



GALAPAGOS *news*

SUMMER
2012

A SEMI-ANNUAL PUBLICATION OF GALAPAGOS CONSERVANCY

Connecting people across the globe with conservation in Galapagos



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Ron Sorkness took this photo of a Small Tree Finch (*Geospiza parvula*) in the highlands of Santa Cruz in July 2008. "It was a gloomy day with off/on drizzle," he recalls. "The finch landed briefly to inspect our group — I was able to get a quick shot of him on that branch before he went off on his business."

© Ron Sorkness



To Blog, or Not to Blog?

I'm certain I speak for many when I say that I am relieved that William Shakespeare did not wrestle with this particular issue, but the complexity of communication and engagement, then and now, is still with us. Technology has changed the way we receive and process information and, as importantly, how we define our communities not only through geography but also through shared ideas.

I am mindful of this as we unveil our new website that, among other important communication tools, features a blog in which GC staff and our wide network of Galapagos colleagues will be sharing their work and thoughts about the islands, and asking for your important observations as we tackle the many issues surrounding biodiversity conservation in Galapagos. (See the opposite page for more on the new www.galapagos.org)

To that end, we regularly ask our supporters to fill out survey questionnaires with details regarding their visit to the Galapagos Islands, their recommendations, and areas of concern. And, we always receive some very thoughtful observations that many of our members kindly allow us to share.

The Galapagos community is remarkably cohesive and passionate. The notes we've received from recent visitors and our long-standing donors reveal a strong sense of responsibility. That someone can visit the Galapagos Islands once and take away from that transformational experience a lifetime of engagement speaks volumes about how Galapagos is not simply a destination but an experience. Visitors express a range of concerns about invasive species and economic development, and question their own responsibility as

visitors to this important and vulnerable archipelago. And they continue to ask about the new science being undertaken, new strides in management, and of course the health and well-being of Lonesome George!

Through blogging, Facebook, Twitter, email, and other social media outlets, we are able to stay connected as a world community almost instantaneously. Hollywood stars visiting Galapagos recently found their pictures uploaded on a local Facebook page before their boat had arrived in Academy Bay! While this may seem invasive, this same technology allows a visitor to photograph an illegal fishing vessel in Galapagos waters, an alien invertebrate in the national park, or any number of behaviors that, if not addressed immediately, can cause immense damage to the Galapagos ecosystem.

But at the heart of communication is the willingness to share. And we are grateful that our community of Galapagos supporters stays so close, so involved, and so relentlessly positive about what Galapagos means to them and how they can continue to be part of protecting and preserving these enchanted islands.

Johannah E. Barry
President

Note about LONESOME GEORGE:

As this issue of Galapagos News was going to press, we learned of the sad news of Lonesome George's death. We plan to dedicate the Fall 2012 issue to George and his legacy.



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GALAPAGOS.ORG has EVOLVED!

If you've visited Galapagos Conservancy's website (www.galapagos.org) recently, you may have noticed that it's undergone quite an evolution. We hope you'll stop by our new online home to check out the improvements and to admire the stunning photos on nearly every page. We boast a new blog with insights from experts on Galapagos, a Photo Gallery, and an abundance of new content on all aspects of Galapagos ranging from conservation programs to green travel to the remarkable biodiversity of the islands. Don't forget to stop by the Gift Shop or make a donation to help us continue our efforts to save one of the world's great treasures!

The screenshot shows the updated website interface. At the top is a navigation menu with links for 'About Us', 'About Galapagos', 'Conservation', 'Travel', 'Gallery', 'Shop', 'Blog', and a 'DONATE' button. A large banner image of a blue-footed booby is featured with a 'Welcome to our new site!' message. Below the banner are several promotional boxes: 'Photo Contest Open!' with a deadline for the 2013 calendar, 'Disappearing Flycatchers' highlighting a new blog post, and a search bar with an 'e-Newsletter Sign-Up' button. A 'Connect with Galapagos' section lists 'DONATE', 'ANNUAL CRUISE', 'GIFT SHOP', and 'LATEST NEWS'. A 'Donate' section includes a photo of a beach and text about the importance of member support. At the bottom, an 'OUR EFFICIENCY' section shows a pie chart: 77% Grants & Conservation Investments, 15% Fundraising, and 8% Management. A 'Newroom' section lists 'Library', 'Contact us', 'Privacy Policy', 'Site Map', and 'Careers and Volunteers'. A 'Get our e-Newsletter' section has a sign-up form. The footer includes the copyright notice '©2012 Galapagos Conservancy', a statement about 501(c)(3) status, and another 'ACCREDITED CHARITY' logo.

NEWS



GALAPAGOS

© Yale University



"EXTINCT" FLOREANA TORTOISES ON ISABELA

A species of Galapagos tortoise — thought to be extinct for more than 150 years — may, in fact, be alive and well on a different island, according to a recent study by geneticists at Yale University.

After the arrival of humans in Galapagos in the 16th century, the tortoises of Floreana Island were hit particularly hard by hungry pirates and whalers in search of fresh meat. Since about 1850, there has not been a single sighting of *Chelonoidis elephantopus* and, for nearly a century and a half, the species has been considered extinct. But recent research provides strong evidence that purebred Floreana tortoises are still alive on Isabela Island's Wolf Volcano.

