



Fundación
Charles Darwin
Foundation
GALAPAGOS



IMPACT REPORT

2022



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BOARD AND G.A. MEMBERS

EXPLORING | UNDERSTANDING | SHARING

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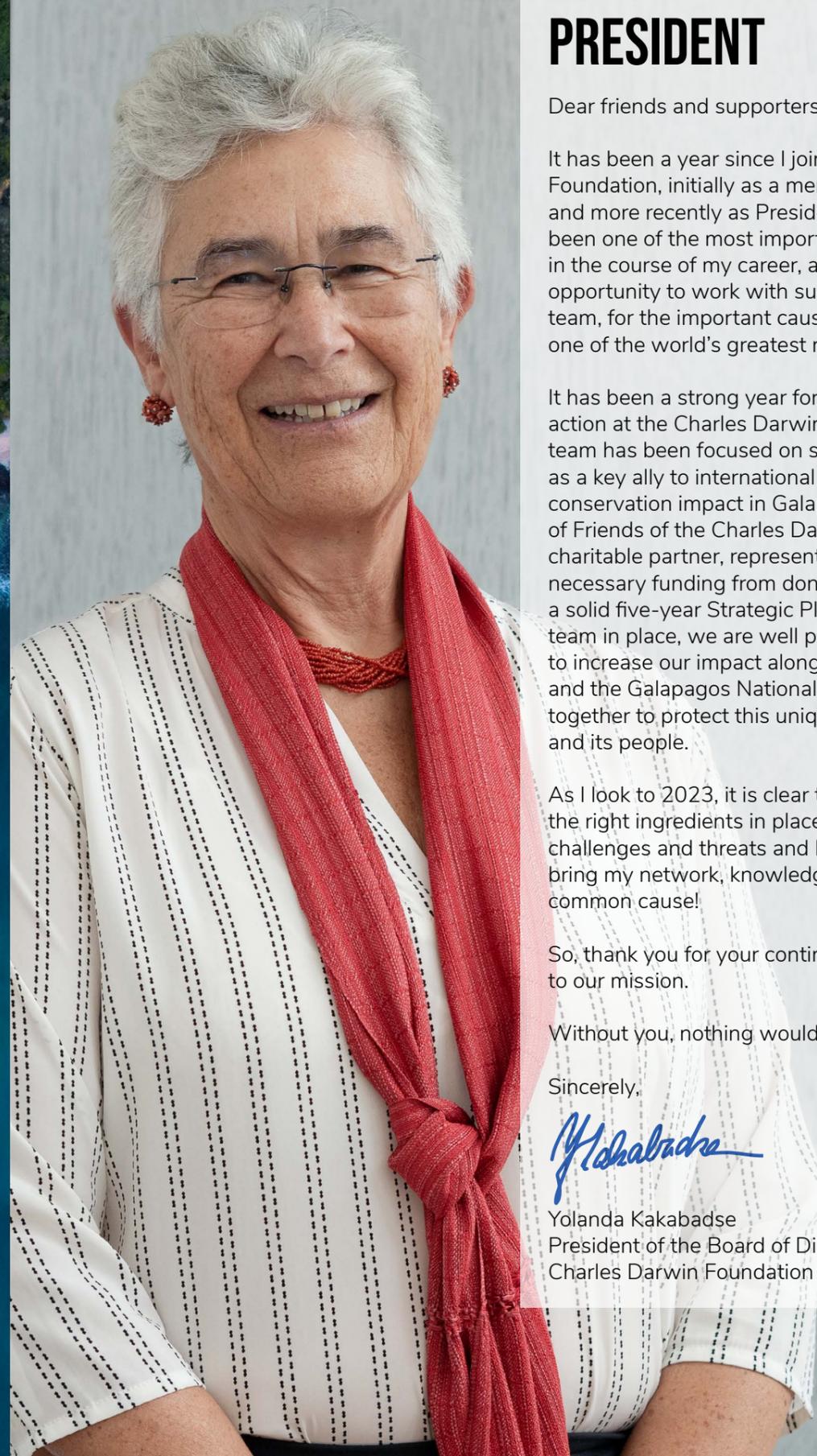


THE CHARLES DARWIN FOUNDATION IS THE LARGEST SCIENCE AND CONSERVATION ORGANIZATION IN GALAPAGOS, GENERATING GROUNDBREAKING DISCOVERIES AND EFFECTIVE CONSERVATION ACTION FOCUSED ON PROTECTING THE UNIQUE BIODIVERSITY OF ONE OF THE GREATEST NATURAL WONDERS ON EARTH.

