Charles Darwin Foundation

Annual Report 2005

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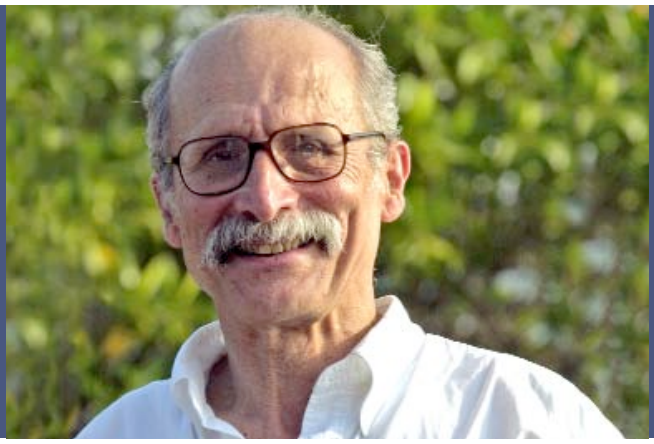
A Message from Peter Kramer President of the Board of Directors



A Year of Change Built Upon a Legacy of Vision

This past year saw the Charles Darwin Foundation (CDF) take great leaps forward with many exciting changes. In February 2005, we welcomed a new Executive Director, Dr. Graham Watkins, to Galapagos. In October, the Assembly approved the final version of the new CDF statutes under Belgian Law, and toward the end of the year the CDF Strategic Plan 2006-2016 was finalized. The changes envisaged in the Strategic Plan have had some encouraging preliminary results. We have strengthened our partnerships with local organizations including the Galapagos National Park, the Galapagos National Institute, municipalities, the fishing sector, local schools and guides.

These changes were built on the extraordinarily successful history of the CDF. This history began over 50 years ago with a joint International Union for Conservation of Nature and Natural Resources (IUCN) and UNESCO mission involving Dr. Robert (Bob) Bowman and Dr. Irenaeus Eibl-Eibesfeldt to examine conservation needs in Galapagos. The extraordinary vision of these two founding members of the CDF is reflected in the restoration of Espanola, Marchena, Pinta, Pinzon, Santa Fe, Plazas, and Baltra Islands. Today's Galapagos is remarkably improved as a result of the foresight of these early members of the CDF.

It was therefore with sadness that as we reflected on the past year we did so with the knowledge that Bob Bowman, the man whose vision was so instrumental in a renewed Galapagos, is no longer with us. Our challenge is to maintain his legacy. We must ensure support for a sustainable society in Galapagos that is united by a shared vision to safeguard these extraordinary islands for future generations.

Yours sincerely

A Message from Graham Watkins Executive Director

The Charles Darwin Foundation (CDF) continues to be the foremost organization exclusively dedicated to the conservation of Galapagos – the best preserved tropical archipelago on our planet.

The core of the CDF mission is to undertake scientific research and develop practical applications for long-term and effective management of the archipelago and surrounding seas. The future of this unique ecosystem relies on these focused efforts. Without these efforts maintaining the existing preserved areas and the restoration of other areas now in jeopardy simply will not occur. During 2005 groundbreaking research has continued at the Charles Darwin Research Station. Effective solutions based on sound science have been developed and others were implemented. Yet, all of our achievements would not have been possible without persistent and concerted efforts to build partnerships with those other organizations striving for a secure Galapagos. During 2005 the CDF provided information and assistance so that local and national institutions are better able to make sound decisions for the health of the Galapagos ecosystem.

Applied Research and Partnerships

In 2005 the CDF built on its baseline and monitoring studies of the marine reserve and national park. Our collections of plants and terrestrial invertebrates have grown significantly and serve as important repositories of baseline information on native and introduced species. In addition, we have completed additional field work in the marine reserve on oceanography and corals.

This year, we deepened our relationships with local people and institutions through the participatory monitoring of invasive plants, introduced invertebrates, and lobster harvests. We have provided support for the long term monitoring of the Galapagos albatross and penguin; these studies have raised concerns about the threats to both of these species. Our studies helped us revise the status of IUCN red listed species of plants and vertebrates in Galapagos.

CDF research was used to analyze the status of endemic butterflies, moths and skippers (Order *Lepidoptera*) and to identify the threats posed by introduced *Lepidoptera*. We have continued priority studies including the evaluation of sport fishing, approaches to controlling invasive species, the restoration of native species after eradications, and the effects of climatic changes such as El Nino on native species. A more unusual accomplishment that reflects the CDF's adaptation to new situations was the completion of a study of how lights on tourism vessels affect the distribution of insect species. We were able to experimentally eradicate two species of blackberry in Santa Cruz, enabling us to move toward addressing three other species.

In December 2005, the Inter-institutional Management Authority, the national body governing the Galapagos Marine Reserve (GMR) banned long line fishing after several years of study of the impacts of this fishing method on native species in the GMR. The year also saw a reduction in conflict in the islands which has allowed several advances in support for sustainable use initiatives. We worked with the fisheries cooperatives and the Galapagos National Park Service (GNP) to develop a pilot project that allows artisanal fishers to take tourists fishing and serves as a small step toward shifting their activities to tourism.

The Isabela Project provided one of the most remarkable successes this year with confirmed eradication of feral goats from Santiago Island and similar news expected for northern Isabela Island in 2006. Substantial CDF support enhanced the ability of the Galapagos Inspection & Quarantine System (SICGAL) through the Ministry of Environment - Global Environment Facility project to address the arrival of new invasive species. The CDF also worked with the GNP and the University San Francisco of Quito to complete the training of 54 new Galapagos tourism guides and supported the finalization of the GNP Management Plan.

Finally, we also concluded the development of a 10 year strategic plan that from 2006 will guide the CDF community in its efforts to build on the successes of the past, and be ready to confront the challenges of today... and the future.

Revitalization for Galapagos and CDF

Venturing another year into the 21st century we find a Galapagos ecosystem that is in a state of revitalization after the ravages of the past – endemic and native flora and fauna are responding well to all the interventions the CDF helped to develop and implement. Nonetheless, Galapagos is under increasing pressure from a world that is still seeking new frontiers and resources.

To help secure a continuing positive trend for Earth's best preserved archipelago, the CDF looks forward to its own revitalization and untapped potential. The new 2006-2016 Strategic Plan is helping the CDF construct a solid foundation for the future that is more proactive, adaptive and innovative. Our tools will be stronger through an expansion of CDF's: pioneering research; practical technical assistance services; dissemination of timely and useful information; funding strategies; and most critically, efforts to build consensus for the creation of a local, national and international coalition of all those who want – and need – a secure Galapagos. With such a vision and solid foundation I am confident that the CDF too will experience its own revitalization and thereby remain the leading scientific research institution dedicated solely to Galapagos.