Back in 2008, a team of geneticists and rangers from the Galapagos National Park (GNP) managed to collect DNA from 1,669 tortoises found on Wolf Volcano, estimated to be 20% of the volcano's tortoise population. Among these, they have found many hybrid tortoises, of which 84 animals had to have had a purebred *C. elephantopus* as one of their parents. Many of these were young, estimated to be just 15 years old, and since giant tortoises can live for more than 150 years, it is likely that their purebred Floreana parents are still roaming the slopes of Isabela.

"To our knowledge, this is the first report of the rediscovery of a species by way of tracking the genetic footprints left in the genomes of its hybrid offspring," says Ryan Garrick, a geneticist at the University of Mississippi and first author of the study published in the journal *Current Biology*. A follow-up expedition to Isabela is planned, raising the possibility that some of the Floreana survivors might be located. "We would have to be very lucky to directly sample one of them," admits Garrick. But their more numerous hybrid descendants could still prove useful for Galapagos conservationists, acting as key individuals in a breeding program to bring Floreana-like giant tortoises back to the island.

"We are now exploring the possibility of starting a captive breeding program to revive the species," says Washington Tapia, GNP's head of the Department of Conservation and Sustainable Development. These could then be used to repopulate Floreana with direct descendants of its original tortoise, he says.

NEW ROUTES

As of February 2012, tourist vessels have been following new itineraries designed by the GNP. Vessels are no longer allowed to visit the same site more than once in any 14-day period, though most operators still have the flexibility to let passengers on and off to cater to customers wanting shorter trips. "The new itineraries are a great step forward for both enhancing the visitor experience and reducing impacts at the individual visitor sites," says Linda Cayot, science advisor to Galapagos Conservancy, USA.

WATER TREATMENT

Construction of a new sewage and water treatment plant has begun on San Cristóbal. Until now, 70% of the island's population has relied on a system that discharges waste directly into the sea. The new plant will use the latest technology to reduce the potential damage to public health and the environment, and enable some water to be recycled for use in the municipal gardens.

PELICAN RESEARCH

Research is underway to study the Brown Pelican, an endemic Galapagos species about which surprisingly little is known. As of January, GNP and CDF staff have been capturing the birds in Pelican Bay, Puerto Ayora, fitting them with rings, and taking several measurements, including a sample of blood for further analysis.



© Jessica Crawford

PHILORNIS WORKSHOP

An international team of specialists gathered in Galapagos in February to work on a plan to control *Philornis downsi*, the invasive parasitic fly that is attacking more than a dozen Galapagos species, including the critically endangered Mangrove Finch, Medium Tree Finch, and Floreana Mockingbird. The workshop, co-funded by the Galapagos Conservation Trust and Galapagos Conservancy, raised awareness of this parasite, identified priorities for further research into its biology, and established a five-year plan to develop new methods of control.



© Samantha Singer

Building materials being unloaded in Puerto Ayora.

The main concerns addressed in the study were: "edge effect" (the boundary between the new urban area and protected park areas), light pollution, urban heat, pollution of water sources (*grietas*) from street run-off, and social conflict among residents. Recommendations to reduce these impacts included: restricting residential traffic zones, reducing street widths, using LED lamps and screens, and using native plant species. In addition, modern, environmentally-friendly building materials will be favored over the traditional and unsustainable concrete used in many existing Galapagos homes. Special consideration will also be given to Biodigestor tanks for wastewater management so that water can be recycled for other purposes.



© US Department of Defense

CONTROLLED EXPLOSION

World War II bombs found in Galapagos have been destroyed in a controlled explosion carried out earlier this year. For more than half a century, these devices lay buried on the island of Bartolomé, left over from when the US Air Force used Galapagos as a military base during the war. But in October 2010, they were discovered by local fishermen and were kept on Santa Cruz since then. In January, the Ecuadorian Armed Forces successfully detonated the bombs — eleven in total — on Baltra Island.

DEEPWATER CATSHARK

Scientists conducting deep-sea research in Galapagos have described a new species of catshark and given it the name *Bythaelurus giddingsi*. The new shark is approximately a foot long and has chocolate-brown coloration with pale, irregularly distributed spots on its body. "The discovery of a new shark species is always interesting, particularly at this time when sharks are facing such incredible human pressure," says John McCosker of the California Academy of Sciences, one of two researchers who first observed the species from a submersible in the late 1990s. "Since this catshark's range is restricted to the Galapagos Islands, its population is likely limited in size, making it more vulnerable than more widely distributed species," he says.



© California Academy of Sciences

ENVIRONMENTAL IMPACT OF EL MIRADOR

In May, members of the Galapagos National Park Service (GNPS) staff assisted at the presentation of the Environmental Impact Study for the development of El Mirador, a new residential area in Puerto Ayora on Santa Cruz Island. The GNPS required the municipality of Santa Cruz to conduct the study in order to reduce potential negative impacts on the surrounding fragile ecosystem.



© Martin Witek

WALKING WITH FINCHES by Peter and Rosemary Grant

In Galapagos — as elsewhere — the animals and plants we see do not appear to change from year to year. Or do they? Does evolution take place so slowly, as Darwin believed, that it's impossible to see? Or can it be witnessed, seen in action, as it happens? Galapagos is a wonderful place to ask that question, and finches on the small island of Daphne Major have given us an answer. They have shown us that evolution can in fact be witnessed if we are in the right place, at the right time, and know what to look for.

