

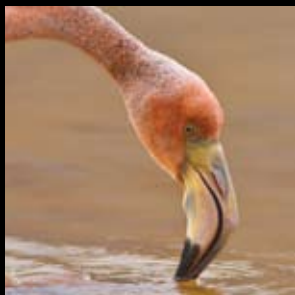


GALAPAGOS

SPRING/SUMMER
2010

news

a biannual English-language publication for members of the international network of Friends of Galapagos organizations



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Compared with many other places in the world, Galapagos does not boast a great abundance of species. There are several intertwined reasons for this: until the arrival of humans, relatively few species and only certain types have been able to find their way to these remote shores; the Islands are also just a few million years old, so there has not been much time for this process of colonization to take place; and then, only certain species have been able to survive and reproduce in this frequently hostile environment. But those species that did reach Galapagos have thrived, often giving rise to new species in the seclusion provided by each volcano and island. This origin of new species is what makes Galapagos particularly special, with a very high incidence of endemism — species found nowhere else on earth.

The images here were taken by the following GC members (from top, l to r): Joe Italiano, Elisabeth Kierkegaard, Mathew Meier, Srdjan Mitrovic, Andy Teucher, Sue Cullumber, Janet Morris, John R. Gentile, Nathan Gregory, Bonnie Haukness, Susan Spiegel, Kathy Reis, Katie Iverson, Nancy Sinnott, Vincent Streech

Thanks to all for allowing us to showcase these photographs, which capture the remarkable and frequently peculiar biodiversity of Galapagos.

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BIODIVERSITY 2010

GC Celebrates 25 Years

Spring 2010

The United Nations designated 2010 as the "International Year of Biodiversity." The intent of this designation is to recommit to the principles established twenty years ago at the Rio earth summit, and to bring into sharp focus the state of our natural world. Country governments, NGOs, and other leaders understood that biological diversity is not only about plants and animals but also about people and their needs. The Convention on Biological Diversity (CBD) sought to connect people and their landscapes and to create agreements on how each could sustain the other.

Regrettably, there is little to celebrate. Ahmed Djoghla, Executive Secretary of the Convention on Biological Diversity, noted that "...we have failed to fulfill the promise to substantially reduce the rate of loss of biodiversity adopted eight years ago by the 110 Heads of State and Government attending the Johannesburg World Summit on Sustainable Development. The more than 100 national reports received so far from Parties have demonstrated that we continue to lose biodiversity at an unprecedented rate."

Where is the disconnect and who has failed to come to the table? As a community, we have brought excellent science and public policy to bear on biodiversity matters. We have committed leaders and ingenious new thinking. We have engaged the public and private sector in new partnerships and yet we are losing species. Ultimately the issue rests at the uncomfortable intersection of economic gain and wilderness preservation.



With this sobering information as background, **Galapagos stands out, offering significant hope for the future.** In this issue of *Galapagos News*, several success stories are highlighted, beginning with biodiversity successes in San Cristóbal, work now underway in Floreana, and work to be undertaken in Isabela. These projects all have been supported by Galapagos Conservancy members and have led to several new groundbreaking conservation efforts. In forthcoming material, you will be reading about Dr. James Gibbs' work with Dr. Linda Cayot, GC's Science Advisor, on Project Pinta, returning tortoises to Lonesome George's island. James is also working on a biodiversity survey of Española Island, funded by GC and the Swiss Friends of Galapagos. It will be the first comprehensive, island-wide survey done in forty years.

We also learn about the work of our Friends of Galapagos Organizations world wide. Their partnership in this global network of associations dedicated to Galapagos conservation is a critical part of the financial support provided to the staff at the Charles Darwin Research Station.

Finally, 2010 marks the **25th anniversary of Galapagos Conservancy**. We began as a project of Nature Conservancy and the Charles Darwin Foundation, and soon found a home in the Smithsonian Institution under the watchful eye of Dillon Ripley, and later, David Challinor. My tenure began in 1992 and it has been my pleasure to see this institution grow and change, while staying true to our single focus, the Galapagos Islands. Our supporters and friends are at the heart of what we do, and we invite you to celebrate our "silver" anniversary with us.

Johannah E. Barry

Johannah E. Barry
President of Galapagos Conservancy

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FOGOS Friends of Galapagos Organizations

Galapagos has a diverse and beautiful native flora, comprising 500 native species of which 180 are found nowhere else. However, more than 1000 plant and animal species have been introduced by humans, either intentionally or accidentally. Many are ornamentals. Scientists at the Charles Darwin Foundation (CDF) work diligently to determine the threats to native flora, suggest what management actions can be taken, and monitor their consequences. **Galapagos Conservancy (GC)**, the **Frankfurt Zoological Society**, Lindblad Expedition's **Galapagos Conservation Fund**, and the **Japan Association for Galapagos (JAGA)** have all supported this work. The **Nordic Friends of Galapagos** and **GC** have also supported CDF's very successful native garden project, which includes a beautifully illustrated guide book written specifically for the local community (right). Local people trained by CDF have found employment and provided positive leadership for conservation while helping the prevention, control, and eradication of introduced species. In the Santa Cruz highlands, JAGA is supporting the restoration of native vegetation as well as gaining some hands-on planting experience during their annual members' visit.