Best wishes

To cherish what remains of the Earth and to foster its renewal is our only legitimate hope of survival.
- Wendell Berry, author

Science for Conservation

When the Charles Darwin Foundation (CDF) was founded in 1959 it became the only international research and advisory institution dedicated exclusively to Galapagos. *It still is today.* Activities carried out at its Charles Darwin Research Station (CDRS) illustrate that conservation is most successful when built on a foundation of research. Galapagos is now a focal point for world-class conservation science and CDF continues to lead the way by using research to protect this world treasure.

Galapagos boasts one of the lowest rates of species loss of any island group on the planet, yet conservation work here is far from complete. Galapagos is extremely fragile and it's diminishing isolation results in an increasing arrival rate of alien species. The human population is growing quickly, adding pressure on the already limited natural resources. The modern world is fast encroaching and without well-informed decisions followed by concerted actions to control and counteract growing threats, many of the native plants and animals of Galapagos could be lost. Information and advice provided by the CDF helps decision makers take the action required to ensure sustainable use of resources. CDF prioritizes conservation research problems and provides solutions based on a sound understanding of the environment and collaborating with scientists around the world to achieve this. Scientific knowledge is the basis for CDF's role in delivering technical assistance to the Galapagos National Park Service, CDF's most important partner in restoration and preservation of the exceptional land and marine ecosystems.

Knowing what is needed for those who have the greatest stake in Galapagos – the communities and Ecuador at large – is central to discovering opportunities for action and also to guide CDF's applied scientific studies. CDF works alongside strategic partners, including the Galapagos National Institute (INGALA), the planning body for the Galapagos Province. Other partners include SESA (Ecuadorian Service for Agricultural Health), SICGAL (Galapagos Inspection and Quarantine System), and the municipalities of Santa Cruz, Isabela, San Cristobal and Floreana islands, as well as local organizations and businesses. Together we are working toward ensuring that the Ecuadorian and Galapagos authorities have the scientific information needed to make appropriate decisions affecting Galapagos in the 21st century, such as tourism development and sustainable livelihoods for local communities.

'Science to sustain Galapagos' is the motivation behind CDF's and its partners' ability to embrace each challenge. Successes of 2005 include significant developments in a number of high impact projects. Progress has been made with the eradication of key invasive plant and animal species from several islands, paving the way for current and future restoration efforts. CDF's knowledge base of native and endemic species has been expanded, enabling CDF to help these species to respond to improvements in their natural habitats following the removal of introduced species. Applied research that supports resource management, particularly within the marine reserve, has been developed and CDF is advising local communities on how best to utilize natural resources in a productive yet sustainable manner. The following examples showcase CDF's commitment to using solid science to inform cutting-edge management strategies.

Baby Iguanas Instead of Bones – the Impact of Cat Eradication

In Galapagos, feral cats prey heavily on native wildlife, including birds, lava lizards, endemic snakes and young iguanas. Ending in 2004, an intensive two-year campaign succeeded in *making Baltra the fourth largest island in the world from which cats have been eradicated.*

Vegetation growth that followed heavy rains had created challenges, providing cover for the last cats and creating conditions favorable for rats *(Rattus rattus)*, whose increased populations provided the cats with a good food supply, which encouraged their breeding. The Galapagos National Park Service (GNP), aided by CDF scientists, not only overcame these problems, but both parties gained knowledge that will be applied to future eradications.

> "This insight into processes occurring in the field will be useful not only for planning future projects to control cats but has also improved understanding of the ecology and population dynamics of introduced rats in Galapagos," said Brian Cooke, former CDF vertebrate specialist.

During 2005, monitoring by the GNP found no evidence of cats on Baltra. It did however provide exciting evidence indicating responses in the land iguana population that had become locally extinct due to unnatural pressures.

A program to release captive-bred iguanas on Baltra has been in progress since 1991, repopulating the island with close to 300 juveniles. The cat eradication has coincided with a significant increase in the number of unmarked juvenile iguanas, demonstrating successful breeding on the island. Having a self-sustaining iguana population reduces the need for a costly captive breeding program.

The Baltra cat eradication experiment is a compelling success story. Combined with the restoration of the Baltra land iguanas, it is an excellent example of a successful conservation partnership between CDF, the GNP, the Ecuadorian Air Force – which manages the island – and donors. Future eradication programs built upon knowledge gained from these successes will help guarantee the survival of many vulnerable native and endemic species, and restore and maintain the natural diversity of Galapagos.

Successful conservation depends on partnerships that blend research, management and stewardship.

Tackling the Blackberry Tangle

More than 750 plant species have been introduced to Galapagos, some of which have gone wild, transforming the landscape and ecosystem. Blackberry bushes are one of the greatest scourges, affecting many islands in the archipelago.

> "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 botanist, Alan Tye. "They are highly competitive plants and their spiny brambles quickly alter natural habitats and render agricultural land worthless."

To help design an effective control strategy, CDF scientists have studied the biology of blackberries, including flower and seed production, seed dormancy and longevity, and seed germination. Scientists have used this information to develop an effective method for controlling the plants, which has been presented as an information package for local farmers and GNP staff.

Working together since 1999, CDF staff and GNP wardens have conducted extensive surveys on several islands to locate, remove and monitor blackberry plants and seed banks. All farms in the agricultural areas are being surveyed during the introduced plant inventories. Known and potential invasion sites are covered by field crews searching systematically.

During 2005, CDF's assistance to the GNP culminated in the eradication of two invasive blackberry species, *Rubus adenotrichos* and *Rubus megalococcus*, from Santa Cruz Island. Dedication, patience and diligence were the keys to this landmark achievement.

Many Galapagos farmers have been part of CDF's invasive species awareness programs. These encourage farmers to identify and report new infestations. By working together it has been possible to achieve what was once thought impossible: to eradicate two species of invasive plants from Santa Cruz. Lessons learned from these successes mean that plans to tackle other blackberry species and other islands during 2006 are now being realized.

Getting rid of pest species is the best long-term strategy to prevent their impacts on the fragile native ecosystems.