The right time was 1977 when a severe drought gripped the archipelago. It caused widespread death, with more than 80% of Medium Ground Finches (*Geospiza fortis*) on Daphne perishing. The few that survived were the ones with large beaks. The reason? They were the only ones able to crack the large and hard seeds of a plant called

caltrop (*Tribulus cistoides*) that remained in relative, though not absolute, abundance after the majority of small and soft seeds had been eaten. It was a clear example of natural selection taking place before our very eyes.

Natural selection leads to evolutionary change in the next generation if, and only if, the selected trait, beak size, is heritable. Beak size is indeed heritable. Just as human children tend to resemble their parents in height because of genetic factors, so, in the world of the finches, parents and the offspring they produce have similar-sized beaks. As a result of natural selection in 1977, the survivors produced a generation of finches with large beaks in 1978. Thus beak size, being inherited, had evolved through natural selection in response to an environmental change. By continuing the study on Daphne, we discovered that selection alters its direction depending upon the size and abundance of available seeds during droughts. Changes in the abundance of one species can also put pressures on others, changing the abundance and genetic makeup of other species. Remarkably, finches are

The bill size of the Medium Ground Finch population can change dramatically from one year to the next, a direct consequence of evolution by natural selection.



© Sarah Knut

not the same now as they were at the beginning of our study. They have changed significantly in beak shape and size as a result of each population responding to environmental changes through the process of natural selection. More surprises are sure to follow. Laboratories have already begun to investigate the genomes of finches to decipher the messages of evolution written in the DNA code.

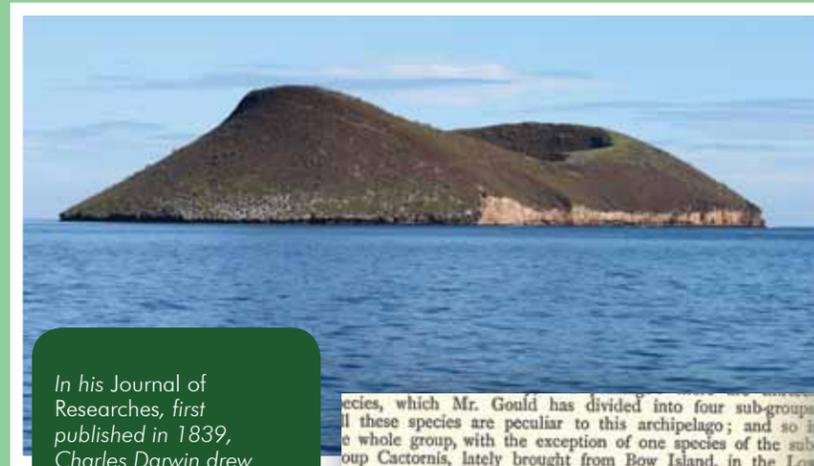
“It was a clear example of natural selection taking place before our very eyes.”

There is a clear biodiversity message from our experience on Daphne, and it is this: *to conserve the environment for the long-term we should be thinking in evolutionary terms as well as ecological terms.* This means protecting the biological richness of Galapagos in such a way that both organisms and the environment they live in are capable of further natural change.

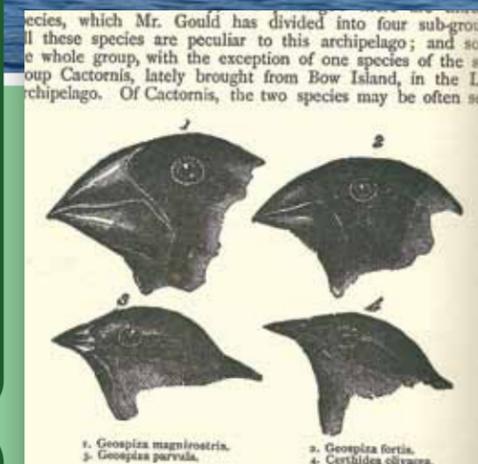
Peter and Rosemary Grant are evolutionary biologists at Princeton University and have dedicated their professional lives to studying Darwin's Finches. They have received countless awards for their work, including the Linnean Society of London's prestigious Darwin-Wallace Medal, which acknowledges "major advances in evolutionary biology."

CONSERVATION NOTE: *The future of the iconic finches is at risk. Philornis downsi is a parasitic fly that can kill up to 100% of all chicks produced in a breeding season. Support Galapagos Conservancy and help fund vital research to find a biological control solution against this terribly harmful invasive pest.*

Daphne Major lies at the heart of the Galapagos archipelago to the north of Santa Cruz. It is a small volcano that occupies an area of approximately 30 soccer fields and is home to four species of Darwin's Finches.



In his Journal of Researches, first published in 1839, Charles Darwin drew attention to "insensibly graded beaks" of the Galapagos Finches. "Seeing this gradation and diversity of structure in one small, intimately related group of birds, one might really fancy that . . . one species had been taken and modified for different ends."



There are at least 14 species of Darwin's Finch, each with a slightly different bill size and shape, occupying a slightly different ecological niche. The Large Cactus Finch (below), found only on more arid, low-lying islands where food is relatively scarce, has an elongated beak that helps it to tackle the prickly Opuntia cactus.



© Sally Taylor

© GCT

© Gerald Corsi



Puerto Ayora, the concrete commercial center of Galapagos.

Building a Sustainable Future

My first emotion on arriving in Galapagos was one of shock. Although well aware of the many challenges that tourism and urban development pose for the Islands, I had expected that given Galapagos' reputation as the best preserved tropical archipelago in the world, the human environment would show greater respect for the natural environment. Instead, I found myself escorted from the airport on Baltra across Santa Cruz amid a steady stream of pick-up trucks en route to Puerto Ayora, a bustling town in which too many people live and work in concrete-sealed, air-conditioned boxes.