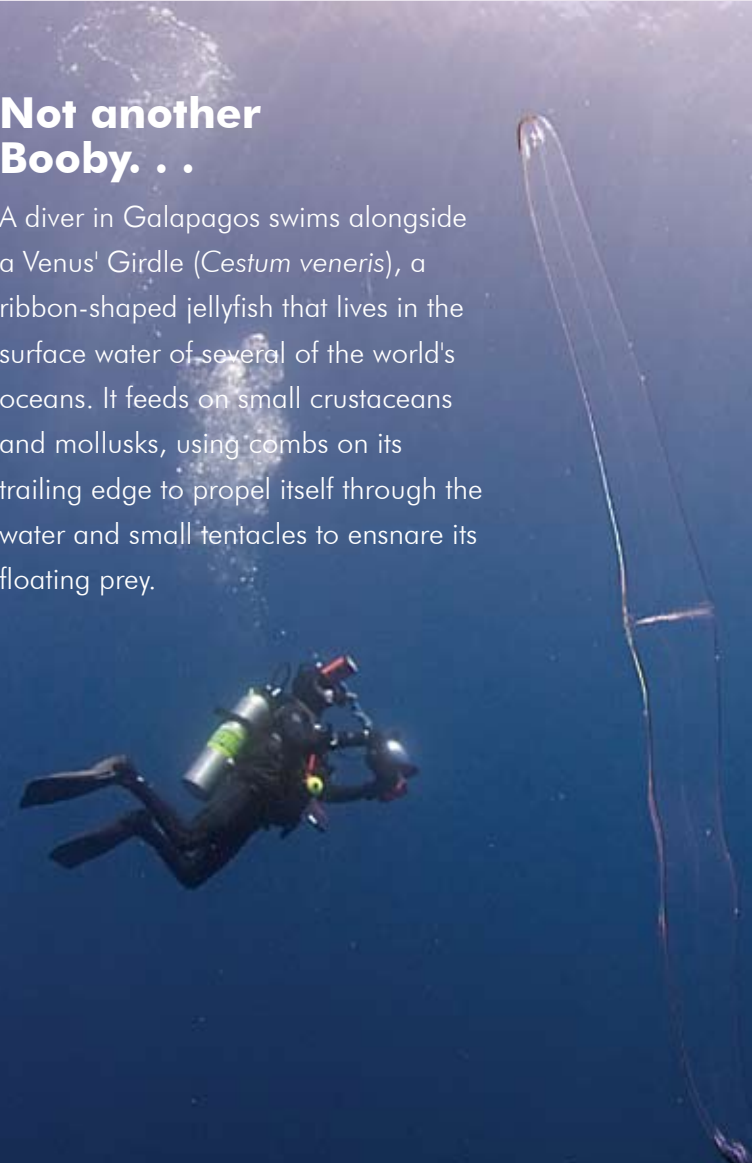
CDF's flagship project, Project Floreana, got off to a good start last year thanks to support from the **Galapagos Conservation Trust (GCT)**. A team of field technicians has developed skills in weed control and mapping, rare plant identification, and monitoring and protection; they understand first-hand their very important role in restoring their home island. A project coordinator has been appointed to work with the local community in Floreana, and GCT has also helped to fund a field worker for the Floreana mockingbird project.

Last year, the **Swiss Friends of Galapagos** celebrated their 15th anniversary by raising the equivalent of about \$100,000. This has been channeled into three main projects: the protection of giant tortoises, the reintroduction of the Floreana mockingbird, and the preservation of the Galapagos petrel.



Not another Booby. . .

A diver in Galapagos swims alongside a Venus' Girdle (*Cestum veneris*), a ribbon-shaped jellyfish that lives in the surface water of several of the world's oceans. It feeds on small crustaceans and mollusks, using combs on its trailing edge to propel itself through the water and small tentacles to ensnare its floating prey.



© Mark Thomas

*Join GC on the
cruise of a Lifetime!*

Galapagos Conservancy now hosts annual cruises to Galapagos, and the dates for 2010, 2011, and 2012 are now set.

August 19 – 29, 2010
July 14 – 24, 2011
July 12 – 22, 2012



All three trips will be guided by GC's own Science Advisor, Linda Cayot, and our hand-picked naturalist extraordinaire, Richard Polatty. We'll sail aboard the *Integrity*, a 16-passenger, 141 ft. luxury yacht.

Details and a downloadable PDF for each trip can be found on our website at **www.galapagos.org** — click on "TRAVEL" Or, you can 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. Our GC cruises are open to anyone 8 years and older.



NEWS FROM GALAPAGOS

PROVIDED BY THE CHARLES DARWIN FOUNDATION & THE GALAPAGOS NATIONAL PARK SERVICE

© CDF



Marine Alarm

One in five of the marine species listed as threatened in Galapagos may already be extinct, warn researchers. The International Union for the Conservation of Nature (IUCN) currently recognizes 43 marine species at risk of extinction in Galapagos. It may be too late to save the endemic Galapagos stringweed and several species of algae on this Red List, report scientists in *Global Change Biology*. Several factors are likely to have played a part in the declining abundance of these species. "The unpredictable mix of El Niño, increased human presence, and global climate change is a recipe for the breakdown of natural ecological functions with serious impact on the recovery potential of species and habitats," says Stuart Banks of the Charles Darwin Foundation and an author of the study.

For his colleague Scott Henderson, Conservation International's Regional Marine Conservation Director in the Eastern Tropical Pacific, their findings offer a wake-up call. "It is time we recognize that the ocean has limits just as the rain forests of the Amazon, the rivers of Europe, the ice sheets of the Arctic, and the grasslands of the Great Plains," he says. "For seas to thrive we need increased efforts to slow climate change, more, bigger, and better managed marine protected areas (MPAs) and better managed fishing activities outside MPAs."