Isabela Project– the Answer was in the Air

Northern Isabela Island is the largest single landmass in Galapagos and has a rich biodiversity that includes many endemic plants and animals. It has the largest and most stable of the Galapagos giant tortoise populations. However, the island's feral goats, inhabitants since the 1970s, were far more aggressive and versatile in their eating habits and were depleting the tortoises' food supply.

Goats are among the most destructive of all invasive species affecting Galapagos, and have caused problems to natural ecosystems the world over. As goat populations expanded, they transformed pristine forests into barren grasslands and caused erosion on the steep volcanic slopes as large herds eliminated protective vegetation through their eating habits. As a result, fewer nesting sites were available for tortoises. Microclimates critical to their survival (including drip pools under summit forests, and humid soils) were disappearing. Other endemic animals, birds, insects and plants were also suffering, potentially leading to extinctions.

In the face of this critical situation, goat eradication was a necessary first step for the ecological restoration of northern Isabela and neighboring Santiago Island, which had suffered from the presence of goats for considerably longer. In 1997, CDF and the GNP met with experts from around the world to discuss the feasibility of eradicating goats from such large areas.

An eradication campaign on this scale and in such a remote location took a tremendous amount of planning, logistical support, finance and organization. In 1997, CDF and the GNP pooled resources to create the Isabela Project - the largest goat eradication project ever undertaken in the world. Since 2002, the Isabela Project team, over 95% of whom are local residents, has developed into a cadre of park wardens highly trained and experienced in specialized hunting techniques.

The Isabela Project gained momentum during 2005. Goats, pigs and donkeys on Santiago Island, which had been used as a training ground for the team, are now considered eradicated. In March, the focus moved from Santiago to the larger and more demanding northern Isabela Island. Cutting-edge technology, including the use of helicopters and GIS tracking for aerial hunting, ensured swift and efficient removal of the feral goats.

As the goat populations declined, vegetation responded positively. Trees began regenerating from the stumps left by the goats and many endemic species began to recover.

Locating and removing goats was facilitated by the use of 'Judas' goats, outfitted with telemetric tracking collars. These goats are released onto the islands to guide aerial and ground hunters to remnant goat populations. Less than 200 goats are believed to remain on northern Isabela and eradication is expected to be confirmed in 2006.

In parallel with the eradication campaign, CDF and GNP have been carrying out fieldwork since 1995 to catalog and monitor the natural recovery of the islands' once splendid vegetation. Highland shrubs, forest tree seedlings, *Opuntia* cactus, and other endemic species are already recovering on Santiago and Isabela, including several endangered species previously restricted to isolated craters and enclosures fenced against goats. Galapagos rails are now common again in the highlands of Santiago; only two decades ago it was estimated that fewer than 100 of these birds remained. With time, the islands are expected to return to a state close to that which existed before the arrival of goats. Continued monitoring will allow CDF and GNP to plan follow-up action for any species that may not recover adequately.

CDF is proud to be part of the Isabela Project; a story that illustrates the benefits of close collaboration between scientists and resource managers. Based on robust scientific research and management, innovative partnerships like the Isabela Project represent a model for integrated conservation efforts worldwide.

The restoration of the realm of the tortoise on northern Isabela is indeed a dream come true, an example of Galapagos conservation setting new world standards.

Galapagos is Like no Place on Earth

... the best preserved tropical archipelago anywhere ...

... an astonishing and extraordinary community of animals, plants and people ...

For decades, CDF knowledge has revitalized this living laboratory, providing solutions to problems that were once considered insurmountable.

Everywhere on the planet increasing human populations are changing the demands on natural resources - Galapagos is no exception.

The CDF fosters the harmony of humanity and nature to secure a sustainable future.

It's a difficult task that is accomplished only through CDF's partnerships with local, national and international institutions ...

... and people like you.

... a symbol of effective partnerships for conservation science and management ...

... the home of the Charles Darwin Foundation - the leader in Galapagos conservation research and its application ...

Understanding the Complexities of Marine Ecosystems

The diverse marine life of Galapagos developed because of a unique convergence of oceanic currents and a dramatic underwater landscape of coastal platforms and submarine mountains. During 2005 CDF has been working on understanding how these complex marine ecosystems are influenced by natural factors such as climate variation, and human activities like fishing and tourism.

Protecting the tropical coral reefs around the northern islands of Marchena, Darwin and Wolf is a priority for the GNP, and baseline knowledge is needed before restoration and protection methods can be developed. The reefs are among the least-studied yet most vulnerable marine habitats, forming a distinct bio-geographic zone that supports high biological diversity including endemic corals. In 2005, CDF and its partners began to survey the composition and dynamics of the northern coral reefs – the first step in developing monitoring protocols and management tools.

In 2005, Galapagos native and CDF scholarship student Nathalia Tirado completed studies of zooplankton. These single-celled animals and microscopic larval or immature stages of larger marine animals float freely with oceanic currents and are a food source for many marine organisms. The database created by Tirado will help CDF to understand how zooplankton composition is affected by environmental factors and location. It will also identify when new marine species have been introduced, a risk that increases with the rising influx of marine transport. Improved knowledge about zooplankton will help plan for the preservation of the entire ecosystem that depends on it.

Understanding the ocean's biodiversity is aided by knowledge of the physical processes acting upon it. During 2005 CDF oceanographers took part in the NASA-Ocean Project. This effort uses remotely sensed satellite data and results from on-site monitoring to begin to characterize key oceanographic processes related to climate change and to understand their effects on the Galapagos marine reserve.

From supporting local talent through scholarships to CDF oceanographers laboring side by side with world experts, the CDF is working with partners to gain the knowledge crucial to sustainable management of this precious World Heritage Site.

The lessons learned by CDF scientists are applied to the restoration of island and marine ecosystems and are helping renew Galapagos' natural beauty.

Building the Knowledge Base for Invertebrates and Plants

Timely information is fundamental to the protection and restoration of at-risk populations. New species are discovered every year, illustrating that there is still much to be learned about the islands' biodiversity. During 2005 CDF scientists and collaborators cataloged and monitored populations of invertebrates and plants, helping to identify changes within native ecosystems and indicating when action is necessary to restore the natural balance.

Galapagos land snails *(Bulimulus spp.)* are an astounding example of adaptation. Over 80 species and subspecies have evolved from a single ancestor. However agricultural clearance, urbanization and introduced species have impacted on them greatly. Many of the snails investigated by visiting scientist Christine Parent, now in her fourth year collaborating with CDF, have been registered as Critically Endangered on the IUCN Red List. CDF entomologist Lazaro Roque and scholarship student Ana Maria Ortega have been evaluating endemic *Lepidoptera* moths for red-listing in 2006. Ortega also analyzed the impacts of feral goats and their eradication on the invertebrate ecology of Alcedo Volcano on Isabela Island, assisting in the development of strategies for its restoration.