The rapid growth in Galapagos tourism – there are now more than 170,000 visitors to the islands each year – has resulted in unprecedented population expansion and economic growth. There are nearly 30,000 people living across the archipelago, creating an extraordinary demand for urban development and posing serious threats to the natural environment – the very reason so many people are drawn to the islands in the first place. Much of this development is inevitable, but there is a choice: with planning and careful coordination, Galapagos could act as an example to the world of how humans can live in harmony with nature. Without these measures, Galapagos could become an illustration of the devastation that human settlement can have on the natural environment.

These two alternative visions have been brought into sharp focus by El Mirador, a new development of 1,133 separate lots that will see Puerto Ayora's geographical footprint almost double in size. As things stand, the town's infrastructure is already stretched. Water is being pumped from a well of unknown capacity; residents depend on diesel generators for their electricity; and the

majority of the sewage is handled by septic tanks that leak into the water table. Unless solutions to these problems can be found and implemented, El Mirador will only make matters worse than they already are.

In 2009, HRH The Prince of Wales visited Galapagos and was deeply concerned by this dilemma. So when the Galapagos Conservation Trust approached The Prince's Foundation to help the Municipality create a more sustainable long-term vision for development in El Mirador and across the archipelago, the response was favorable. In autumn of last year, I arrived in Galapagos at the invitation of the Consejo de Gobierno – the Galapagos regional government – as half of a two-person team sent out to provide support and recommendations on urban planning and the design of appropriate housing across the four populated islands.

In collaboration with many local partners, The Prince's Foundation Galapagos Initiative is working in three main areas. First, a change in building practice is needed. Currently, there is too much reliance on importing building material to construct the kind of concrete air-conditioned box-type buildings found in Guayaquil on the mainland Ecuadorian coast. Rather, we would like to see structures more suited to

island life. Eaves to protect against rain and sun, windows positioned on opposing walls to let in indirect light and improve ventilation, and careful use of trees to generate shade should all reduce dependence on air-conditioning. LED lights can be wired to small solar panels to generate electricity and minimize use of diesel generators. Cisterns can collect rainwater. Space can be set aside to grow non-invasive vegetables. Neighborhood, closed-loop waste water systems can be used to treat sewage. Flexible and modular house designs are both simpler and cheaper to build and generate less waste.

Second, there needs to be more strategic use of land to contain

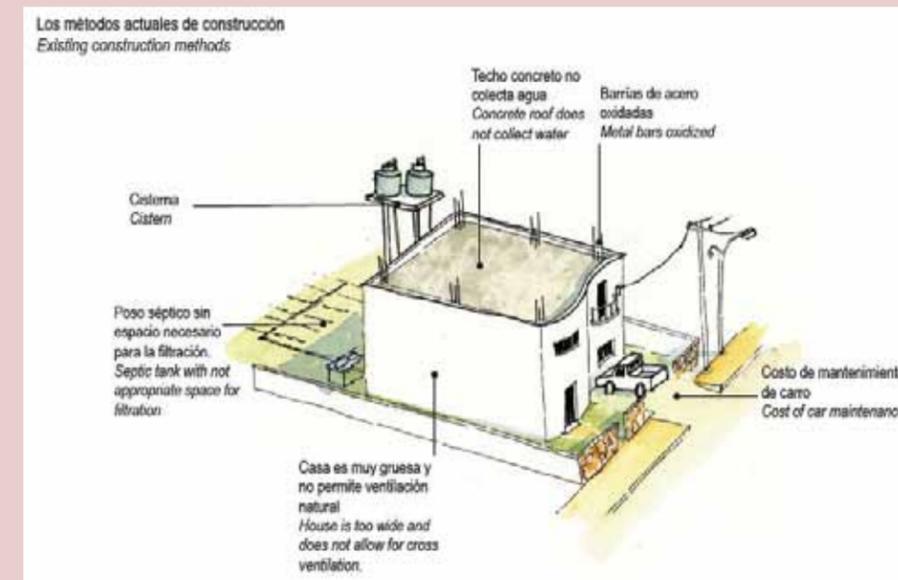
consumption of scarce resources and careful planning regulation to prevent development beyond where it is absolutely necessary.

“With planning and careful coordination Galapagos could act as an example to the world of how humans can live in harmony with nature.”

