

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

# IN THE NICK OF TIME

# TUI DE ROY REFLECTS ON HER RECENT VISIT TO ALCEDO'S TORTOISE-LAND

he huge, ancient tortoise—a giant amongst giants—rests unmoving under a scraggly tree that is barely casting enough dappled shade to save it from the killer midday sun. This is a scene from Hell. Where the native *Scalesia* forest once stood, now only a handful of moribund trees dot a dusty, desert-like scene, each sheltering one or two more tired tortoises. Today a sere wind is blowing and, with roots laid bare in the denuded ground, their remnant skeletons are toppling one by one as I watch.

The old tortoise slowly raises his head and sniffs the air with a pumping action of his throat, moist eyes scanning the desolate landscape before resuming his resigned siesta, chin on the ground. The skin around his neck is wrinkled and furrowed like a crumpled newspaper, his fat reserves long spent, his armoured body deeply emaciated. He is waiting for deliverance, having endured in patient reptilian fashion the rampant goat invasion which has laid waste to his volcanic homeland over the past 20 years.

But suddenly, at the eleventh hour, his wait is fast drawing to an end. An incongruous sound is wafting on the wind the whop-whop of a helicopter working for the Project Isabela, a joint program of the Galapagos National Park and the Charles Darwin Research Station that is the most ambitious exercise in island habitat restoration ever undertaken in the world. With the urgency of a bee making honey, the small chopper shuttles back and forth across the volcano, ferrying hunters and gear and running survey track lines.

The imminent victory for conservation is literally throbbing in the air. Day by day, week by week, the goats that ran here in herds of thousands are vanishing, have vanished, and the transformation of the landscape is already in full swing. Ecological recovery is literally visible as a systematically advancing green line.

The tortoise-land of Alcedo Volcano on Isabela Island remains one of my favourite places anywhere in the world. It is truly a land apart, and I have been coming here again and again for 35 years. When the goats started invading in the early 1980s I began witnessing the slow agony of the tortoises and their prehistoric wonderland. In 1995 I documented the loss of fog-drip trees along the rim of the caldera. In 2000, even as Project Isabela was progressing through its major logistical preparations, I was back photographing the conversion of lush thickets on the outer slopes into a rolling landscape with only scattered remnant trees. Shade was becoming scarce and tortoises were beginning to die from overheating.

Now in 2005 the contrast between raw devastation on the western side of the caldera—the last goat stronghold—and the eastern side, where regrowth was fully underway, was nothing short of riveting. To the west, windswept plains had replaced

Photo taken before Project Isabela got underway shows near-desertification caused by goat invasion.





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Charles Darwin Foundation of Canada 55 Avenue Road, Suite 2250 Toronto ON M5L 3L2 Tel: 416.964.4400 Email: garrett@lomltd.com woodlands, dotted with bleached tortoise carapaces attesting to their inability to find shade, or fallen down the steep caldera walls while searching for scant plantlife to graze. The endemic *Darwiniothamnus* thickets and passion vines were but a distant memory, the desolation made even more acute by recent drought.

A half hour walk to the east and at once I felt as though I had stepped forward through time. Here *Scalesia* seedlings were springing up beneath the few surviving old trees, light rains having cast a vivid green flush on the land. Some saplings were already nearly one metre tall, having survived unscathed through the dry season for the first time in a decade. *Tournefortia* shrubs, stripped bare of leaves only a few months ago, had resprouted and were once again offering copious shade to contentedly sleeping tortoises. Darwin's finches sang from the foliage and already a few shy ferns were appearing in damp hollows.

For the first time in two decades I returned from Alcedo feeling like I was walking on air, a sensation accentuated by flying, rather than walking, for the very first time to the caldera rim and back. Seeing is believing, yet it took me a while to fully absorb the triumph before my eyes.

To think of well-fed tortoises entering the next rainy season with the breeding fervour I first witnessed here in 1970 is indeed a dream come true, an object lesson in Galapagos conservation setting new world standards, thanks to the vision of a few, and the support of thousands.

# Tired and emaciated tortoise (right) awaits deliverance.

Above right and below: vegetation regrowth, post eradication.









# UPCOMING EVENTS AND DARWIN LECTURE SERIES

Please join the staff of Galapagos Conservancy, Charles Darwin Foundation, and members of our extended family of scientists at our 2006 Lecture Series. We value these opportunities to meet with our supporters and friends and talk about Galapagos conservation.