CDF's botanists also had an exciting year. Park warden Jeffreys Málaga discovered an unusual Darwin's aster *(Lecocarpus)* while working with CDF staff on San Cristobal to protect a population of endangered plants from feral donkeys and goats. CDF scientists are now investigating if it is a distinct species.

> "This population is different from the Darwin's aster species commonly found on San Cristobal, but matches two historical specimens, including one collected by Charles Darwin in 1835," said CDF botanist Alan Tye.

The news is not so promising for *Scalesia affinis*, one of the 15 species of *Scalesia*, an endemic genus of trees and shrubs. On Santa Cruz Island fewer than 100 *S. affinis* plants remain, almost all of them in an area used for extracting rock for construction. While *S. affinis* is found on other islands, each population has unique characteristics. Fencing constructed by GNP and CDF will prevent further destruction while less sensitive areas for rock extraction are sought. Propagation of *S.affinis* is difficult and CDF's botanists are researching ways to secure the future of this highly unusual plant.

Invertebrate research throughout Galapagos in 2005 identified nine new native insect species.

Restoring the Realm of the Giant Tortoise

During the 19th century giant tortoises were hunted as a source of fresh meat, severely depleting many of the accessible populations. Today, the biggest problem facing the endemic giant Galapagos tortoise is invasive species. Introduced predators such as rats destroy tortoise eggs and consume hatchlings, while feral goats, donkeys, pigs and cattle compete with tortoises for food and have destroyed their habitats.

As these pests are brought under control, monitoring of native habitats and populations is vital to establish whether further action is required for complete recovery. During 2005, on the volcanoes Sierra Negra, Wolf and Darwin on Isabela Island, CDF herpetology staff monitored tortoise populations to determine their health and stability, as well as the effects of reduced pressure from feral goats following the successes of the Isabela Project.

For other more vulnerable populations the only solution is captive breeding at centers managed by the GNP on San Cristobal, Santa Cruz and Isabela Islands. Now a hallmark of successful restoration, it began humbly as the first joint project established by the GNP and CDF at the Charles Darwin Research Station in the early 1960s. Guided by CDF herpetologists, the GNP routinely collects tortoise eggs and young from the wild, rearing them under controlled conditions safe from the effects of introduced species.

The risk of extinction was particularly acute on Espanola. Although there were no introduced predators on this arid island, the tortoise population was decimated by centuries of hunting, and the scarce vegetation was devastated by large herds of introduced goats. A combination of captive breeding and the eradication of the goats has rescued the Espanola giant tortoise from extinction. The twelve females and two males found on the island in the 1960s were brought to the breeding center. They were joined in 1977 by another male named "Diego", who was returned to Galapagos from the San Diego Zoo. Accompanied by his seven female companions, Diego continues to play a significant role in rebuilding his island's population. By the end of 2005 over 1400 young tortoises have been repatriated and many of Diego's offspring are now breeding in the wild.

CDF's research provides the knowledge about the natural balance of native species that is needed to protect and restore entire ecosystems.

Despite the eradication of feral goats on Espanola in 1978 by GNP wardens, a vegetation survey by CDF indicated that even without the grazing pressure by goats, the tree cactus *Opuntia megasperma orientalis*, which formerly dominated the skyline and formed a staple part of the tortoises' diet, was not recovering. The *Opuntia* was found to be locally extinct over parts of the island where it had been abundant.

CDF's scholarship student Vanessa Coronel has been investigating the reasons for the lack of recovery and in 2005, continued experimental restoration work in the field as part of her Ph.D. studies at Lund University in Sweden. Plants that germinated in the laboratory were reintroduced to areas on Espanola where large stands of *Opuntia* previously grew. Coronel found that many young seedlings were trampled or eaten by birds or reptiles and needed protection during this vulnerable stage. The *Opuntia* fruit fed to the Espanola tortoises housed at the CDRS resulted in an 80% seed germination rate. Tortoises are known to be natural dispersers of *Opuntia* seed and passage through their digestive systems promotes germination.

By using a holistic approach to restoration CDF is helping Espanola to reach a point that the island will be able to complete its own recovery. Diego and the other Espanola tortoises play a vital role in restoring their island to its former splendor and are one of the native species that contribute to a balanced and healthy ecosystem.

A prolific breeder, even at almost 100 years old, "Diego" represents the future for his home island of Espanola.

Confronting a Dwindling Resource

CDF's research supports resource management, providing information to guide stakeholders in the development of sustainable activities in the Galapagos Marine Reserve (GMR). In 2005, GMR users and authorities received considerable technical assistance from CDF, including studies to identify effective artisanal fishing techniques and to support the development of a sustainable local fishery.

The use of long lines in the GMR had been under discussion for several years pending the analysis of the results of pilot studies to evaluate fishing potential and the impacts on non-target species. Long line fishing in the GMR was banned by the Inter-institutional Management Authority (IMA), the national body governing the GMR, in December 2005 as a direct result of the technical information provided by the CDF.

> "Our studies demonstrated that long lining also hooks protected species including sharks and marine turtles," said project leader Juan Carlos Murillo.

CDF and local fishing cooperatives also carried out studies to monitor populations and distribution of commercially fished species including sea cucumbers *(Isostichopus fuscus)* and spiny lobsters *(Panulirus penicillatus and P. gracilis)*.

Despite the moratorium agreed the year before, the sea cucumber season was opened during 2005 due to socio-economic pressure. The IMA made this decision pending the development of a new model of fisheries management in recognition of the failure of the current system to manage the resources sustainably.

In 2005, the IMA also approved an alternative approach to sport fishing, referred to as "experiential fishing" (pesca vivencial), based on collaboration between CDF, local fishers, guides, the local tourism sector and the GNP. This permits local fishers to use small converted fishing boats to showcase their fishing culture while building their financial and skill bases. By gaining experience in managing visitors and generating income from tourism, locally owned and conservation-oriented businesses will be developed that significantly reduce pressures on the GMR. Sport fishing is contemplated as an alternative for the local fishing sector in the 1998 Special Law for Galapagos and this is a first step towards local fishers benefiting from a new tourism-based activity.

Our research supports the development of sustainable businesses that link benefits to local people and protect the natural resources.