In spite of these alarming trends, there is cause for some optimism, says Graham Edgar, former head of marine science and conservation for CDF and the lead author of this study. "For a marine biologist, Galapagos is the most remarkable location on the planet. It is the only place worldwide with a coexisting mix of tropical species such as corals and hammerhead sharks and cool-water species such as fur seals, kelps, and penguins," he says. "There is still much hope

for the future for this global aquatic treasure through innovative efforts in participative management by the Galapagos National Park Service and through learning from the findings of collaborative studies by local and international marine scientists."

Floreana Tortoises

Scientists have identified nine hybrid tortoises with Floreana ancestry currently held in captivity. The Floreana tortoise was assumed to have gone extinct around 1850. The nine individuals — six females and 3 males — are currently housed at the Tortoise Center on Santa Cruz, report geneticists in the scientific journal *PLoS One*. These Floreana-like animals, together with others identified on Isabela, will be used in a breeding program to generate tortoises suitable for re-introduction to Floreana in the future.

New Itineraries

The Galapagos National Park will begin rolling out new itineraries for tourist vessels this year in an effort to maintain the high-quality experience that tourists expect. Monitoring activities and feedback from guides and visitors have suggested that high demand at some visitor sites was compromising the wilderness experience that is part of the Galapagos package. The 70 vessels operating multi-day tours will now stick to 15-day itineraries that will prevent them from visiting the same site twice. This is expected to halve the pressure on popular stop-offs like Bartolomé and Española.

Finch Immunity

Galapagos finches are fighting back against invasive pathogens, according to a new study. Researchers have developed a rapid means of detecting the presence

of antibodies against the avian pox virus *Poxvirus avium* and the nest fly *Philornis downsi*, two recently introduced pathogens that could prove lethal to some of Galapagos' most iconic bird species. Reporting in *PLoS One*, the scientists found that medium ground finches that have encountered these pathogens have elevated levels of disease-specific antibodies. It is not yet known whether this actually improves the finches' chances of surviving an attack by these pathogens.

Brighter Boobies

Male blue-footed boobies that take a year off from breeding turn up the following year with brighter feet, which may make them more attractive to females. The research, carried out on a colony of boobies in Mexico over the course of two successive breeding seasons, shows that foot color in boobies fades with age and breeding effort, but a male can recover some of his former glory by taking time out from the annual reproductive grind. "Sabbaticals might allow boobies to recover from reproductive effort and display brighter feet," they suggest in the journal *Biology Letters*.



© Rosalind Cohen, NODC, NOAA

CDF Plans

In a report delivered at a meeting in Quito at the end of January, the Charles Darwin Foundation's executive director J. Gabriel Lopez looked back on 2009 and revealed plans for the organization's forthcoming year. The focus will now be on three "emblematic" projects, he said: measuring the "human footprint" in Galapagos; the "comprehensive" restoration of Floreana (see pg. 8); and studying the consequences of climate change. Galapagos is an "ideal laboratory" for compiling "highly trustworthy" data on the effects of the El Niño phenomenon, noted Lopez. Current studies show that "it is almost certain El Niño events will be more frequent, more intense" and could have a "devastating impact on the islands' endemic species like sea lions and marine iguanas."

Coastal Clean-up

Fishermen are being offered alternative employment to ease the demand on the dwindling stocks of sea cucumbers in the Galapagos Marine Reserve. The Galapagos National Park (GNP) is now paying fishermen to help clean up the waters of the reserve.

This initiative has already resulted in the collection of more than 4000 kg of waste. Once back on land, the fishermen record weight, material type, and size of the waste items, which are then either recycled or disposed of appropriately.

© GNP



Species Checklist Launch

CDF's checklist of all known Galapagos species is soon to be launched officially on its website (www.darwinfoundation.org). This will provide the first clear, accessible database of the species known in the Archipelago, says Frank Bungartz, CDF's leader of the Biodiversity Assessment program. It will have many uses, providing essential background information needed to measure conservation success, as a tool for identification, and as a management tool. "Intricate knowledge on sensitive and rare species distribution is an essential pre-requisite for development planning," says Bungartz.

Fur Seals on the Move

The Galapagos Fur Seal no longer appears to be endemic to the Archipelago, after a colony has set up home almost 1,500 km away off the coast of Peru. The Peruvian Geophysics Institute has reported that the sea surface temperatures just off their coastline have risen from an average of 17 °C to 23 °C in the space of just 10 years. Climate change may help account for this remarkably rapid increase, although this remains speculation. Whatever the cause, the Peruvian waters are now closer in temperature to the waters of Galapagos, making them well suited to the Fur Seals' lifestyle.

Photo by GC Member, Wynnell Schrenk



For more Galapagos news, visit the NEWSROOM at www.galapagos.org.

Galapagos Reforestation

In Galapagos, large areas are being reforested with endemic plants and native gardens are being planted.

In the Galapagos archipelago, the Galapagos National Park is promoting actions to care for the planet and to reverse some of the environmental degradation that has taken place in Galapagos.

Using a variety of methods that are safe for humans as well as the environment, a group of park rangers, known as "the jaguars," regularly control harmful introduced plants such as blackberry, guava, and elder over extensive areas of the islands.

After introduced plants are brought under control, rangers reforest many areas with endemic plants, such as scalesias, miconias, and a variety of native ferns, to help restore the islands' original ecosystems.

Over the past 30 years, the GNP has controlled 12 different species of introduced plants in an area of 4,478 hectares on the islands of Santa Cruz, San Cristóbal, Santiago, and Floreana. More than 108 hectares have been reforested with native and endemic plants.