# June 20, 2006 🔅 San Francisco, California

Dr. Graham Watkins, Executive Director of the Charles Darwin Foundation, will present a lecture entitled "Galapagos: The Next 100 Years" at the California Academy of Sciences at 2:00 p.m. and 7:30 p.m.

# September 14, 2006 🔅 Dallas, Texas

Dr. Jack Grove, marine biologist and co-Founder of Zegrahm Expeditions, will be at the the Dallas Museum of Natural History, where he will present a lecture on challenges and opportunities in the Galapagos Marine Reserve.

# SYLVIA HARCOURT-CARRASCO: MBE

CDF Board member, Sylvia Harcourt-Carrasco, has been appointed a Member of the Order of the British Empire (MBE). The honor came in recognition of her significant contributions to the conservation of the Galapagos Islands and to British education in Ecuador.

## A NEW VISION For Galapagos Fisheries

Longline fishing was banned on December 20, 2005 by the Interinstitutional Management Authority of the Galapagos Marine Reserve, a body established by the Special Law for Galapagos. This decision has ended an argument which had been raging for several years and which was causing conflict and entrenched positions for and against a particular fishing method, rather than focusing on how to develop a sustainable high seas fishery. The fact is that, in Galapagos, longline fishing results in the capture of unacceptable numbers of sharks, turtles, and other protected species.

The decision to ban longlining opens an important space in which the Galapagos community (made up of fishermen, tourism operators, administrators, guides, and scientists) can work together to make high seas fishing sustainable. The CDF vision leans towards a lowvolume, high-quality product, with an operation that causes minimal environmental impact, both on target and non-target species, and which brings maximum benefits to the local community.

Since 2005, CDF has been working with fishers on Isabela Island studying the impact of oceanic handlines, as part of the USAID-WWF project "Conservation of the Galapagos Marine Reserve." Preliminary results from this study suggest that the challenges lie not so much in obtaining a high quality catch as in developing the market links for its sale.

"There is probably no magical solution that will satisfy all fishers," said Alex Hearn, Coordinator of Fisheries Research at the Charles Darwin Research Station. "We need to identify and work with small groups of fishers who are interested in developing specialized sustainable enterprises. In this way, some will specialize in high seas fishing, others may focus on making lobster fisheries sustainable, still others may go into partnership with tour operators to supply their boats with whitefish, and so on."

# **PROJECT ISABELA UPDATE**

## BACKGROUND NOTES ON Project Isabela



Photos top and center show Santiago highlands in March 1999, and after goat eradication in March 2005. Diagram above shows GPS tracks of ground hunters walking 100-150 meters apart on Santiago.

The year 2005 was a busy and rewarding one for the Project Isabela team. A considerable effort had been expended during the year and results are becoming increasingly obvious, as Tui De Roy reports. By the end of the year goats were ecologically extinct across Isabela Island and the remnant population (estimated at less than 200 animals at the year-end) was being removed.

Santiago Island, which was used as a kind of training ground before the team began operations on Isabela, also saw a massive effort in 2005 by ground hunters with helicopter support. In the last complete sweep of the entire island, a single goat was detected and removed; additional surveys will be required to confirm eradication in 2006. Vegetation recovery has been swift in the Santiago and Isabela highlands, even though the last few years have been drought years. In the lowlands, due to drought conditions no new seedlings have been seen, but existing small trees are shooting up from the stumps to which they had been reduced.

Various species of previously rare or uncommon plants that were palatable to goats are now relatively common, particularly in the highlands. During the next wet season, we expect to see vegetation recovery transform Santiago and Isabela Islands. However, complete recovery of these systems will take many years.

#### SOME NOTES ON JUDAS GOATS

Judas goats are animals that are fitted with radio-collars and released into the wild. Goats are by nature very social and the Judas goats will soon seek out and join others. Hunters can thus locate the herds by using radio-directional equipment.

Judas goats were monitored intensively on Santiago Island during 2005, primarily by helicopter. Some 213 Judas goats were active during the year, but they were removed in November to facilitate the activities of ground hunters and dogs. These were very active on Santiago, with two complete sweeps at 100-150 meter spacings being conducted across the entire vegetated area of the island in the second half of 2005. During the last sweep of the year, only a single goat was detected and removed.

Similarly, Judas goat monitoring was also active on Isabela Island in 2005. A total of 578 Judas goats were deployed across all the vegetated areas on this large island. Monitoring was conducted exclusively by helicopter. When Judas goats were found together, the trackers captured all but one, and re-deployed the others. In this way Judas goats kept searching for other goats. It was estimated at the end of 2005 that less than 200 goats remained on Isabela, predominantly on Sierra Negra Volcano; work on large parts of this volcano and Cerro Azul had only started in the last quarter of the year.