Such alternative means of employment will only be successful if developed in conjunction with the fishermen and also managed by them. The role of the CDF and partners will be to support sustainable activities and help with the responsible implementation of these in accordance with the GMR's management and conservation principles.

In 2005 CDF published the fourth information package of a marine awareness series dedicated to fisheries management. Local input aided the selection of themes and content for this new package that covered the development of artisanal fisheries including information on quotas, seed bank areas, minimum catch size, the fishing calendar, and restrictions to boat capacity and fishing methods. This built on earlier publications that covered topics such as the unique ecology, socio-economic pressures and decision-making processes for the GMR.

Until 1998, the GMR was an open ocean with few restrictions. Now it is a World Heritage Site coping with expanded fishing pressures and increased tourism. CDF finds creative ways to inform the local community about its unique ecology, as well as their obligations and responsibilities – all leading to local and sustainable economic benefits and conservation. Through the work of the CDF's participation team, the extensive research carried out by our marine scientists is shared with local communities creating a link between science and stewardship.

The new CDF vision for the islands interlinking conservation with the community is the way forward; harmony can only be achieved by involving people in every decision and action.

Securing a Sustainable Future

The conservation challenges facing Galapagos are becoming increasingly complex due to rapid development associated with the increasing human population, and the arrival and dispersal of invasive species that impact the native and endemic species and their fragile habitats. A population boom that began in the 1990s was fueled by increased opportunities in fisheries and tourism in the islands at a time when the economy of Ecuador was weak. Even though regulations to curtail human impacts were established under the Special Law of 1998, growing demands on resources are reaching levels that the islands cannot sustain. CDF recognizes that now, as never before, an island culture that nurtures a shared vision of sustainable development amongst local people is the only way to secure the future for Galapagos.

Local decision makers often do not have sufficient and objective information, so crucial decisions may be based on immediate needs or uninformed perceptions of the biological, socio-economic and cultural situation in the islands. The success of biodiversity conservation in Galapagos will depend not only on the availability of this information, but on the active participation in the decision-making process of the people whose livelihood and economic well-being depend on the islands. Through applied science and technical assistance, CDF is filling in the gaps in knowledge that will help its partners, both locally and nationally, to develop well-informed guidelines for the management of Galapagos.

Complementary to this role, CDF helps to build a better understanding among local people of the pressures affecting Galapagos, thereby strengthening conservation consciousness and promoting support for sustainable use of the islands' resources. CDF has been working with local communities for decades by teaching environmental education and providing professional and scientific training opportunities. In 2005 CDF expanded relationships with local organizations and groups including local and national government and political bodies, fisheries associations, schools and tour guide associations. Our collaboration with local government in park management, regional planning and the quarantine system for the islands is of particular importance. The CDF travel partnership with tour operator Lindblad Expeditions has generated funding for a range of local conservation initiatives and environmental education projects.

By promoting participation in research and restoration activities, CDF is encouraging responsibility by local communities for the conservation of their islands. Their participation in our efforts creates a better understanding of the value of science to their own lives and in the decisions they make for Galapagos. Greater collaboration and dialogue between CDF, other organizations and the residents of Galapagos are essential for building a balanced and harmonious relationship between the people and the biodiversity of these unique islands.

Effective Prevention and Early Detection

As Galapagos experiences accelerating economic and population growth, the risk of introducing alien species increases. The Galapagos Inspection and Quarantine System (SICGAL) has the vital role of preventing the entry and spread of species that could threaten the unique plants and animals that exist only in the islands and surrounding seas. It is always better to prevent the arrival of alien species because the financial and ecological costs of their eradication are much higher once they become established.

Since the quarantine system was created in 1998, CDF has provided technical assistance to SICGAL. In 2005 CDF developed procedure manuals for the inspectors and an electronic registration system to record confiscated and infected products. We also updated lists of permitted and restricted products for use in airports and ports, as well as the methods used to deal with pests associated with common imports. SICGAL inspectors search incoming cargo and luggage carried on the six cargo boats and 80 commercial flights that arrive in Galapagos each month. CDF provides SICGAL with training to build the inspectors' skills, and in 2005 published fumigation protocols for use on planes and boats coming to the islands.

CDF has interacted extensively with the community to develop local awareness of the impacts of invasive species and of each person's role in helping to prevent their arrival or spread.

This is particularly important when considering the potential ease of introduction and dramatic effects of small exotic species, including ants, mosquitoes and other invertebrates.

CDF scientists work with SICGAL inspectors and GNP wardens to track new introductions and develop methods for the eradication and control of invasive species that arrived prior to the implementation of the SICGAL program or have slipped through the ever tightening net. The team was disappointed to find 13 new introduced invertebrate species on the uninhabited island of Daphne Major in 2005. This may be due to the island's proximity to Santa Cruz Island, with its large human population, and to the airport on Baltra Island, increasing the risk of it being colonized by - introduced species.

SICGAL is the only quarantine system in the world whose primary goal is to conserve biodiversity.
- Charlotte Causton, CDF scientist

The mosquito *Aedes aegypti*, which is the vector for the debilitating viral disease Dengue in humans, was introduced to Santa Cruz Island in 2001. During 2005, more than 40 CDF staff became backyard scientists as part of a community-wide monitoring and awareness campaign in Puerto Ayora, the main town of Santa Cruz Island, designed to reduce or eliminate *Aedes aegypti* before the beginning of the 2006 wet season. Each person received bottles of mango leaf solution and germination paper for mosquito traps to collect mosquito eggs in their neighborhoods.

> "The information from this study will help the Public Health Department to identify and act in the affected areas," said project leader Ronal Azuero.

Azuero and his team of 45 local university and high school students are using the information gathered to target breeding areas in Puerto Ayora. The campaign, which began in November 2005, teaches residents about the life cycle of the mosquito, encouraging them to clean out and cap water storage tanks and to keep their gardens and homes free of standing water. An important goal is to help create an involved, proactive community that is aware of the seriousness of introduced species, both to the islands' delicate ecosystem and to their own health.

As human population and activity rise, more introduced species arrive, threatening fragile Galapagos ecosystems and creating huge challenges for detection and management.

Linking Science and the Community

The annual "Darwin Day" open house at the Charles Darwin Research Station was held in September 2005. It helped to strengthen the link between science and the community by illustrating the importance of CDF's research to their daily lives. The event attracted nearly 3,000 visitors (of an island population of about 15,000), including students from local schools, curious residents and tourists.

The event featured exhibits on marine environments, Dengue mosquito monitoring, *Scalesia* forest restoration in the Santa Cruz highlands and bird mortality caused by traffic along the highway that crosses Santa Cruz Island. CDF staff members guided visitors and answered questions about the exhibits and CDF, fostering the link between scientists and the community.