To complement its work in the field, the GNP also works with local schools to plant native gardens on school grounds. Many students then do the same at their homes.

Shark Breeding Sites

The Galapagos National Park (GNP) is developing a monitoring system to identify potential breeding areas for sharks in the Galapagos Marine Reserve (GMR), in order to establish management measures to preserve these vitally important species and to improve the coastal zoning systems. This activity is being carried out by the GNP's Applied Marine Research team of the Office of Conservation and Rational Use of Marine Ecosystems. For the first time, natural breeding sites of the hammerhead shark (*Sphyrna lewini*) were found, as well as other species such as the Galapagos shark. Additional studies will help define migration patterns, movement between sites, and zones and periods of reproduction of the species.



© GNP

Correction: In the last issue of *Galapagos News* (Fall/Winter 2009), it was stated incorrectly that the El Niño phenomenon may have a dramatic influence on the Nazca Booby population. According to the latest evidence, Nazca numbers appear to hold fairly steady over the course of an El Niño event.

BOOK REVIEW

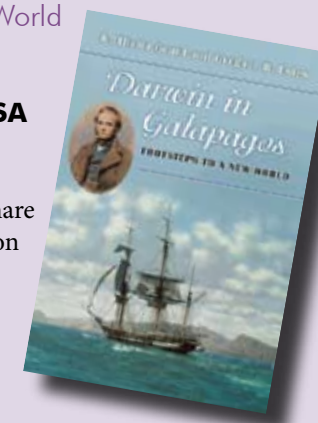
Darwin in Galapagos: Footsteps to a New World

by K. Thalia Grant and Gregory B. Estes, Princeton University Press (2009), \$29.95 USA ISBN: 9780691142104

Darwin and Galapagos have had more than their fair share of publications, but once in a while a special contribution appears, and such is this new book by K. Thalia Grant and Gregory B. Estes. A good book should be based on first-hand knowledge of the subject and the authors offer an impressive combination of experience — from an intimate knowledge of Galapagos today (the authors have been retracing Darwin's footsteps in the islands for years), the science, and even the historical documents composed by Darwin.

The first chapter provides Darwin's biographical background before moving on to the voyage of the Beagle. The treatment becomes much more detailed when Darwin and the Beagle reach Galapagos in late 1835 — a vast amount of information is marshaled to give readers a full picture. The book is well illustrated with a rich mixture of historical and modern images. Any reader seriously interested in Darwin and Galapagos will want to read this book.

Reviewed by John van Wyhe, director of Darwin Online (darwin-online.org.uk)



THE BIG PICTURE

Most conservation efforts in the last 50 years in Galapagos have focused on single iconic species. Using this approach there have been many notable successes such as the recovery of Española Island tortoises from 14 to more than 1600 individuals and the complete eradication of goats from Santiago Island. However, when focusing on single species there are often perverse effects at the ecosystem level. An example of this would be an explosion of the mice population after competing rats have been eradicated. Most conservationists in Galapagos are now thinking more holistically and are focusing on whole ecosystem ecology and trying to understand the mechanisms that drive each system. In addition, it is essential to develop an understanding of the economic, policy, and social pressures that lead to current system degradation: without considering the human element most conservation efforts are bound to fail.

Unfortunately there is no magic wand for restoration; changes in abiotic and biotic factors that occur as systems degrade may be difficult or impossible to reverse sufficiently so that systems can return to their pristine state. It is increasingly understood that the maintenance or restoration of ecosystem function should be the ultimate goal of conservation management and we suggest that this should also be the focus in Galapagos. Ecosystem function includes the plethora of interactions between biological, physical, and social elements.

The examples that follow look at three islands in different states of degradation and the limitations and challenges for their restoration.

— Mark Gardener, Director of Terrestrial Sciences, Charles Darwin Foundation

Collapse of the humid highlands



Mark Gardener
is the Director of
Terrestrial Sciences
at the Charles
Darwin Foundation

San Cristóbal

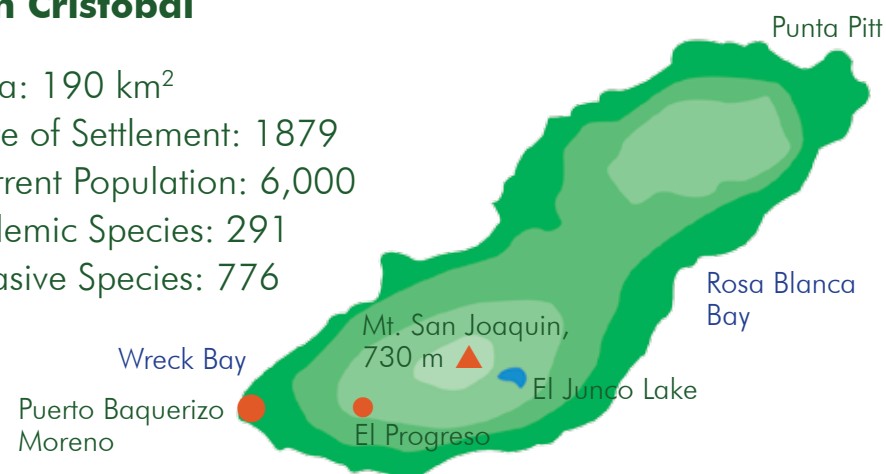
Area: 190 km²

Date of Settlement: 1879

Current Population: 6,000

Endemic Species: 291

Invasive Species: 776



San Cristóbal, of all the islands in the mostly arid archipelago of Galapagos, has been the most frequently visited by passing ships for the last 500 years. This is for a single reason; fresh water flows from the humid highlands to the coast. It is for this same reason that Galapagos' first permanent colony, the agricultural village of El Progreso, was established here in 1879. Today, more than 95% of the humid highlands of San Cristóbal have been degraded by land clearance or invasive species. The list of invasives is long and includes blackberry, guava, rose apple, goats, donkeys, pigs, cattle, horses, rats, cats, and the freshwater fish tilapia. Insect pests such as the Mediterranean fruit fly and the dengue mosquito have also affected human livelihoods and health.