The mission of the Charles Darwin Foundation and its Research Station is to tackle the greatest threats and challenges to Galapagos through scientific research and conservation action, in order to safeguard one of the world's most important natural treasures.

For more than sixty years, we have conducted cutting-edge research in marine and terrestrial environments, working both in the Galapagos National Park and in the Galapagos Marine Reserve to inform effective management and conservation actions on the ground. In this impact report, we share the important milestones and successful stories from 2022 driven by our efforts to support conservation of the unique species and ecosystems of Galapagos and their services.

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LETTER FROM OUR PRESIDENT

Dear friends and supporters,

It has been a year since I joined the Charles Darwin Foundation, initially as a member of the Board of Directors, and more recently as President of the Board. This has been one of the most important missions entrusted to me in the course of my career, and I am honored to have the opportunity to work with such a passionate and expert team, for the important cause of safeguarding Galapagos: one of the world's greatest natural treasures.

It has been a strong year for research and conservation action at the Charles Darwin Foundation. Our executive team has been focused on strengthening our position as a key ally to international institutions looking for conservation impact in Galapagos, while the creation of Friends of the Charles Darwin Foundation, our US charitable partner, represents a critical tool that will unlock necessary funding from donors in the US. Further, with a solid five-year Strategic Plan and a strong leadership team in place, we are well positioned as an organization to increase our impact alongside collaborating partners and the Galapagos National Park Directorate, as we work together to protect this unique archipelago, its flora, fauna and its people.

As I look to 2023, it is clear to me that we have all the right ingredients in place to tackle tomorrow's key challenges and threats and I look forward to continuing to bring my network, knowledge and passion to advance our common cause!

So, thank you for your continued support and dedication to our mission.

Without you, nothing would be possible.

Sincerely,

Yolanda Kakabadse
President of the Board of Directors
Charles Darwin Foundation for the Galapagos Islands

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LETTER FROM OUR EXECUTIVE DIRECTOR

Dear Members, Friends, and Supporters of the Charles Darwin Foundation,

It is a great pleasure to present our 2022 Impact Report. The year has proven to be a particularly strong one with our research programs returning to full swing after the COVID-19 pandemic. We've achieved a great many milestones, both institutionally and in terms of our research, which I invite you to explore them in more detail in this report.

STRATEGIC HIGHLIGHTS

After a year in the making, we formally launched our 5-year Institutional Strategic Plan last October and we are now finalizing our Science Plan, which will guide CDF's research priorities for the next 10 years. The Science Plan will be published in the second half of 2023. We have further strengthened our leadership team with the recruitment of a Director of Marketing and Communications, and bolstered our Science department with two key hires on our marine projects. And finally, we proudly launched our US charitable partner Friends of the Charles Darwin Foundation in June, that makes supporting conservation research and activities to safeguard Galapagos easier than ever for US based individuals, corporations, and foundations.

RESEARCH HIGHLIGHTS

In research, we have continued to make great advances. First, on the critically endangered species front we were finally able to pick up monitoring of the Mangrove Finch again and our scientists documented new breeding pairs for the season. With a population size of less than 100 individuals remaining in the wild, such additions are noteworthy and cause for hope. Similarly, with the Little Vermilion Flycatcher recovery program on Santa Cruz Island now running for several years, we have observed an increase in its distribution range, which is a very promising sign.

In the marine world, we have continued to generate important insights to inform effective conservation action. For example, one of our tagged Silky sharks was recorded to have swum some 33,000 km in a little over 1.5 years – swimming half way to Hawaii and back again, twice! Such results put a daunting spotlight on scale, and how conservation efforts and marine protected areas are too often only a fraction of where they need to be. Meanwhile, the invasive species marine team have continued monitoring throughout the Galapagos Marine Reserve. While there are no new introduced species relative to 2021, several aggressive invasive species have been found in new locations as the team continues range expansions.