CDF's Environmental Education Center (EEC) finished 2005 on a high note with "Yo te Canto Galápagos" (I sing of Galapagos), an open-air singing competition celebrating all things Galapagos. Helped by local songwriters and accompanied by professional musicians, ten young finalists from Isabela, San Cristobal, and Santa Cruz Islands entertained an audience of more than 3,000 people. Family, friends, neighbors and passing visitors were enthralled by songs celebrating Galapagos animals, such as the hammerhead shark, the marine iguana and the Sally Lightfoot crab.

"Through their music, these young people expressed how they feel about their islands in a very creative way," said Sandra Tapia, EEC coordinator.

This performance celebrated the importance of the Galapagos as a World Heritage Site, and was a wonderful chance for the whole community to come together.

An aware and proactive community understands the importance of research to the future of Galapagos.

Local Farmers Help Protect Isabela Island's Giant Tortoises

During 2005 a pilot project on Isabela Island began enlisting local farmers to help restore one of the giant tortoise populations through a unique protection and education program that also provides an eco-tourism opportunity for local people.

The project fosters out young tortoises to the care of local farmers. The tortoises will one day return to their original home on the southern slopes of Sierra Negra Volcano, but for the moment the invasive species problems in that area require keeping them in captivity. Poaching of the tortoises is a problem even today. With the help of the local farming community, the young tortoises receive vital protection and care, thereby increasing personal interest in these creatures among the island's residents so that tortoises are no longer killed. The project is also being encouraged as a small scale eco-tourism enterprise, one in which CDF's environmental education clubs will also participate as guides.

Wilfrido Michuy, the first local farmer to participate in the project, cares for 44 juvenile giant tortoises at his "Campo Duro" Recreational Center in the upper part of the island. Working with the GNP and CDF, he has built a corral on his property to house and protect the animals. Mr. Michuy, who calls himself the tortoises' "guardian" says that he took on the responsibility of feeding and protecting them in order to support the restoration of his home island.

CDF herpetologist Cruz Marquez hopes to recruit more guardians to contribute to the restoration of this, the classic emblem of Galapagos. A move away from farming and towards eco-tourism will contribute to the restoration of tortoises and Isabela's highland ecosystem in general.

The Lindblad Expeditions project "Funds for Local Conservation Action" provides opportunity for CDF and the GNP to award small grants for this and other local conservation initiatives. Such support however small can be the catalyst for turning great ideas into sustainable futures.

By providing a halfway house for young tortoises, farmers can generate a tourism-based income in harmony with Galapagos' unique biodiversity.

Financial Outlook

The CDF is grateful to international community that contributed to our conservation efforts in 2005. Donations and in-kind contributions enabled us to achieve our goals in research, technical assistance, and information delivery.

A quarter of CDF expenditures addressed introduced species and their ecological impacts. Two substantial investments in the CDF were the Global Environment Fund Invasive Species of Galapagos project, through the Ecuadorian Ministry of the Environment and managed by the United Nations Development Program, and the UNESCO-United Nations Fund for the Control and Eradication of Invasive Species project.

During 2005 the CDF provided funding to the Galapagos National Park (GNP), especially to the highly successful Isabela Project. This was a CDF/GNP undertaking that would not have been possible without the generosity of the Merrill Foundation and the Stewart Foundation.

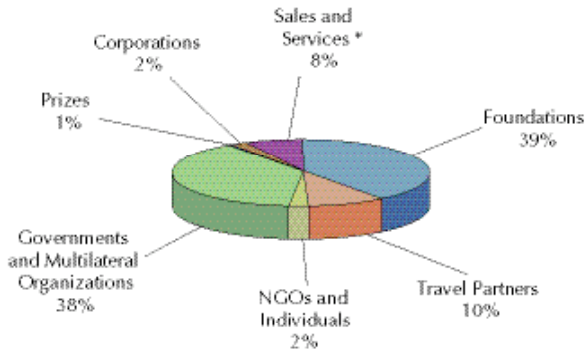
Marine research and conservation received significant financing from the USAID Biodiversity and Conservation of the Galapagos Marine Reserve project, managed through WWF and the North Carolina State University Ecological Monitoring project supported by NASA.

Other significant allocations were made to studies of plant and invertebrate diversity and also in providing technical assistance to the Galapagos quarantine system that helps prevent the arrival of new introduced species.

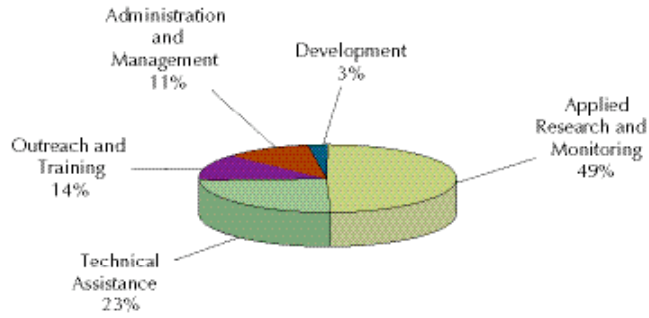
We reserve special thanks for the travelers visiting Galapagos with Lindblad Expeditions who, through the Galapagos Conservation Fund, provided an ever-increasing financial base for our work. Galapagos Conservancy staff also deserve special mention and appreciation for, along with CDF earned income, providing the majority of our unrestricted funding for 2005.

We look toward the next decade and beyond with great enthusiasm. A 10 year strategic plan will guide the CDF family as it embarks on a course of expanding existing programs and the creation of new ones. Creative financing, earned income and new fundraising initiatives will be critical to this exciting and on going adventure to conserve Galapagos.

Operating Revenue



Operating Expenses



STATEMENT OF ACTIVITIES

For the fiscal years ending December 31, 2005 and 2004 (in U.S. Dollars)

Revenue	**2005**	**2004**
Foundations	1,491,962	1,443,358
Travel Partners	362,103	273,413
NGOs and Individuals	87,460	100,476
Governments and Multilateral Organizations	1,431,062	2,250,539
Prizes	29,665	45,494
Corporations	56,633	79,628
Sales and Services*	304,566	298,684
Total Operating Revenue	**3,763,452**	**4,491,592**

Expense	**2005**	**2004**
Applied Research and Monitoring	2,065,183	2,206,663
Technical Assistance	956,005	1,157,730
Outreach and Training	565,332	568,741
Management	461,817	378,860
Development	106,778	86,734
Total Expenses	**4,155,115**	**4,398,728**
Accounting Surplus (Deficit)	**(391,663)**	**92,864**

Reconciliation	
Accounting Surplus (Deficit)	(391,663)
GEF/UNDP Accounts Receivable	436,165 **

☐ * Includes services and net revenue from sales and boat operation

☐ ** Amount invoiced to the project during 2006 for expenses incurred in 2005 (invoice no. 1007 – 18 May, 06)

Our 2004 financial audit statement was conducted by chartered accounting firm Deloitte and Touche. They will also conduct the 2005 audit.