One person who has seen all these changes is Alejandro Jerez, an 84-year-old retired farmer. He worked as a salt miner on Isabela, helped the Americans build the World War II military base on Baltra, fished on boats without motors, and worked a farm in the Soledad district of San Cristóbal. Until the 1970s, when regular cargo boats started to come, Alejandro was completely self sufficient for all food except rice and lentils.

COLONIZATION

In 1879 the infamous Manuel J. Cobos established sugar cane plantations and a mill, which he made profitable by diverting water and utilizing slave labor. This all came to an end with his assassination in 1904. Gradually, this agricultural land was abandoned and the mill dismantled in 1930. After the war, Cobos' daughter-in-law set up a cattle ranch in the high grasslands, though recurring droughts made large-scale cattle production unsustainable. During the 1970s and early 1980s, ongoing colonization brought a wave of plant invasions, which have contributed to the transformation of grassy highlands to low forest. Today most agricultural land has been abandoned and the 6,000 inhabitants live mainly in Puerto Baquerizo Moreno (right), working in the public sector or the burgeoning tourist trade.

ELECTRICITY

The San Cristóbal highlands are a wind-swept place. In 2007, three 50-meter-high wind turbines (right) capable of generating 2.4 megawatts (MW) were installed. In 2008 they produced 10% of the archipelago's power requirements. They have resulted in little or no mortality of endemic seabirds that nest in the highlands. There are plans to install five more turbines on Baltra with 3.2 MW capacity to supply Santa Cruz. If this green energy production is coupled with a campaign to limit energy use, Galapagos may well be on the way to a sustainable future.

FRUIT BOWL

In 2010, Galapagos has a resident population of around 30,000 and an annual tourist population of 170,000. Unfortunately, feeding all these people is far from sustainable, with more than 90% of foodstuffs imported from continental Ecuador. This is the principle mechanism for the introduction of invasive species to the archipelago. Considering the degraded state of the highlands and since San Cristóbal has a relatively good supply of freshwater, why not intensify agriculture to reduce the dependence on food imports? There would be challenges: invasive plants reduce farmland productivity and managing them is expensive; the cost of labor and materials is also higher than on the mainland; and locally-made products will struggle to compete with subsidized mainland imports.

DISAPPEARING FAST

Several species noted by Darwin in 1835 (including the Galapagos hawk, San Cristóbal rice rat, marine iguanas, and San Cristóbal tortoise) are now either extinct or vulnerable as a result of land clearance and the introduction of invasive species. Others, like the Chatham mockingbird and vermillion flycatcher (right), have lost a lot of habitat. Furthermore, whole ecosystems have disappeared: the once widespread and iconic *Scalesia pedunculata* forest no longer exists.

HOPE IN THE ARID ZONE

Compared to the humid highlands, the arid lowlands of San Cristóbal were relatively unaffected by colonization. However, in the early 1990s the population of more than 10,000 goats and donkeys was having a serious impact on the arid vegetation. Two very threatened species which are only found in San Cristóbal, the Galapagos Rock Purslane (*Calandrinia galapagosa*; right) and the Cristóbal Yellow Daisy (*Lecocarpus darwini*), needed urgent attention. A number of fences were erected between 1993 and 2005 which gave plants intermediate protection. In the last few years, the Galapagos National Park has been undertaking a goat and donkey eradication program which will remove the long-term threat to these special plants.

EL JUNCO

San Cristóbal's El Junco lagoon (right) is the only permanent freshwater body in Galapagos and its well-preserved sediments make it invaluable for constructing a picture of what the climate was like in Galapagos' past. Using pollen, scientists have shown that during the Ice Age, between 26,000 and 13,000 years ago, Galapagos was a much drier place than it is today. Other researchers have studied the lake's microbiological, molecular, and hydrogen isotopic signatures. Yet more work has focused on algae records, demonstrating that the last 50 years were the warmest on record, possibly as a result of anthropogenic global warming.



© CDF



© CDF



GC Member, Judy Molinaro



© CDF



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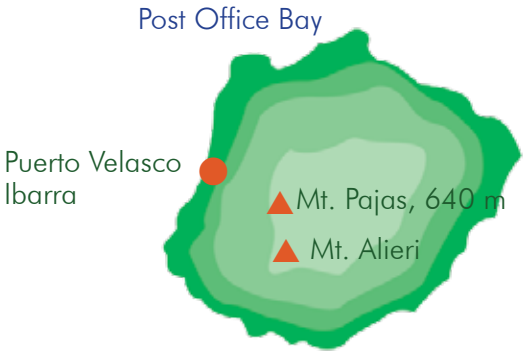
Into the Unknown



Felipe Cruz is the Director of Technical Assistance for the Charles Darwin Foundation (with additional reporting by Henry Nicholls).