LOOKING AHEAD

I want to close by noting an exciting new infrastructure initiative. Thanks to a major pledge by the COMON Foundation, we will soon embark on a complete overhaul of the two Tomas Fischer buildings. The project will centralize all four Natural History Collections and house them under one roof in a design that will allow visitors the opportunity to peek through the window. The project will also revamp the Exhibition Hall to make for an exceptional immersive museum space for the thousands of visitors we receive from all over the world.

All this is but a taste of what is in this report so please read on! I want to thank all of you for your continued support of our conservation efforts and here's looking towards a great next year together, to safeguard the future of Galapagos.

Sincerely,

Rakan A. Zahawi
Executive Director
Charles Darwin Foundation for the Galapagos Islands



Juvenile Albatross

© Andrés Cruz

OUR STRATEGIC PLAN 2022 - 2027

Download our
strategic plan



The strategic plan, launched in October 2022, sets the course for the Charles Darwin Foundation and its Research Station for the period 2022-2027. It is framed around six core pillars, all designed to better position the Foundation to address the most pressing challenges facing Galapagos today.



SCIENTIFIC RESEARCH

Be the central research enterprise advancing discovery and sustainability in Galapagos and the Eastern Tropical Pacific



INFRASTRUCTURE

A modern physical plant that strives toward a carbon neutral research station, while providing the platform and resources to underwrite state-of-the-art research and interactive engagement with visitors



EDUCATION AND OUTREACH

Leverage environmental education and community outreach to drive conservation awareness and inspire behavioral change



PARTNERSHIPS AND VISIBILITY

Leverage research portfolio to strengthen institutional partnerships, and increase local and global awareness for critical regional conservation issues



FINANCIAL STABILITY

Secure long-term financial stability for research and operations



INSTITUTIONAL GOVERNANCE AND CULTURE

Improve institutional governability and ensure that values and principles provide for transparency and strengthen the organization's culture



King Carl Gustav and Queen Sylvia presenting a cheque symbolically to Gunter Reck, Executive Director of the Charles Darwin Foundation in 1986.

FROM OUR ARCHIVE TO THE WORLD

THE TOMAS FISCHER BUILDINGS AT THE HEART OF GALAPAGOS SCIENCE, PAST, PRESENT AND FUTURE

The two Tomas Fischer buildings of the Charles Darwin Research Station (CDRS) were constructed in the early 1990s and have served as the core research facilities for most of the scientific staff ever since.

Built under the leadership of Dr. Daniel Evans who was CDRS Director at the time (Feb 1989 to Jan 1992), the Fischer buildings were named after Tomas Fischer, a Swedish book publisher, businessman and philanthropist who financed their construction.

As everything in Galapagos, the story behind how the donation and buildings came about is quite unique. Let's rewind a few years to 1986, when their Majesties King Carl Gustav and Queen Sylvia of Sweden visited the Galapagos Islands. During their visit to the Charles Darwin Research Station, King Gustav, Honorary President of WWF-Sweden at the time, formally handed over a donation of 700,000 Swedish crowns (equivalent to about \$100,000 at the time) to the Charles Darwin Foundation on behalf of Tomas Fischer.



Group of WWF - Sweden in front of the old dining hall of CDF in 1984.

Mr. Fischer chose to direct the funds towards the construction of what became (and remains to this day) the scientific heart of the Charles Darwin Research Station: the Tomas Fischer complex. Over the intervening years these two buildings have had numerous add-ons and modifications, and today, they include laboratories, offices for researchers, storage facilities, and common areas. They are also home to three of the four natural history collections curated by the Charles Darwin Foundation.

The scientific vision that drove the construction of the Fischer buildings 30 years ago remains true today as we embark on a much-needed redesign and upgrade of the complex so it is fit for modern scientific research, collaboration and growth, while also better engaging the more than 125,000 visitors we receive every year on our campus to inspire them to become active stewards for conservation.

NATURAL HISTORY COLLECTIONS

THE CHARLES DARWIN RESEARCH STATION IS HOME TO FOUR NATURAL HISTORY COLLECTIONS, COMPRISING MORE THAN 135,000 SPECIMENS OF ENDEMIC, NATIVE AND INTRODUCED SPECIES.