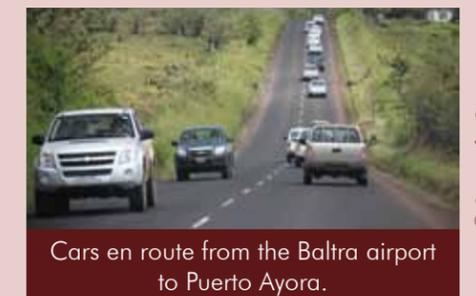
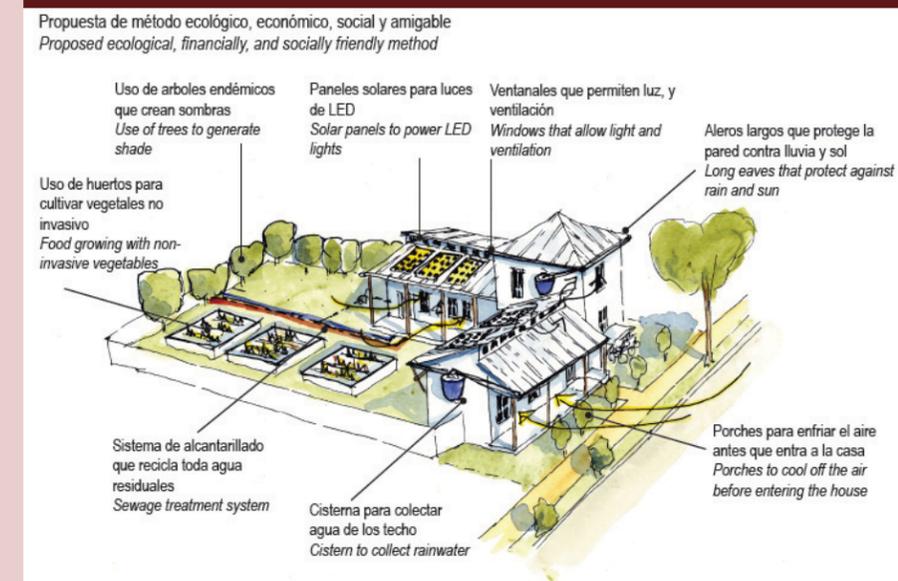
At present, for instance, there is no mechanism to encourage the identification and exploitation of underdeveloped spaces within existing settlements. One consequence of this is that as soon as a town reaches its geographical limit, there is pressure to expand into areas of the Galapagos National Park. In addition, there are few restrictions on development in the agricultural highlands. The gradual erosion of the area available for local food production will only increase dependence on imports from mainland Ecuador with the inevitable introduction of yet more invasive plants and pests.

Finally, sustainable planning and development will only be possible if local, national, and international institutions work together to achieve this goal. We have been asked by the Parish of Floreana and the Municipality of Isabela to help develop standards for their Islands. The regional government is currently developing its policy for the entire archipelago and has asked us to participate in incorporating planning and sustainability into their codes of practice.

There is much work to do to adapt the building culture in Galapagos, blending practices of sustainable living into the national agenda of *Buen Vivir* or 'Good Living'. Although we are only at the start of our time here, I look forward to coming back in the distant future to experience a built side of Galapagos in harmony with the wider natural environment. From my short experience here and all the people I have met and worked with, there is the will, passion, and determination to realize this goal, conserving the islands for wildlife and humans alike.



The current model of development in Puerto Ayora (top) contrasted with the principles of a sustainable house (below). © The Prince's Foundation.



Cars en route from the Baltra airport to Puerto Ayora.

CONSERVATION NOTE: Galapagos Conservancy funded a workshop led by the Prince's Foundation to help local authorities incorporate sustainability into their planning and building codes.



Galapagos National Park Ranger Freddy Villalba captures a cormorant. Great care is taken to ensure that no harm or distress is caused to the birds during these monitoring trips.

All photos:
© Volker Koch.

PROJECT UPDATE

Penguin & Cormorant Monitoring

Galapagos Conservancy's supporters helped to secure funding to carry out essential research work, for two years, on two of the islands' endemic and threatened species — the Galapagos Penguin and Flightless Cormorant. Because small numbers of each species exist — approximately 1,500 — it is important to keep a close eye on them.

These photos were taken during two of the field trips that took place in 2011. Work will continue into 2012 and 2013, and we look forward to sharing some of the findings with you. Thank you again for helping Galapagos Conservancy ensure that this vital work can take place.

Below: A cormorant gets its beak measured — beak size is an indicator of a bird's health. Below center: The team at work with Flightless Cormorants on Fernandina Island.



Above: Project Coordinator Gustavo Jimenez and his CDF colleagues weigh a Galapagos Penguin. Below right: Each penguin is weighed, fitted with an electronic tag on its foot, and marked with a pen to ensure it is not collected again.



During his trip to Galapagos in 2009, Alexis Deacon did not take a single photograph, preferring instead to sketch as he went. These illustrations were made on the day of his visit to the Fausto Llerena Tortoise Breeding Center at the Charles Darwin Foundation on Santa Cruz.

The Tortoise and the Egg



While I was staying in Puerto Ayora on Santa Cruz, I was taken around the Fausto Llerena Tortoise Breeding Center by Fausto Llerena himself. His knowledge and experience in the workings of the Center are second to none, so I understood the privilege of such an opportunity.

It was feeding day when I visited and Señor Llerena and his assistants were travelling from pen to pen, hacking slices from plant stems with machetes. The youngest tortoises are kept in a central zone of terraced enclosures within a larger corral. Each enclosure in this section houses young of a different island species and the individuals are distinguished by numbers painted on their shells. The smallest tortoises move around at surprising speeds and the anticipation of a meal only seems to spur them on. I saw several crashes and many mass pile-ups. With their numbered shells and sand-filled enclosures, they looked a lot like a series of tiny demolition derbies.

At this point in their life, the features that distinguish one species from another are slight, but the differences become more apparent as they grow. I struggled

to tell one batch from another in the terraced pens, but the larger juveniles roaming around the surrounding corral were already beginning to show differences in their shells. They were also a lot slower!

“With their numbered shells and sand-filled enclosures, they looked a lot like a series of tiny demolition derbies.”



When the feeding was done, I was taken to the hatchery, actually a kind of bunker with a desk and two large wardrobes at one end. Each wardrobe is kept at just the right temperature by a cunning arrangement of hairdryers: a little cooler, around 28°C, to produce males on one side; and warmer, just below 30°C, for females on the other. Inside the wardrobes and stored in Tupperware boxes, there are dozens of smooth, white eggs, round like tennis balls.