Floreana

Area: 173 km²
Date of Settlement: 1807
Current Population: 120
Endemic Species: 350
Invasive Species: 369



Floreana is one of the oldest islands in Galapagos boasting greater biodiversity than many of the younger islands. Its relationship with humans is particularly unusual. It was the first island to be inhabited by humans, with a small colony established in the 1830s. But this and later efforts to exploit the island’s natural resources ended in failure so that there were no humans on Floreana between the 1870s and the 1930s. Today, it only has one small village — Puerto Velasco Ibarra (which is where I grew up) — there is no airport and the island’s total human population stands at just 120, with little immigration from the continent making it a stable community.

From now until 2014, the Charles Darwin Foundation (CDF) and the Galapagos National Park (GNP) will be raising funds to invest in Project Floreana, a bold plan to inspire a new, holistic approach to island conservation, embracing the local community as the solution to the island’s problems, not the cause. Here are some of its highlights...

INVASIVE SPECIES

With the removal of Floreana’s introduced mammalian invaders, many of the highly threatened endemic plant species are now flourishing. Unfortunately so too are some of the worst weeds in the archipelago, and a team of local residents is employed full time to search for and control this species in order to contain their spread.

Mice, rats, and cats continue to be a serious problem, particularly for Floreana’s birds. In the 1980s, CDF and the GNP began to control rats in key areas around the petrel breeding colonies. This work will be continued and expanded to other areas that are of importance to wildlife and people, with eradication as a long-term goal. We also aim to remove cats from the island within the next five years.

Across the globe, the spread of alien species is caused mainly by people, and working with the local community will be the key to minimizing the arrival of new invasives. For example, gardening with native species rather than introduced ornamentals, helping to improve standards of hygiene in chicken farms to reduce the spread of disease to wild birds, and implementing quarantine measures should all help contain this problem.

REINTRODUCTIONS

Although the impact of humans has been less on Floreana than on other islands, several species have gone extinct. These include the Floreana tortoise (see pg. 4) and a relative of the cucumber. Both of these species are gone forever. Other species have been lost from the island, but luckily remain on surrounding islets. The Floreana Mockingbird, which figured strongly in Charles Darwin’s thinking, disappeared from the island not long after his 1835 visit, but two small populations survive on tiny islets off the coast. As soon as we have a field team in place, we will start the preliminary work to reintroduce some of these surviving mockingbirds to the main island. Similarly, a snake — the Galapagos racer (right) — is today only found on these same islets and could also be returned once the restoration has been achieved.

NO-TAKE ZONE

When I was growing up in Puerto Velasco Ibarra, the waters near the port were highly productive, yielding lots of lobsters, groupers, and other fish. Now the area has been heavily overfished and it is rare to see much marine life around the village. In order to understand the process of restoration in the marine realm, and help to bring back species to this area, there is a proposal to protect a 4 km stretch of coastline while allowing fishing to continue along an adjacent stretch. Not only should this allow the marine populations to recover in the protected “no-take” zone, but it will produce real data on how a marine community recovers following overexploitation and the benefits of marine protection.

PEOPLE

The small human population presents a golden opportunity to gain the support of everyone living there. Floreana residents are more aware than those on other islands of the challenges of island living due to the difficult conditions and lack of basic resources. Project Floreana will build on



© CDF



© CDF

this awareness, helping the community to develop a shared vision for the island, focusing on waste management, water, energy, and agricultural production to help the community use scarce resources effectively, investing in education about conservation and sustainable living, and offering vocational training to local residents.

Work with the community is planned to start soon and with the help of the seven local residents now trained as wildlife technicians, we believe they will be a valuable help to the experts in each field (previous page, bottom). After all, it is only with the local community support that Floreana can become the first society in Galapagos aiming for sustainability, and thus providing an example to the rest of the archipelago and the world.

Back from the Brink

Isabela, the largest and most diverse island in Galapagos, is composed of six large volcanoes, most of them active. One of them — Alcedo— hosts a rich mix of species, with several endemic plants and insects as well as some 5,000 tortoises, perhaps the largest single tortoise population in Galapagos. The volcano’s ecosystems have recently undergone a cycle of destruction and renewal that serve as an example of the staggering challenges, remarkable successes, and ongoing concerns associated with conservation of Isabela’s magnificent biodiversity.

I first visited the island with members of the Galapagos National Park (GNP) almost 20 years ago, when it was possible to move easily around the flanks of the volcano because little vegetation blocked our passage. Cresting the crater rim on our first day we discovered the reason: among the dozens of tortoises were hundreds of goats in coats of all colors. I photographed one raised up on its hind legs reaching for some last leaves, its rear hooves planted firmly on a hungry tortoise’s shell. There was little herbaceous growth left for tortoises to eat and little shade from the searing rays of the sun. The volcano’s scant soil, the product of nearly one million years of gradual erosion, was exposed and about to be whisked away by the first rains. With so many goats, what could possibly be done?

The answer came in the form of Project Isabela, an ambitious joint effort between CDF and GNP to remove all feral goats from the north of the island. Its successful conclusion in 2006 was due to a combination of intricate planning and preparation, methodical eradication, and careful monitoring, and Project Isabela is now known as the largest ecosystem restoration project accomplished in any protected area anywhere in the world. So how does the island look today in 2010, and what are the challenges that still lie ahead?

RECOVERY

By chance, the removal of goats coincided with an El Niño rainfall event that “jump started” many of Isabela’s plant communities, particularly its herbs and shrubs. Though there have been no records of Alcedo’s endemic shrub, *Hyptis gymnocaulos*, for more than 20 years, there is still hope that some of its seeds lie buried and will, in time, germinate. Along with the recovering vegetation, species such as the Galapagos rail — a fascinating small bird that skulks in the underbrush looking mostly for spiders — has returned (right). In many areas their loud chattering in response to footsteps can be heard frequently where once silence reigned. Ecosystem recovery on Alcedo is especially evident in the invertebrate community.