This brief account is based on the Annual Report of Project Isabela, and is published here by agreement with Felipe Cruz. The Project Isabela team would like to thank all its generous supporters for helping to make 2005 such a success; they look forward to receiving continued support and being able to report further advances in 2006.

On the last day of March, when we had nearly finished preparing this issue, we received the following message from Felipe Cruz, Technical Director of Project Isabela: "As of today (2:00 p.m. Galapagos time) we have closed down all field activities on Santiago and Isabela Islands. Camp facilities have been evacuated and all the personnel and dogs are safely home. The helicopter is being packed in a container to go home too! All the objectives and challenges planned many years ago have been fulfilled and we have done what the world believed was impossible! Pigs, goats, and donkeys are part of Santiago's history, as well as from the whole of northern Isabela!! I am now turning off my phones and hand-held radios for the first time in two years. We have finished this project successfully!"

# REMEMBERING ROBERT BOWMAN

# ♦ IN MEMORIAM ♦

In our last issue of Galapagos News, we were delighted to share with readers the news that Dr. Robert Bowman had received a lifetime achievement award from the Charles Darwin Foundation for his extraordinary efforts on behalf of Galapagos and his seminal work on Darwin's finches. We are saddened to bring you news of Dr. Bowman's death.

Professor Bowman was a renowned ornithologist with an uncanny ability to mimic the varied chirps and warbles of the birds he studied. A retired professor of biology at San Francisco State University, he died March 12 of heart failure at his home in Berkeley.

Dr. Bowman, along with his wife Margret, visited the Galapagos Islands in 1952 as a graduate student. Although his trip to Galapagos focused on his area of interest and expertise, Darwin's finches, he was also concerned about protecting this extraordinary place. As a result, he and an international group of scientists and representatives from a number of international conservation organizations created the Charles Darwin Foundation for the Galapagos Islands in 1960. Professor Bowman was awarded the Republic of Ecuador's Medal of Honor in 1964.

A memorial service for Dr. Bowman will be held at the Seven Hills Conference Center at San Francisco State University on Sunday, June 18, 2006 from 1:00 to 4:30 p.m.

Arthur Rochester is a Galapagos Ambassador who credits Professor Bowman with kindling his strong environmental interest and ethics. Here are some of his thoughts...

More than 40 years ago, Bob Bowman taught me new ways to view the living creatures in our environment. He taught his many fortunate students about ecology and the interaction of all living species. He demonstrated to us how evolution works. Dr. Bowman was an inspiration to all of his biology students. He taught us to be aware, to pay attention to the smallest details and to take copious exacting notes. Although now it seems obvious to all of us, every creature is a vital part of the environment in which it lives. From the tiniest microbe to the largest mammal, we are all sharing this earth together in a biological soup.

In 1965, Bob took me under his wing and shared his vast knowledge of the Galapagos Islands. He took me to these islands in 1967. This was a thrilling experience that changed my perceptions for life. When we were there on our scientific documentary filming expedition, the islands were virtually pristine. The indigenous animals were plentiful and remarkably unafraid of humans. There were probably 100 people on the islands then. We were there before the first Lindblad public expedition in 1968.

In 2002, a group of filmmakers shooting *Master and Commander: The Far Side of* 

*the World* were witness to the overwhelming population explosion. There were at least 10,000 people living on Santa Cruz Island and perhaps another 10,000 on San Cristobal. There are now 11 churches, 3 disco clubs, several bars and they are all powered by polluting gasoline generators. There are cars, trucks, buses and the paved roads on which to drive them. At the same time, the animal populations seem to have diminished. This growth must have broken Bob Bowman's heart because the islands were no longer free from human tampering.

The Galapagos Archipelago was a scientific wonderland for Bob. Because of their remoteness and lack of popularity as a trendy destination, the islands provided Bob and his colleagues with a living laboratory in which to observe the interaction of many species and sub-species without the destructive influences of human beings. Now, along with Bob, this fragile biology laboratory is a vital part of our history. We will miss you Bob, along with the tremendous efforts you made to secure the Galapagos Islands for the advancement of scientific knowledge. Yet, we will savor your memory and the many things you made possible for us to enjoy. You opened our eyes to the wonders of nature in their purest forms.