At first I was shown boxes of eggs like these, packed in sand. Then, to my great delight, Señor Llerena pulled out one of the boxes to reveal the amazing spectacle of giant tortoises hatching!

This isn't quite as serendipitous as it might seem as it can take up to two days for them to free themselves. That being said, I will count myself very, very lucky if I ever see it happen again.

Above: A recently-hatched baby tortoise (© Godfrey Merlen) Left: Young tortoises, only a few years old,

amble about their pen at the Fausto Llerena Tortoise Breeding Center. (© Lori Ulrich)

Alexis Deacon is a celebrated author and illustrator of children's books. His first book, *Slow Loris* (2002), was shortlisted for the Blue Peter Book Award and his second, *Beegu* (2003), was shortlisted for the Kate Greenway Medal in 2004.

Member Support in Action

WHERE ARE THE BLUE-FOOTS?

AN UPDATE BY DAVE ANDERSON, PHD

With support from Galapagos Conservancy, a group of seabird biologists (myself, Kate Huyvaert of Colorado State University, and Ecuadorian Master's degree student David Anchundia) has begun the first comprehensive survey of Blue-footed booby distribution and population dynamics in Galapagos. This effort comes as a response to concerns of a number of long-time Galapagos observers that this iconic species seems to be declining in numbers. Traditional breeding sites are largely unattended and without successful nesting; indeed, the large colony of hundreds of nests at my group's research site on Española Island has been essentially unused since 1997.

The project began in May 2011, with a survey of the entire coastline of Galapagos, excluding the northern-most islands where Blue-footed boobies almost never venture. That effort revealed a critical clue: *only two birds in juvenile plumage were seen in the entire survey area.* Blue-footed boobies show distinctive juvenile plumage between the time that they become independent from their parents until around 2 years old. This was a change from the 1980s - '90s, when juveniles were common throughout the islands.

We have now completed four rounds of intensive searches of major breeding colonies in the archipelago, at four month intervals since May 2011. During the first round, we were fortunate to find large aggregations of birds at most colonies, and we banded more than 700 birds. Since then, we have seen few of these birds, because attendance at breeding colonies has been very low. And if they don't try to breed, they don't produce fledglings that can eventually recruit into the population, balancing natural losses of adults to old age and the other hazards of life. The virtual absence of juveniles in May 2011 probably indicates that little successful breeding had been occurring for the previous two years (at least).



© John Andrade, GC Member

In June 2012, we conducted a coastal survey of blue-footed boobies, around the entire archipelago except the few northern islands that lack this species. This effort required ten people in five different boats, and occurred over three consecutive days, allowing us to minimize double-counting and misses due to movements of birds among sites. Again, we found few juveniles (<100), consistent with the previous year's data indicating little breeding. Our preliminary estimate of the adult population size is 6,000-8,000 birds. For comparison, the estimate from the 1960s and '70s was 20,000-30,000 breeding birds. The contrast between even these admittedly loose numbers suggests a substantial decline in population size, and the failure to breed offers a demographic mechanism for the decline.

Why are they not breeding? We suspect that food is behind the failure to even try. We know from previous work on Española that successful breeding there occurs when Blue-footed boobies have access to sardines. But sardines have been largely absent from the Española area since 1997 (we know this from Nazca boobies there, who also prefer sardines but can also breed using other prey). Over the past year, we have found that approximately half (54%) of >500 individual prey items were sardines. But this is much less than the nearly 100% that we have found in the diet during good times, and we suspect that the birds find this diet sufficient to live, but not to breed. Other factors may be involved, but we have no evidence yet.

Taken together, the first results of our work are consistent with a difficult breeding environment, and possibly with a declining adult population that experiences typical adult mortality but little replenishment from recruitment by successful breeding. We plan to continue our monitoring of the population at four-month intervals until January 2013 to provide as clear a picture as possible of the population status of this trademark Galapagos species.

David Anderson is a professor of biology at Wake Forest University. Since 1984, he has been involved in major field research in many areas of Galapagos conservation.



© Carolyn Stadler, GC Member

WHALE SHARKS

TAGGING IN THE GALAPAGOS MARINE RESERVE

Each year from May through November, the Galapagos Marine Reserve (GMR) is visited by the world's largest fish, the whale shark. Whale sharks can reach up to 20 meters in length and travel great distances across oceans, yet very little is known about their biology, migration routes, reproductive and pupping grounds, or home range areas. Listed as *Vulnerable* on the IUCN Red List, whale sharks are threatened mainly by Asian fishing activity. Their characteristic "white meat" is sold for food, and whole fins may sell for as much as \$15,000 in China. Overfishing has led to great reductions in numbers caught in areas, such as India and Taiwan, where they have been fished for years. The whale shark's slow growth rate and late sexual maturation mean that local populations are unlikely to recover after a collapse due to fishing.

Galapagos Conservancy is funding a 2012-13 study of whale sharks in the GMR in order to:

- Understand the importance of the GMR to whale sharks
- Increase our knowledge of whale shark migratory patterns
- Raise awareness of whale sharks as charismatic ambassadors for sharks and marine conservation in Galapagos

In August and again in October 2012, two 15-day field surveys will be carried out at the dive site known as *The Arch*, near Darwin Island in the northwestern tip of the archipelago. Scientists hope to tag 20 whale sharks with satellite positioning devices in order to assess diving behavior and patterns of movement.