HUMAN IMPACT

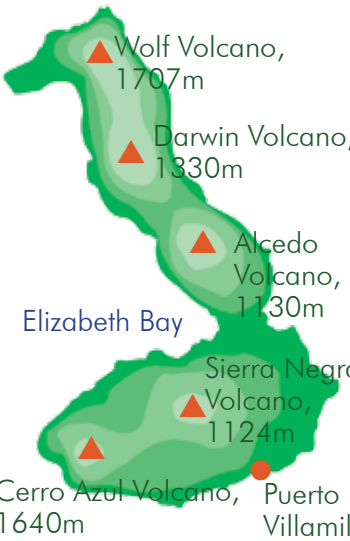
Despite these successes, major challenges remain. Many originate in Puerto Villamil, the primary population center on Isabela. The last decade has witnessed its transition from a sleepy fishing village with sandy streets to a bustling urban center. Despite a relatively tiny footprint, Villamil nevertheless generates continual threats to the biodiversity of all of Isabela. A recent CDF survey of the gardens in Villamil discovered a biological time bomb: about half of landholders are cultivating exotic species, including many “black-listed” in the islands. Most of the hundreds of “pet” dogs and cats in the town live largely uncared for outdoors — a potential reservoir for new diseases that could easily spread to the fauna in the adjacent National Park. Consumption of tortoise meat, prohibited since 1933, remains a continuing problem. Between 1995 and 2004, humans killed at least 190 giant tortoises, most of them on Isabela (right). The only long-term solution to this troubling statistic seems to be educating Villamil school-children about the benefits of conservation. (Continued on the next page.)

Isabela

Area: 4,588 km²
Date of Settlement: 1897
Current Population: 1,749
Endemic Species: 931
Invasive Species: 816



James P. Gibbs is Professor of Environmental and Forest Biology at the State University of New York and has worked in Galapagos since 1981.



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Galapagos Islander

MASON CAMERON is . . .

. . .16 years old, and is studying gastronomy as part of his curriculum at the government high school in his home town of Puerto Ayora on Santa Cruz.

Many of our readers may know his mother, Ros Cameron, who works at the Charles Darwin Research Station.



What was it like going to school in Galapagos?

There are around 20 schools on Santa Cruz. The one I went to from first grade is a private school and one of the smallest in the islands. In the primary school, there were around 100 children, but in the secondary school there were only about 30 kids in total. In my last year, there were only six pupils in my class, including me. This is probably a reflection of the fact that most people in Galapagos can't afford to send their children to a fee-paying school. There were plenty of animals and plants around the school and lots of open space. It was a fun school.

What are you doing now?

I am now in my first year at the oldest high school in Galapagos. It has been here for 40 years and offers gastronomy as one of the general high-school subjects. I love to be creative, and I love to cook, plus I really enjoy being one of almost 600 kids as I have lots of new friends and a lot more fun things to do outside of school. I hope to travel after high school and maybe work in Australia where I was born. I would like to be a boat captain who can cook.

What do you do outside school?

I usually help mum or visit my friends. We go camping up in the highlands and I get to go kayaking, scuba diving, or windsurfing quite often. I also like to paint, usually with oils on canvas. At the back of my house is a little tree house studio that my mum and I built years ago. I usually paint Galapagos landscapes, but what most people seem to like most are the paintings of my fat cat Harry.

Do you think this is typical of most teenagers in Galapagos?

Probably not. When I was at school, most of the kids in my class wanted to go to the cinema or visit Quito at the end of term. I always enjoyed physical exercise and open spaces, so sitting in class is hard unless it's something I like. Last year, my class won a prize for a project we did on mangroves around Puerto Ayora. We took samples of the sand or, in my case, mud and looked for interesting little bugs and crustaceans.

Have you been outside Galapagos?

Yes, I've been to a lot of places on holiday including Nantucket, Samoa, London, Australia, and even Antarctica, but some of my favorite holidays were in Galapagos. I always feel safe in Galapagos. It's my safe spot, you could say. There's more to this feeling than this is the place I call home. There's something incredibly special about the mornings in particular, especially when you go camping on the beach. You see great sunrises and sunsets and animals everywhere you look. I have everything I need here: friends, food, places to go, and fun things to do, and every now and again I get a surprise because I live in such a special place; meeting princes, being at the filming of the movie *Master and Commander*, erupting volcanoes, going on board the replica of the *Endeavour*. And friends from all around the world pop in.

(ISABELA, continued from page 9)

FROGS

The increased human activity on Isabela probably accounts for the introduction of an entirely new class of vertebrate—frogs—to Galapagos. The species *Scinax quinquifasciata* is common in the coastal lowlands of Ecuador and is now well ensconced in the wetlands around Villamil. This has proven extremely vexing because little is known about the species' biology and, by extension, methods for its control. Applications of high concentrations of caffeine—known to kill frogs by arresting heart function—have been proposed but pose risks to other aquatic organisms. Another approach under consideration is to increase the salinity of the frog-infested lagoons by pumping sea water into them—an expensive project involving large water pumps with an uncertain outcome.