Read more about the 263 samples returned to the natural history collections



3,300+

new specimens added to the collections

- **Herbarium Collection:** 46,000+ specimens
- **Terrestrial Invertebrate Collection:** 75,000+ specimens
- **Marine Invertebrate Collection:** 11,000+ specimens
- **Vertebrate Collection:** 2,500+ specimens

The collections serve not only as a repository of known species, but also as a reservoir of historic information on distributions and ranges, and possible new identifications waiting to be processed that could lead to the discovery of new species for science. Our specimens also serve as a reference for broader taxonomic studies and for reports of introduced and invasive species. They are available to researchers worldwide to facilitate scientific studies that contribute to knowledge of the distribution, ecology, and diversity of the Galapagos biota.

In 2022, we added more than 3,300 new specimens to our collections. We also repatriated more than 300 specimens of sponges (of which 25 were new species to science) and other marine and terrestrial

vertebrates and invertebrates that had been loaned to Dr. Cleveland Hickman, zoologist & Professor Emeritus of Washington and Lee University in the United States, for scientific research for more than 10 years.

591

types (Holotypes, Syntypes, Paratypes) are housed in our terrestrial invertebrate collection

CHARLES DARWIN RESEARCH STATION
03-682 Sponge, pink, dimpled
Locality: Cape Marshall, 100 ft, rock on sand
Photo: 13/9-10 & CP digital 4-6
Collector: C. Hickman, 17 November 2003



2022 SCIENCE REVIEW

In 2022, our scientific field activities returned to full swing following the COVID-19 pandemic. Over 75 of our dedicated scientists actively worked on 26 projects, achieving major breakthroughs in addressing the pressing threats and challenges facing the Galapagos Archipelago. Furthermore, we have achieved **important institutional milestones** that will bolster our research efforts and our exploration and restoration initiatives of critical ecosystems.

Of note, the governments of Ecuador and Germany, through the KfW Development Bank, signed a 5-year agreement that will fund the implementation of the program “Biodiversity Protection in the Galapagos Islands”, for a total value of €15 million. A significant portion of these funds will be used to finance strategies for the prevention, control and eradication of invasive species such as the avian vampire fly and the blackberry—both under investigation by our scientific teams.

This year, our marine scientists participated in **two major international ocean exploration expeditions**, one with Mission Blue and the other

onboard the Inkfish. Both expeditions contributed significantly to advance our work in deep-sea, marine bio invasions and ecological subtidal monitoring. CDF also participated in the production of the management plan for the new Hermandad Marine Reserve which took place in 2022, and we continued to be a key advocate in the Eastern Tropical Pacific region through our leading work with CMAR and through our attendance at high impact events such as the U.N. Ocean Conference in Lisbon, Portugal, and COP23.

Following the launch of our 5-year Institutional Strategic Plan last year, we have been working actively on our **Science Plan** and are on track for its publication in the second half of 2023. The Science Plan will guide the research priorities of the Charles Darwin Foundation and its Research Station for the coming 10 years.

