estimate an average of 17.5 tons of fish per hectare, of which around two-thirds is made up of sharks. This is far in excess of similar calculations made elsewhere, they write in the openaccess journal *PeerJ*.

In March, Ecuador’s president Rafael Correa announced the creation of more than 20 marine sanctuaries within the Galapagos Marine Reserve, including the Darwin and Wolf Marine Sanctuary, an area of 15,000 miles surrounding these islands. Although no commercial-scale fishing activity has been permitted in these waters for almost 20 years, smaller artisanal fishing operations have been allowed. The new sanctuary system is the result of an open, transparent dialogue involving hundreds of stakeholders from many different sectors of Galapagos life and means that all fishing activity is now banned in 32% of the Galapagos Marine Reserve. The new sanctuary system should benefit the 34 different shark species found in Galapagos waters, as well as the tourism sector. A live shark is worth an estimated \$360,000 to the tourism industry every year.

The Galapagos National Park, meanwhile, is continuing its efforts to tag and monitor juvenile sharks within the Galapagos Marine Reserve to improve our understanding of the movements and breeding habits of these apex predators.

Galapago Conservancy funded the creation of a new interactive *Shark Count* App for smartphones — please see the short article at right.



Scientists have been conducting annual surveys of shark populations in Galapagos since 2007. But, to significantly expand the knowledge base about sharks and other marine species, Galapagos Conservancy is working with the Aquatic Biotelemetry Lab at the Universidad San Francisco de Quito, the College of Environmental Science and Forestry at the State University of New York, and the Galapagos National Park to build a “citizen science” platform through which dive tourists can make important data contributions to species monitoring efforts at 20 dive sites throughout the Archipelago.

Divers will be able to record sightings of eight different species of sharks, two species of sea turtles, giant manta rays, and the ocean sunfish. In addition to species counts, divers will be able to upload photos and notes related to their dives. These data will be automatically uploaded to a database that will be shared with the Galapagos National Park and other decision-making entities in Galapagos. Data analysis will be viewable through the phone app and the website.



GALAPAGOS NATIONAL PARK'S OFFICIAL GALAPAGOS APP

by PWW Comunicaciones del Ecuador SA, Free, App Store, Google Play, compatible with Apple and Android

The Galapagos National Park has invested in an app aimed at engaging visitors to Galapagos. With a Spanish and English version, the main feature is a list of all the islands that contain visitor sites. Selecting one of the islands brings up the opportunity to tab between terrestrial and marine sites on or around that island, opening the way to a summary of what can be seen at each specific location, a little history, and a photo gallery. It's recommended to download a copy of this freely available app *before* travelling to Galapagos. It will then function without having to rely on the patchy internet access in the Islands. “We all have an inner Darwin in us. Let him free with this app,” the developers suggest.

Another way to support **GALAPAGOS**

Dear Friend of Galapagos,

As a supporter of Galapagos Conservancy, your gifts help us provide funding for our critical work to save and restore the Galapagos Islands. We appreciate your sustaining gifts each year that make this work possible.

We know many of our friends, like you, would like to do even more to insure that the valuable work we do continues for as long as necessary. Did you know there are other ways to give that can help GC to build our reserves to address new issues and threats to wildlife, marine life, and ecosystems of the Galapagos Archipelago? An excellent way to help us build our reserves for the future is a planned or estate gift! One of the most common estate gifts is a gift in your will.

Leaving a gift to Galapagos Conservancy in your will is the perfect way to satisfy your charitable interests while preserving one of the great natural environmental wonders of the world. A gift in your will also has many benefits for you:

Simplicity. As little as one sentence in your will is all that is needed. Please contact our development office at (703) 383-0077 or at legacy@galapagos.org for more information.

Flexibility. It is very simple to update, change, or add to the charitable giving portion of your will. You can update the charities, amount of your gifts, etc. with a call or even a letter or other correspondence with your estate attorney.

Versatility. You can structure the gift to leave a specific item to GC (including type of asset, i.e. — stock or real estate gifts), an amount, a percentage of your estate, or the remains or “residue” of your estate (whatever is left after other distributions but before any potential estate taxes are paid).

If you have already included a gift to us in your will or trust, please let us know. That way we can ensure that your gift will be used exactly as you intend. Plus, it would be our honor to thank you for your gift.

Join the Galapagos Conservancy Legacy Society

... and receive the following recognition from Galapagos Conservancy:

- Recognition in Galapagos Conservancy publications and at the Charles Darwin Research Station in Galapagos (with donor’s consent)
- An exclusive Galapagos tortoise silver pin, designed by the renown Galapagos artist, Jacqueline de Roy
- Galapagos Conservancy’s Annual Report and other special mailings
- Invitations to special events

“To help now while I can see the positive changes being effected by the good stewardship of Galapagos Conservancy is lovely, but to know that my estate will be helping after I am gone is truly wonderful.”



Leslie Lenny
of Arlington, VA

GALAPAGOS CONSERVANCY 2016 PHOTO COMPETITION

THANK YOU to all of our photo competition entrants! The GC team had a difficult task choosing the winners from **more than 1,400 photos.**



Congratulations, David Anchundia! Our first place winner, hailing from Galapagos, Ecuador, won for his shot of this peaceful scene of tortoises on Alcedo Volcano, Isabela Island. David's photo appears on the cover of our 2017 calendar, and he is the recipient of 10 free calendars and a \$100 gift pack!