Other goals of the study are:

- Build the local capacity in the study of whale sharks, through training in the use of acoustic and satellite technology and collaborative analysis of results
- Characterize the population abundance and structure of whale sharks visiting the GMR using photo identification
- Assess the seasonality of whale shark occurrence within the GMR with relation to environmental triggers such as changes in major currents
- Determine the migratory routes taken by whale sharks
- Raise local awareness of the importance of the GMR for migrating pelagic species using whale sharks as an example, with emphasis on schools.

GC Member, Kathy Reis, took this photo of a whale shark in the Galapagos Marine Reserve in 2007. For size reference, note the diver in the upper left.



GALAPAGOS FUND

CELEBRITY XPEDITION BUILDS LOCAL CAPACITY



The Galapagos Fund will help improve recycling on Isabela Island.

Travelers aboard *Celebrity Xpedition* can point to real impact on the ground in Galapagos, as contributions they have made to the Galapagos Fund at the end of their trips have been put to work. The **Galapagos Fund** is a small grant program managed jointly by **Celebrity Xpedition** and **Galapagos Conservancy**. It is designed to strengthen local capacity and foster sustainable living in the islands. The following projects are being funded in 2012:

Development of the specialist-volunteer program of the Puerto Ayora Red Cross Specialized Medical Center

Basic medical services are lacking in Galapagos and specialized treatment in areas such as ophthalmology, cardiology, dermatology, pneumatology, and gastroenterology require travel to the mainland. As a result, there is unnecessary travel to and from the mainland, and many local residents ignore symptoms or postpone medical treatments, leading to potentially treatable conditions becoming more severe. In general, poor health results in a less productive population in Galapagos. Funds will cover 1) volunteer costs for 52 visiting physicians, who will not only serve patients but will also train and mentor local doctors and 2) the final stages of design and construction of the medical facility.

Building environmental management capacity in the Municipality of Isabela

The Municipality of Isabela will benefit from technical assistance to organize, implement, and manage environmental management projects that will promote a sustainable community on Isabela Island. Funds will cover the 1-year salary and travel expenses of a local environmental technician to complement the Municipal Environmental Department's current staff.

Key investments to implement the Tomás de Berlanga School's Strategic Plan 2012-2016

The Tomás de Berlanga School will make essential short-term investments in its administrative structure and processes that will ensure long-term financial sustainability and the ability to reach its goal of educating students who are committed to and capable of contributing to the sustainable development of Galapagos. Specifically, the project will provide 1-year funding for an Administration/Financial Manager and a market study to help predict the future demand for a Tomás de Berlanga education.

CRUISE WITH GALAPAGOS CONSERVANCY!



May 1-12, 2013

Let Our Experts Lead the Way

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

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

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

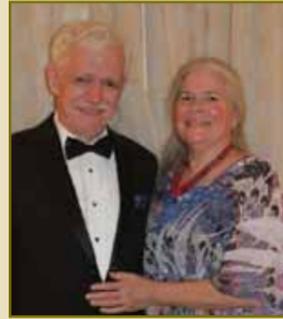
More details and a downloadable brochure can be found on our website at www.galapagos.org. Call our office at 703-383-0077 or email rfuhrken@galapagos.org with questions. A \$1500/person non-refundable deposit is required to reserve your spot. Must be 10 years or older.



GC's Linda Cayot (left) talks tortoises at the Charles Darwin Research Station. Photo by traveler, Joachim Frank.

DONOR SPOTLIGHT: Ken and Diane Saladin

"I think back now at how unbelievable it would have seemed when I was 16 and first learned about the Galapagos, if someone had told me that I would one day be able to contribute to preserving the islands in some significant way," reflected Dr. Ken Saladin, Distinguished Professor of biological and environmental science at Georgia College. Indeed, Ken and wife Diane have had a profound impact on Galapagos conservation through more than a decade of financial support, and their recent five-year, \$1 million pledge of support.



Ken and Diane began to translate their fascination with Galapagos into action following a 2002 visit to the Charles Darwin Foundation's (CDF) Research Station, during which they inquired about a volunteer opportunity for their daughter, a marine biologist, and toured the CDF's facilities. Diane recalls, "We were so impressed by CDF staff and programs, but we couldn't help but think that the Station needed a better library to serve as a home to nearly 50 years of research and as resources for scientists and the local community."

On returning home, the Saladins joined Galapagos Conservancy and began to invest in GC's and CDF's collaborative programs. In addition to helping to improve the CDF library's physical space, they have supported a number of other important programs including early rat eradication trials carried out by the CDF and National Park. Thanks in large part to their support, North Seymour and Mosquera Islands are now rat free.

Ken and Diane's pledge—the largest ever received by GC—will provide significant improvements to the CDF library infrastructure, collections and archiving software, and "virtual" access to the CDF holdings. As importantly, it will establish a library studies scholarship through which the CDF will identify scholarship students and ensure their training in this very important work.

Ken makes regular visits to Galapagos, leading a study abroad course on the natural and cultural history of the Galapagos Islands. He has authored three college textbooks (11 editions) in human anatomy and physiology, the sales of which have allowed the Saladins to realize their dream of helping to preserve the Galapagos Islands for future generations.

"This is one of the best outcomes I could imagine from my success as a writer—giving back to one of the places that truly inspired us—a place with global significance."