Donors

Our success depends on the generosity of individuals and organizations on every continent. Their continued commitment and support will help us to make Galapagos an enduring wonder of the world for future generations. Without these donors and many others, the exciting advancement CDF has made in the last year would not have been possible.

Presented here are those donors whose generous gifts funded active projects in 2005.

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Saladin Family
Shawn Kreloff

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Discovery Initiatives
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Galapagos Travel
G.A.P. Adventures
International Galapagos Tour Operators Association (IGTOA)

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North Carolina State University (project sponsored by NASA)
United Nations Foundation (implementing agent, UNESCO)
U.S. Agency for International Development (USAID)
Queen Beatrix of the Netherlands

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In-Kind Contributions
Visiting scientists and collaborators
Ecuadorian Air Force
Galapagos National Park Service
TAME Airlines
Tour operators

Friends of Galapagos Organizations (FOGOs)

FOGOs of several countries partner with the CDF to raise funds and awareness in support of conservation in Galapagos. Primarily membership organizations, FOGOs work within their respective countries to develop long-term relationships with donors (individuals, foundations, government and others) and advocate for the conservation policies established by the Galapagos National Park and the CDF. FOGOs often play a key role in obtaining and administering specific grants included in the CDF donor list. The CDF extends its appreciation to these FOGOs for their invaluable support in 2005.

Frankfurt Zoological Society
E-mail: info@zgf.de
Web site: www.zgf.de

Friends of Galapagos Switzerland
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Web site: www.galapagos-ch.org

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Galapagos Conservancy (formerly Charles Darwin Foundation, Inc.)
E-mail: darwin@galapagos.org
Web site: www.galapagos.org

Galapagos Conservation Trust
E-mail: gct@gct.org
Web site: www.gct.org

Galapagos Darwin Trust in Luxembourg (Contact cdrs@fcdarwin.org.ec)

The CDF General Assembly

The General Assembly is the governing body for the CDF and reflects its international character. Members include scientists, philanthropists, governmental officials and others dedicated to the CDF mission. The Assembly establishes policy, issues regulations, elects the Board of Directors and approves the operational plan and the budget, as well as other important business. The CDF President presides over the General Assembly at its annual meeting in Ecuador.

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A team of hardworking and dedicated people is at the core of CDF's work.
More than 75% of CDF staff are Galapagos residents and almost 90% are Ecuadorian.

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Scholarships

CDF provides scholarships for exceptional Galapagos students and support for promising Ecuadorian thesis students following careers in conservation, science and education.

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Thesis Scholarships for Ecuadorian Students

Ana Lucía Dávalos • Carolina Larrea • Ana María Ortega • Marjorie Riofrío • Javier Torres • Eduardo Vintimilla

Ecuadorian Ph.D. Thesis Student

Vanessa Coronel

Volunteers

A hands-on conservation experience awaits our national and international students and professionals. The volunteers contribute their considerable expertise and enthusiasm to help CDF's ability to effectively respond to the challenges facing Galapagos.

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Publications

(CDF staff, students and volunteers in bold)

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Visiting Scientists

CDF guides and supports an international network of scientific experts and institutions that further the goal of conserving Galapagos. Through their work on the islands and in the surrounding seas, CDF is able to learn even more about this amazing ecosystem.

Research on Terrestrial Vertebrates

David Anderson (sea birds) with Jill Awkerman, José Castillo, Steven Emslie, Rodrigo Estela and Carlos Zavalaga

Carlos Delgado (giant land tortoises) with Ligia Pérez and Jaime Urrutia

Gabriele Gentile (land iguanas) with Alberto Castello, Francesco Origgi, Roberto Palozzi and María Torrente

Stephen Gregory (endemic rats) with Charlotte Hardy

Kathryn P. Huyvaert (Nazca boobies) with Mark Westbrock

Sonia Kleindorfer (Darwin's finches) with Rebekah Cristensen, Rachael Dudaniec, Birgit Fessl, Katherine Goss, Norbert Hohl and Jeremy Robertson

Patricia Parker (Avian disease) with Diego Alarcón, Patricia Baiao, Jennifer Bollmer, Galo Buitrón, Mary Campbell, Tjitte De Vries, Vishal Dosanjh, Carolina Duffie, Andrés Iglesias, Robert Mauck, Mary McPhee, Charles McWilliams, Benjamin Nims, Luis Padilla, Pablo Sánchez, Catherine Soos and Erika Travis

Kenneth Petren (Darwin's finches) with Lukas Keller and Heinz-Ulrich Reyer

Jeffrey Podos (Darwin's finches) with Luis de León, Ana Gabela, Kenneth Gadow, Andrew Hendry, Michael Hendry, Anthony Herrel, Sarah Huber, Kimberly Iwamoto, Eric Milton, Betty Mobbs, Jean Moore, Beatrius Vanhooydonck and Brenda Whited

David Rostal (giant land tortoises) with Valentine Lance and Thane Wibbels

Barbara Shurman (penguin and cormorant census)

Hernán Vargas (climate change and endemic bird species) with Antje Steinfurth and Glyn Howell Young

Ilonka von Lippke (Galapagos mockingbirds) with Antonette Gutierrez, Gregory Grether, Benoit Laliberté, Eliana Naranjo and Lauren Throop

Research in Botany

María del Mar Trigo (palinology of flora)

Stacey DeWitt Smith (*Iochroma ellipticum* - Solanaceae) with Kathleen Randell Smith

Syuzo Itow (vegetation changes from 1970 to 2005) with Horishi Nishihara

Conley K. McMullen (*Cordia* L. - Boraginaceae)

Yamama Naciri Graven (*Geoffroea spinosa*) with Sofía Ramos Caetano

Anders Tehler (lichens) with Lilian Elisabeth Soderstrom

Willem O. Van der Knaap (plant sub fossil analysis) with Jacqueline F.N. Van Leeuwen, Petr Pokomy, Petr Kunes, Frederik Bos, Sophia Van Noordwijk, Klara Röethlisberger and Cynthia Ann Froyd