A few other winning and detail photos from the 2017 Galapagos Conservancy calendar:

- Small Tree Finch** © Jim Kirklin, Scotts Valley, CA
- Galapagos Penguins** © Andrea Landeira, Quito, Ecuador
- Land Iguana** © Bette Cotzin, Ann Arbor, MI
- Flamingoes** © Sam Leinhardt, Pittsburgh, PA
- Sally Lightfoot Crab** © Sarah Cocks of Chester, UK
- Sea Lion in Surf** © Bill Bintzer, New York, NY
- Blue-footed Booby** © Karen Codling, Bangkok, Thailand
- Puffer Fish** © Cibele Sanches, Blumenau, Brazil





GALAPAGOS
CONSERVANCY

Saving one of the world's great treasures

GALAPAGOS UPDATES

MEMBER SPOTLIGHT



Will and Matty G.

Will and Matty G., 12 and 10 years old respectively, are a dynamic brother duo who live in Arlington, Massachusetts. Even though the boys have yet to visit the Galapagos Islands, they were inspired to raise money and awareness to help protect blue-footed boobies in Galapagos, which Will had learned about while studying threatened birds in his 5th grade science class last year.

Will describes himself as a true “birder” and when he learned that blue-footed booby populations were declining in Galapagos, he told his father that he wanted to do something to help. He also happens to have a large personal sock collection, which is how he came up with the fun and fitting idea to sell socks to raise money for his favorite threatened bird. Will allowed his little brother to join the cause when Matty came up with the name of their foundation, The Blue Feet Foundation, and their generous father provided the seed money for their first sock order. Will recalls, “One day, nine giant boxes of blue socks were dropped off in our driveway. My mom was really shocked. I set up a website, Facebook and Instagram accounts, and started to sell the socks. So far it’s been really fun! We’ve had orders from 31 states and Canada, the UK, and Australia!”

Galapagos Conservancy is thrilled to welcome Will and Matty G. as two of our newest members — they also share the special honor of being our youngest Galapagos Ambassador Society members, to date. Proceeds from the sales of their blue socks on The Blue Feet Foundation’s website have allowed the brothers to donate \$3,000 to Galapagos Conservancy in 2016 so far!

Will exclaimed, “Galapagos Conservancy rules! They take us seriously.” Yes, we do, Will! And we encourage our loyal members to do the same and order some blue socks today.

Stocking stuffers for Galapagos lovers!



To place an order, visit:
bluefeetfoundation.com

Socks come in adult and kid sizes and are \$12.50/pair. Proceeds support Galapagos Conservancy and the Charles Darwin Foundation.



September Membership Challenge

This year Galapagos Conservancy raised more than \$36,000 for the 2016 Membership Challenge, our annual campaign to raise \$30,000 online in September. We’re thrilled with the enthusiastic response from new and existing members who contributed.

Gifts from the Challenge will be used to support important conservation projects like our Giant Tortoise Restoration Initiative and Education for Sustainability in Galapagos Program. From everyone at Galapagos Conservancy, and on behalf of all of Galapagos’ spectacular wildlife, thank you for your support!

GALAPAGOS GIFTS

www.galapagos.org/shop/

Animal Adoptions, Gift Memberships, Books, Posters, Calendars, Puzzles, Ornaments, Glassware, Apparel, and more . . .

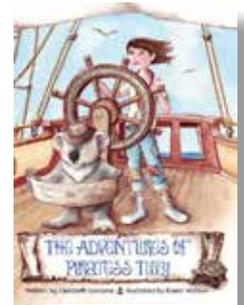
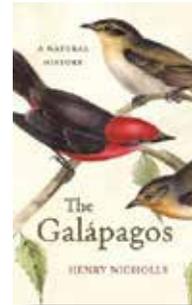
Animal Adoption Kits

Ranging from \$30 up to \$100, we offer symbolic adoptions for tortoises, marine iguanas, and sea lions. A great gift for a budding conservationist! New adoption options to come soon, including blue-footed boobies, penguins, and more!



Books

Ranging from \$15 up to \$50, we offer a limited selection of Galapagos books for all ages, while supplies last.



Military-Style Caps, \$15

Embroidered, cotton, and offered in khaki and olive.



Holiday Gift Memberships and Honor Gifts

Celebrate the holidays and honor your loved ones by supporting the important conservation efforts in Galapagos! Gift levels start at \$25.

Recipients will receive a beautiful card informing them of your gift, which you can personalize with a special message.

SHOP SHARP SHIRTER for GC!

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

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



Wine & Pilsner Glasses, \$5.50 - \$12
Imprinted with the Galapagos Conservancy logo or a montage of iconic Galapagos animals

Support **Galapagos Conservancy** when you shop at **amazon.com** through the Amazon Smile program!

- Go to smile.amazon.com and log in to your Amazon account
- Type 'Galapagos Conservancy' into the box and click 'search'
- Click 'select' and Amazon will donate 0.5% of your eligible future purchases to GC!



GALAPAGOS CONSERVANCY

11150 Fairfax Boulevard, Suite 408
Fairfax, VA 22030 USA



2017 Galapagos
Calendar, \$15
Featuring stunning
photos from the winners
of our 2016 photo
competition.

This beautiful 2017 Galapagos Conservancy calendar was created exclusively for our Friends of Galapagos. Nearly 50 stunning photographs (taken by many of our members for our annual photo contest) celebrate Galapagos' biodiversity. Perfect for the home or office, the calendar reminds us daily of the importance of protecting our fragile earth. It is printed on recycled paper with soy-based ink, making it a perfect gift for you or your favorite conservationist.

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

See page 17 for more on the photo contest winners.

Order online at:
www.galapagos.org/shop/