GLOBAL GALAPAGOS

GALAPAGOS IN A GLOBAL CONTEXT



Galapagos Penguins © Jack Baldelli

Hotspot or Not?

by Ana Rodrigues



Ana Rodrigues is a conservation biologist at the Center for Functional

and Evolutionary Ecology in Montpellier, France. Her research focuses on the identification of global priorities for conservation of biodiversity.

Over the course of several million years, a volcanic hotspot beneath the Pacific Ocean caused island after island to erupt from beneath the waves. Galapagos was born. So fascinated are we by the plants and animals that colonized and subsequently evolved in the isolation provided by these islands that we have come to refer to them as a hotspot of an altogether different kind as a hotspot of biodiversity.

When the idea of "biodiversity hotspots" was first proposed in the 1980s, it was embraced by the conservation world. Yet with its

growing popularity, the term became progressively fuzzier and is now liberally employed to refer to any geographical region considered of conservation importance. When British scientist Norman Myers first coined the term in 1988, he was referring to large biogeographic regions with two characteristics: exceptional concentrations of endemic species (that cannot be found anywhere else) and exceptional degrees of threat to biodiversity. Just over a decade later, the definition became even more precise, with hotspots defined as regions that have at least 0.5% (1,500) of the world's 300,000 vascular plants as endemic species and that have lost at least 70% of their primary vegetation. Together, these two conditions are a recipe for a conservation disaster: these are regions where many species are vanishing from the face of the Earth. Biodiversity hotspots defined in this way became the core global conservation strategy of the US-based conservation organization Conservation International, resulting in substantial investment to protect regions such as Madagascar, the Philippines, and the tropical Andes.

In the 1990s, however, other meanings of hotspots emerged: sites of exceptional species diversity ("diversity hotspots"); sites with many

rare species ("rarity hotspots"); and sites with high concentrations of threatened species ("threatspots"). As if this weren't confusing enough, many other kinds of hotspot began to appear in the literature, including "environmental hotspots" (sites with high environmental diversity), "forest clearing hotspots" (with active deforestation), and "conservation planning hotspots" (intense conservation activity).

Where does this leave Galapagos? Is it a hotspot or not? With fewer than 1,500 endemic plant species, Galapagos is too small to meet the original definition of a "biodiversity hotspot" adopted by Conservation International, though they are an important part of the wider "Tumbes-Chocó-Magdalena" hotspot, a region that occupies the coastal flank of the Andes from Panama to Peru. But in the broadest sense of a "hotspot" as a region of high conservation value, Galapagos certainly ranks high. The islands feature in most schemes that highlight conservation priorities at a global scale, including UNESCO's list of World Heritage Sites, WWF's Global 200 ecoregions, and BirdLife International's Endemic Bird Areas. But, there can be no doubt that Galapagos biodiversity is at risk and, without sustained conservation action, could become one of the world's hotspots of species extinctions.



The Galapagos volcanic hotspot at work, causing the eruption of Fernandina in 2009. Today, many people consider Galapagos to be a hotspot of biodiversity. © Paula LeVay



GALAPAGOS
CONSERVANCY

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Special Note: *Lonesome George, the last Pinta island tortoise, passed away on June 24, 2012, just as this issue of Galapagos News was going to press. We will honor his memory in our Fall 2012 issue. In the interim, please visit the special pages we have created on www.galapagos.org to learn more about George and his legacy.*

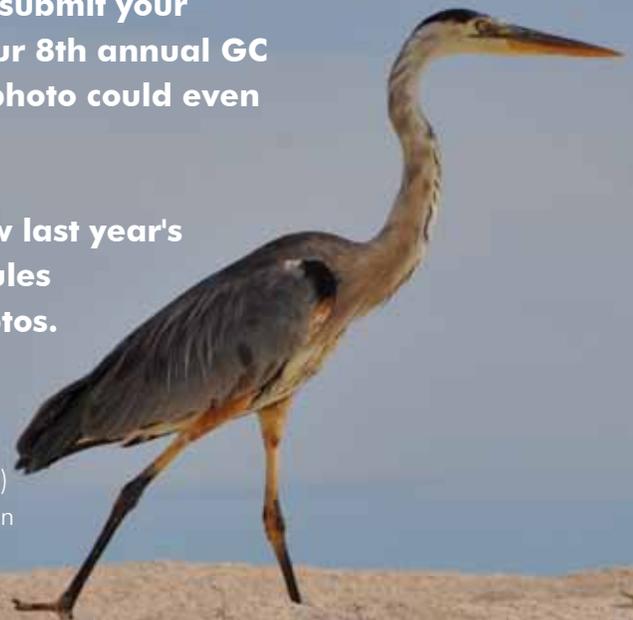


Enter Your Photos in the 8th Annual GC Photo Contest!

Galapagos Conservancy invites you to submit your favorite Galapagos photographs for our 8th annual GC calendar photo contest. Your winning photo could even grace our 2013 calendar cover!

Please visit www.galapagos.org to view last year's winners in our photo gallery and for rules and guidelines on submitting your photos.

Email no more than 5 digital photos, one per email, to photo@galapagos.org. Include your name, subject of the photo, and location of the photo (if known) in the email subject line, and your full contact information in the body of the email.



Submissions due: Midnight on August 15, 2012

Background: Great Blue Heron by Anne A. Brown. Inset photos by GC members: Sally Lightfoot Crabs by Bill Bevington, Nazca Boobies by John Belchamber, Land Iguana by Michael Kulakofsky.