BIRD CONCERN

Two bird species remain of great concern on Isabela. Flamingoes use the brackish ponds along the coastal margin and have been in slow decline, probably because rising water levels during recent strong El Niño events have flooded nesting sites. This is only expected to get worse with climate change. More urgent perhaps is the situation of the Mangrove Finch, now confined to a breeding population of about 100 individuals in just two mangrove forests on the island. The main threats to this species are introduced Black Rats, Smooth-billed Anis, fire ants, and parasitic flies. Should the situation get much more desperate, it might be necessary to bring the last mangrove finches into captivity. Work has already begun using the more abundant woodpecker finch to develop the husbandry techniques that would be needed.



GC Member, Enrique Urena

NEW DISCOVERIES

Against this background of conservation achievements and ongoing concerns, Isabela has witnessed some remarkable discoveries in recent years. Most surprising perhaps was the announcement last year of an entirely new species of land iguana—the so-called Pink Iguana—that had been lurking unnoticed on the flanks and summit of Wolf Volcano. Even the better known Yellow Land Iguana, assumed to have been stripped from most of the island by dogs and other introduced predators, was recently discovered to have a substantial previously unknown population at Punta García on the east coast.

The largely unexplored lakes in the caldera of Cerro Azul, one of the most active volcanoes in the world, have also yielded some surprises. The lakes face recurrent desiccation and eruption events, yet host a remarkable diversity of aquatic life, including groups such as nematodes, beetles, and dragonflies.

Finally, new forms of insect diversity continue to be cataloged, particularly on the slopes of the northern volcanoes. In 2008, for example, it was revealed that the moth *Galagete darwini* is actually not one but two different species, one based in the low, arid zones and the other in the high-elevation areas of the island (below). Together these discoveries have added gravity to efforts to conserve and restore the native biodiversity of Isabela—perhaps the most important gem in the biological treasure trove that is Galapagos.



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GALAPAGOS ANIMAL ADOPTION GIFTS www.galapagos.org



MEMBERS' CORNER

2010 Galapagos Fund Grants

Galapagos Conservancy and Celebrity Cruises are pleased to announce the 2010 beneficiaries of the Galapagos Fund, which was established in 2006 to allow travelers aboard Celebrity's *Xpedition* to contribute to the long-term protection of the archipelago. This year's projects include:

- **Construction of an ecological trail and interpretive center.** FUNDAR Galapagos, a local organization based on Santa Cruz, will use this project to strengthen public education programs associated with multi-institutional efforts to restore the island's highland areas.
- **Recycling in San Cristóbal.** The Galapagos Fund will continue to support operations and technical support needed to consolidate the community's first solid waste recycling operation, which was started two years ago.
- **Environmental management planning.** This project, coordinated by the Municipality of Santa Cruz, represents the first time that a local government in Galapagos will develop an Environmental Management Plan to document environmental hazards and to outline measures to prevent, mitigate, and control air, water, and soil contamination.
- **Sustainable agriculture.** A growing number of Galapagos farmers seek to replace imported vegetables—a major source of invasive species—with produce grown locally through low-input agriculture. The Galapagos Fund will finance technical assistance and training needed to strengthen these efforts.
- **Promoting the use of bikes in Galapagos.** The Galapagos Fund will support a large-scale program involving businesses, local government organizations, and NGOs, designed to lessen dependence on local taxis and other gas and diesel powered vehicles. The project will involve the community in the design and construction of bike paths and will provide bike safety education and training in maintenance and repair.

We look forward to keeping you informed about these and other projects made possible by the generosity of *Xpedition* travelers.

In Memoriam BRUCE CARL EPLER



Galapagos conservation lost a great friend and passionate advocate when, on March 17, 2010, Bruce Carl Epler died after a long struggle with cancer. A natural resources economist, Bruce was among the first to write critically and thoughtfully about tourism in Galapagos and its unintended consequences on long-term conservation. His seminal work in the 1980s provided a baseline against which future tourism models and economic flows could be captured. In 2007, Bruce revisited his earlier examination on tourism in a white paper entitled *Tourism, the Economy, Population Growth and Conservation in the Galapagos* which looked unflinchingly at the negative impact on Galapagos economics, social structure, and conservation brought by unchecked growth in tourism. In 2010, Bruce finished what would be his last white paper, in collaboration with his long-time colleague Dr. Craig MacFarland, called *Galápagos Tourism: An Ecological and Economic Conundrum*. While a serious writer and conservation professional, Bruce was also a witty, lively, and irreverent presence. His intelligence and spirit will be deeply missed.

SHARE YOUR BEST **GALAPAGOS PHOTOS**

Galapagos Conservancy **2011 Photo Contest**

Galapagos Conservancy invites you to submit your favorite Galapagos photographs for our 2011 Galapagos Conservancy fundraising calendar.

Staff and supporters of Galapagos Conservancy will choose **13 winning photos** sent in by GC members: twelve will be selected for the calendar and one will be selected for the cover of the 2010 GC Annual Report. One photo will be chosen as the overall winner and will be featured on the cover of the 2011 calendar and in many of our web and print marketing efforts. We will also select an additional **25-35 "honorable mention" photos** that will appear as details throughout the calendar monthly grids.

Please visit **www.galapagos.org** and click on the **Wildlife Gallery** to view the last year's winners and for rules and guidelines for submitting your photos. **Submissions are due by midnight on July 15, 2010.** E-mail digital photos, one photo per email, to **photo@galapagos.org**. Limit submissions to 5 photos per person.



2011 calendars will go on sale in September 2010.



GC 2010 Photo Contest Winners: (l to r) La Cumbre Volcano by Paula LeVay, Sea Lion by Srdjan Mitrovic, Land Iguana by Jeff Ashwell, Blue-footed Booby by Steve Spiegel

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Saving one of the world's great treasures