Arthur Rochester is an acclaimed sound engineer with a long history of major Hollywood films to his credit. His most recent Academy Award nomination was for his work on Master and Commander: The Far Side of the World.



Robert Bowman (front row, second from right) at the inauguration of the Charles Darwin Research Station in 1964.

# MAJOR AWARD FOR EVOLUTIONARY RESEARCH



n August 2005, the Balzan Foundation, with offices in Switzerland and Italy, awarded one of its four annual prizes jointly to Peter and Rosemary Grant, who are both professors in the Department of Ecology and Evolutionary Biology at Princeton University in the United States. The award of 1,000,000 Swiss francs (about \$780,000) honored their thirty years of research on the evolution of Darwin's finches in Galapagos. Half of the money must be used to fund the work of young scientists.

The Prize Committee's citation hailed their long-term studies which showed evolution in action among Darwin's finches. "They have demonstrated how very rapid changes in body and beak size in response to changes in the food supply are driven by natural selection. They have also elucidated the mechanisms by which new species arise and how genetic diversity is maintained in natural populations. The work of the Grants has had a seminal influence in the fields of population biology, evolution, and ecology. It is generally regarded as the most significant study of evolutionary change in the field that has been carried out in the last 30 years." The Grants have also revealed the significance of birds' songs, which are unique to each species, and are more important than physical appearance. In recent years they have collaborated with colleagues at Harvard University in studies that have resulted in discovery of an important gene responsible for the development of beaks of different shapes and sizes.

Peter Grant graduated in zoology from the University of Cambridge, and earned a PhD at the University of British Columbia, while Rosemary studied genetics and zoology at the University of Edinburgh and obtained her PhD at Uppsala University in Sweden.

#### UNRAVELLING THE MYSTERY OF MYSTERIES

At the end of August 2005, a group of 30 scientists gathered at the University of British Columbia to discuss progress in evolutionary ecology, and in particular the similarities and differences between evolution in Galapagos and elsewhere in the world. Researchers from the Galapagos were well represented, including Peter and Rosemary Grant, Tjitte de Vries,



Carlos Valle, and former Charles Darwin Research Station director Hendrik Hoeck.

Topics discussed at the meeting were diverse. Ken Petren gave a recent summary on the phylogenetic relationships of the Darwin's finches. Many of the finch species continue to interbreed at low levels, and divergence among species within the group is relatively recent, well within the past two million years. Several other adaptive radiations—such as fish in lakes in British Columbia and in the African crater lakes—are younger, whereas others, notably the lizards of the Caribbean are older.

A theme to emerge from the meeting is that we are now beginning to identify the genes that cause conspicuous differences between species. Darwin's finches are at the forefront of this work, with the discovery of genes that cause differences in beak size and shape between the species. But other researchers described the search for genes affecting snake venom, fish bone development, beetle horns, and the black pigmentation of birds and bears.

The meeting generated tremendous excitement among participants. The genetic insights we are obtaining are leading us into a new era in evolutionary studies, where we will be able to piece together the changes that occurred as one species diverged into two. Perhaps only at one time in the past has our understanding of evolution been poised to take such a large step forward.

That other time was of course in the 1850's, when Charles Darwin and Alfred Russell Wallace developed the theory of evolution by natural selection. Charles Darwin's visit to the Galapagos had a large part to play in his insights. While the new era will involve many researchers in many labs across the world, it is fitting that studies from the Galapagos Islands continue to play a prominent role in our search for increased understanding of Darwin's ultimate "mystery of mysteries."

*This report was written by Trevor Price of the University of Chicago.* 

Rosemary and Peter Grant receive the Balzan Prize in Berne, Switzerland.



## Botanists beat the blackberries

The CDF's botany staff recently celebrated two unusual victories in conservation biology: the eradication of two invasive blackberry species—*Rubus adenotrichos* and *Rubus megalococcus*—on Santa Cruz Island.

"In Galapagos, where there are no native blackberries, at least five species of this plant have been introduced over the last 40 years," said CDF's Director of Science, Alan Tye.

Blackberries are highly competitive plants, and their spiny brambles quickly alter habitats and destroy agricultural land. In Galapagos, patience, dedication, and meticulousness have cut two species off at the root.

Since 1999, CDF staff and park wardens have conducted extensive surveys on several islands to locate, remove, and monitor blackberry plants and seed banks. Although conservationists are sometimes happy to simply control invasive species, the goal this time was to completely remove all plants of two of these species. Eradication is considered a good option on islands, where there is a high chance of preventing re-invasion.