Research on Marine Ecology

David Aureoles (pinniped rescue) with David Beezer, Curtis Coughlin, Jodene Garrison, Steven Hajic, Peter Howorth, Daniel Muhr, Erin Ohlenkamp, Alberto Paras, Earl Richmond, David Risdall, Evonne Rodríguez and Sandie Sálazar

Daniel Costa (pinniped rescue) with Stella Villegas

Roberto Danovaro (marine meiofauna) with Norberto Della Croce, Mario Petrillo and Anastasios Stefanos

Peter Terence Dawson (coral reefs) with Angel Chiriboga, Estrella Villamizar and Fernando Rivera

Joshua Feingold (coral reefs) with Sarah Meltzoff

Paul Kingston (marine worms) with Daniel Harries, Alessandro Icardi, Philippa Kingston, Carol Struthers and Fiona Ware

John Morrison (upwelling dynamics in the GMR) with Anita Ayn Black, Blake Schaeffer, Daniel Kamykowski, Geoffrey Sinclair, Blake Schaeffer and Williams Sweet

Fernando Rivera (fish recruitment)

Fritz Trillmich (sea lions) with Mireya Bastidas, Adrian Hurtado and Paul Insuasti

Martin Wikelski (marine iguanas) with Silke Berger, Kelly Boyle, Louis Caron, Christian Martínez, Thomas Roedl, James St.Clair, Maren Vitousek-Bemis, Martina Wagner and Coral Wolf

Jon Witman (subtidal rock wall communities) with Andrew Altieri, Margarita Brandt, Susan Daly and James Palardy

Research on Terrestrial Invertebrates

William Conner (*Lepidoptera*) with Sarah Garret and Jesse Barber

Bernard Landry (invertebrate reference collection) with Patrick Schmitz

Christine Parent (terrestrial snails) with Deborah K. Austin

Leila Von Äsch (ants of Floreana) with Marc Servajan

Other research activities

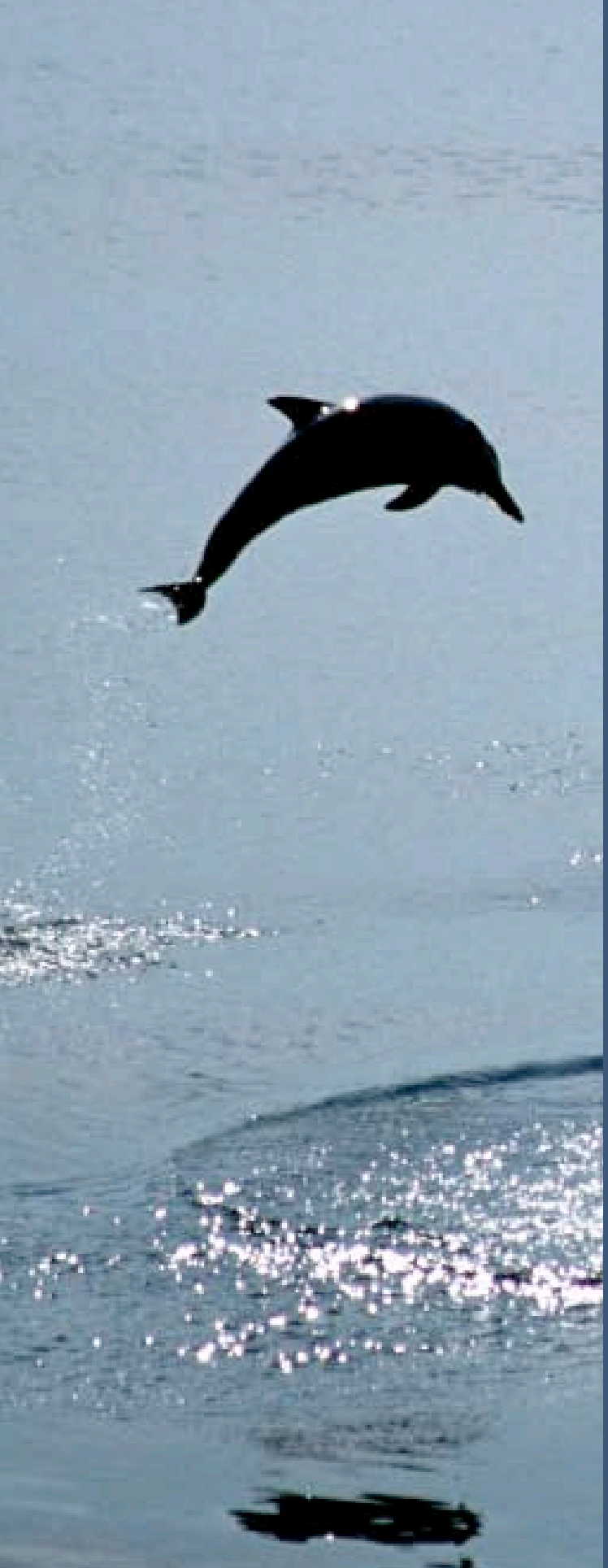
Noemi d´Ozouville (hydrology) with Mathilde Adelinet

Dennis Geist (geochemistry and microbiology of fumaroles) with Diego Barba, Susan Childers, Karen Harpp, Daniel Johnson, Lisa Mayhew and Terry Naumann

Simon Haberle (human colonization and environmental change) with Atholl Anderson, Keith Bennett, Iona Flett, Cynthia Froyd, Hans Gotthold, Hendrik Heijnis, Ann-Charlotte Martisson, James Neale, Karen Stothert, César Veintimilla and Katherine Willis

Miriam Kannan (climate change) with Mark Bush, Byron Fonseca, William Gosling and Alejandra Restrepo

Frank Sulloway (ecological change) with Daniel Bennett, Michael Jackson, Robert Smith and Josef Vascovitz



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CDF Mission

To provide knowledge and assistance through scientific research and complementary action to ensure the conservation of the environment and biodiversity in the Galapagos Archipelago.

CDF Vision

The realization of CDF's mission is founded on a set of core values:

- recognition of the uniqueness of Galapagos
- cultivation of transparency and integrity to build trust
- belief in dialogue and working with people
- pursuit of excellence in all aspects of work
- commitment to leading by example.

Learn more about the Charles Darwin Foundation by visiting us on the web at **www.darwinfoundation.org** or writing to us at **cdrs@fcdarwin.org.ec**

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