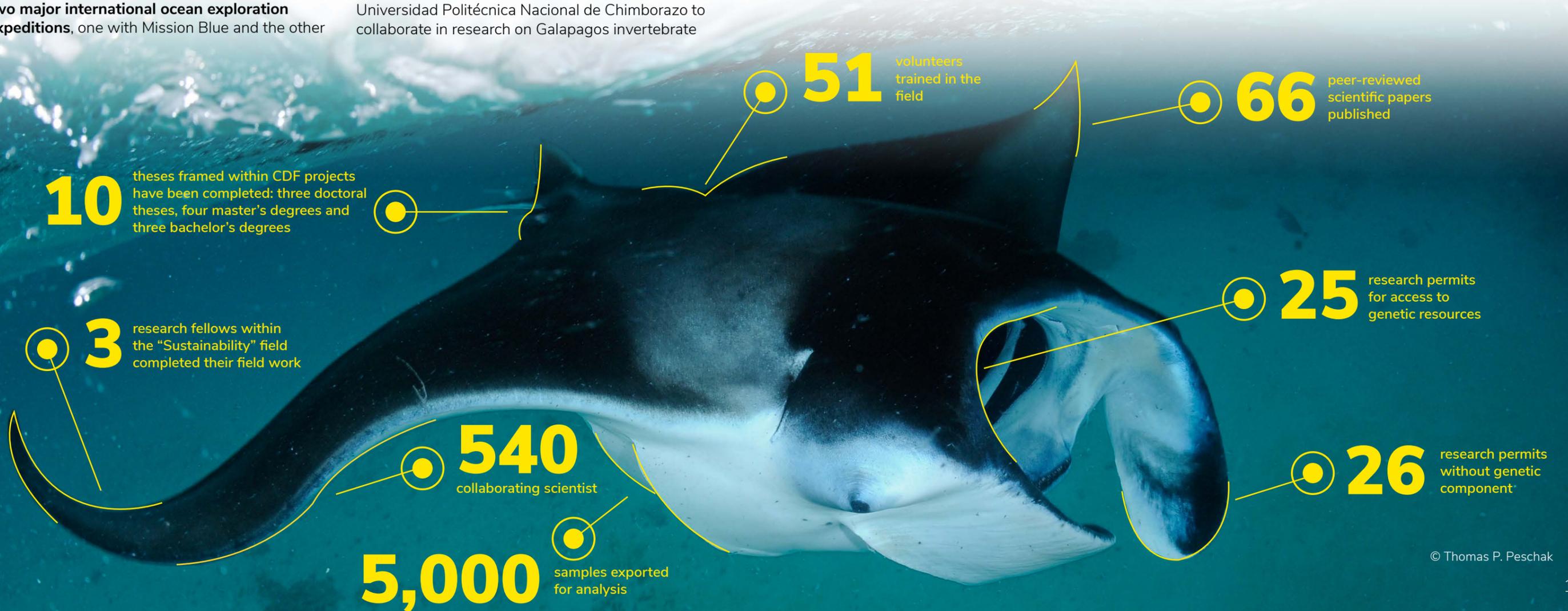
We are also pleased to report the **signing of several key academic collaborations**. One in particular that is worth highlighting is our collaboration with the University of Hawaii to develop joint projects and student training initiatives, and apply for joint funding to develop them. Further, we renewed our alliance with the Universidad Politécnica Nacional de Chimborazo to collaborate in research on Galapagos invertebrate

biodiversity, and renewed our long-term collaboration with the Leibniz Centre for Tropical Marine Research, ZMT for research initiatives linked to marine biodiversity. We also signed a new collaboration agreement with Fundación Amigos de la Isla del Coco (FAICO) who are based in Costa Rica, in the context of the CMAR. Finally, we signed a cooperation agreement with Sayari Earth to co-design strategies and frameworks for pilot studies on blue carbon-focused research.

Local collaborations are essential if we want our work to have meaningful impact among the Galapagos community. As such, we signed a Memorandum of Understanding with the Association of Interpretive Guides for Galapagos (AGIPA) to strengthen collaboration for the management of the “Galapagos for the World” Library and the G.T. Corley Smith Library of the CDRS. We also established a strategic alliance with the company Netafim, Ecuador, to provide support and technical assistance to local farmers regarding the use of fertilization technologies to strengthen production systems and promote the use of farm space to mitigate the presence of invasive species. This initiative is being carried out jointly with the Ministry of Agriculture.

On the people front, we have made **two major hires in 2022**. The first is Stuart Banks, a Principal Investigator (PI) for our deep-sea – seamounts project who will drive our ocean exploration research. We also reinforced our Shark Ecology team with the hiring of Dr. Gabriel Vianna, a co-PI and specialist in shark and fisheries research in anticipation of some major projects that will start in 2023.

Last but not least, our scientists’ work continues to gain recognition for their contribution to the scientific community. Dr. Inti Keith, our marine invasive species PI, received the Explorers Club award, which is given annually to Fifty People Changing the World for her research. In turn, Dr. Gabriela Rodríguez Jácome was awarded the Doctoral School Prize of the Universidad Autónoma de Barcelona for her PhD Dissertation about Cultural Heritage in Galápagos, while our colleague Jorge Ramírez won an Expert Membership to the National Ecuadorian Group for Marine Biodiversity Conservation.