To confirm eradication, data from previous field research on blackberry seed productivity and dispersal patterns was used to guide search plans. "All farms of the Santa Cruz agricultural area were surveyed during our introduced plant inventories. All known and potential invasion sites were covered by field crews in an intense, systematic search of more than 2,000 hectares (some 7.72 square miles) conducted over several years," said Tye.

Although there is a remote chance that undiscovered *R. megalococcus* and *R. adenotrichos* plants still remain in the Santa Cruz



agricultural zone, most of the island's farmers have been part of the CDF's invasive species awareness program, which encourages farmers to identify and report any new infestations.

# Motorbike gift to protect birds

The open stretch of paved highway leading to the Baltra airport and the highland towns crossing Santa Cruz Island are well travelled roads—but like many roads in Galapagos, they lack speed controls.

Not surprisingly, there are frequent bird injuries and deaths resulting from vehicle impact. CDF studies have shown that of the 18 species registered in their accident reports, the most heavily affected are newly hatched and juvenile birds.

To counter this, the Santa Cruz Island Environmental Police Unit and Galapagos National Park conducted awareness campaigns with taxi drivers and regular users of the highway in 2005, but were frustrated by their inability to monitor driver behavior.

A gift from Shawn Kreloff, a visitor to the islands in 2002, will help to change this situation. In January, the CDF proudly handed over the keys to a motorbike that police will use on regular patrols along the critical sections of the highway and a computer for managing and monitoring data, both of them donated by Kreloff.

"Thanks to the vision and generosity of one person who was concerned about what he saw during his visit, we have started the year able to fulfill our commitment to stronger patrolling to reduce traffic injuries and deaths among our birdlife," said Santa Cruz Island Police Chief, Major Pablo Aguirre. "In these times of economic crisis in Ecuador," Aguirre continued, "Mr. Kreloff"s gift is most welcome, and shows how multiple institutions can work together to protect this island paradise."

## New introduced species alert

In December, residents of Puerto Ayora began to report finding large numbers of small black insects they had not seen before. The pests were congregating in large numbers on introduced ornamental *Ficus* trees as well as on light-colored clothes hung on clotheslines.



Cuban Thrip, photographed by Alejandro Mieles

"Preliminary analysis indicates that it may be the Cuban thrip, *Gynaikothrips ficorum*, a common insect pest around the world," said Charlotte Causton, head of CDF invertebrate research.

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Below left: blackberry control Below: Park, CDF, and Police officials with motorbike



#### (continued from page 7)

Within a week of the first report of the insects, specimens were sent to a specialist for identification. Scientists and quarantine agents are concerned that they could threaten endemic plant species as well as some crops, as this thrip is also known to attack citrus. The concern is heightened by the fact that current dry conditions are favorable to this insect.

Although there are some 50 species of thrips in the islands, it is suspected that this may well be a new one. Residents are being encouraged to report any new infestations to the CDF and to the local quarantine offices of the Ecuadorian Service for Agricultural Health (SESA-Galapagos). CDF and SESA staff, meanwhile, are monitoring the situation to establish the distribution of the insect and will determine the next steps to take once they have a more complete picture of the situation.



# GALAPAGOS PHOTO COMPETITION 2006

*Galapagos Conservancy invites you to submit your Galapagos photographs for our 2007 Friends of Galapagos calendar.* 

### 2007 Friends of Galapagos Calendar

Galapagos Conservancy staff and supporters will choose 13 photographs sent in by our members to be included in the 2007 calendar. The photo recieving the most votes will be featured on the cover of the calendar.

#### Submission Information

Submissions are due by **July 31, 2006**. Please do not send more than 5 photographs per person. If you would like your photographs returned, enclose a self-addressed stamped envelope with your submission. We will accept photographs, slides, and digital images. If you would like to submit digital photographs, please email them to **photo@galapagos.org**. Photo credit will be given to all winners. Winners will be notified by email in October.

High quality photos make all the difference! If you are emailing digital images, please follow the guidelines posted online at: http://www.galapagos.org/photos/photocontest.html.

Please do not send photos that have been submitted to the contest in past years. By submitting your photographs you agree that Galapagos Conservancy has the right to edit and resize the photographs as needed, is under no obligation to publish your submission, and may use your photographs and name in any of our materials with proper credit.

Please include the following information with your photo(s): your name, mailing address, email address, and telephone number. Mail photographs to:

Photo Competition: Galapagos Conservancy 407 N. Washington Street, Suite 105, Falls Church, VA 22046



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