TERRESTRIAL ECOSYSTEMS

Giant tortoises in fresh water pond





IN FOCUS: TRACKING AND CONTROLLING INVASIVE SPECIES ACROSS LAND AND SEA

The Galapagos Islands are made up of truly remarkable ecosystems that house a plethora of unique and endangered species. Unfortunately, invasive species pose a significant threat to the long-term conservation of these unique and delicate ecosystems, making it essential to monitor and control their spread.

In Galapagos, invasive species have been introduced through human activities, such as the introduction of domestic animals and plant species from other parts of the world, and accidentally in food and other commercial products or as stowaways in ships and planes, as well as through marine currents floating on plastics and marine debris. The impact of these invasive species on the Galapagos Islands is immense and actions to monitor and control them urgent.

To protect Galapagos from invasive species, the Charles Darwin Foundation (CDF), in close collaboration with the Galapagos National Park Directorate (GNPD) and the Galapagos Biosecurity Agency, has been monitoring and controlling the

spread of invasive species since the 1970's. Our monitoring involves regular surveys of the islands' flora and fauna, with subsequent data analysis to track changes over time, to inform effective management strategies. The process of monitoring and controlling invasive species includes a range of techniques such as surveys, trapping, lab experiments, field experiments, drone flights, use of satellite imagery, manual removal, chemical control, and biological control.

One of the most important projects currently undertaken by CDF is the investigation of the Avian Vampire Fly, *Philornis downsi*. This invasive fly is driving population declines in more than 20 species of land birds, including the critically endangered Mangrove Finch. The fly lays its eggs in bird nests and its larvae feed on the blood of hatchlings, often causing all the chicks in a nest to die. Given that it is an introduced species, the fly has no natural predator in Galapagos. To reduce the impact of this parasitic fly on birds, CDF and the GNPD have been overseeing a multi-institutional collaborative effort for more than 10

years that has been investigating the biology and ecology of the fly while simultaneously conducting research to find effective and environmentally friendly control methods such as biological control. (see page 20 for more details.)

A second key project focuses on assessing the impacts of the invasive blackberry *Rubus niveus* and its control on the resident plant and invertebrate communities. Since its introduction in 1968, the blackberry has seriously degraded the highland vegetation zones of the inhabited islands, as well as Santiago Island, and has particularly affected the *Scalesia* forests. *Scalesia* trees form a unique ecosystem that is home to endangered and endemic plant and animal species that are affected by the invasion of blackberry but also by other invasive plant species, such as Cuban cedar *Cedrela odorata*. On Santa Cruz, the *Scalesia pedunculata* forest is estimated to cover less than 3% of its original distribution. Aside from the long-term monitoring of change in vegetation, several management actions are being taken by CDF and the GNPD, including the control of invasive plant species which we are looking to scale up in coming years. We are also researching effective biocontrol methods.

Other terrestrial invasive species we are actively investigating with collaborators include the invasive tree frog (*Scinax quinquefasciatus*), smooth-billed ani (*Crotophaga ani*), yellow paper wasp (*Polistes versicolor*), tropical fire ants (*Solenopsis geminata*) and red quinine tree (*Cinchona pubescens*), among others.

But invasive species are not exclusive to our terrestrial landscapes. Marine invasive species can cause significant impacts to coastal communities, affecting ecosystem services such as fisheries and ecotourism. The number of marine introduced species in the Galapagos Islands is 10 times the number previously known to be present: a minimum of 59 alien marine species are now documented in the archipelago. Some are well-known pests. For example, one species that is being studied is *Caulerpa chemnitzia* a green algae that is threatening the last structural reef near Darwin island. Even well protected areas such as Galapagos are at risk of invasions, which threaten to diminish their high conservation and social value. (See page 35 for more details)

REWILDING FLOREANA ISLAND

Our scientists have been actively working with the Jocotoco Foundation, the GNPD, and other collaborating institutions in the most ambitious restoration effort to date: rewilding Floreana, one of the islands most altered by human activity. The project, which includes a key invasive species eradication component, will begin in the second half of 2023 with removal of rodents, cats, and other non-native feral animals in the wild. Thereafter, the project will seek to reintroduce 13 locally extinct species to the island. At a workshop in July 2022, CDF scientists contributed to the decision-making process to establish a timeline for the progressive reintroduction of five species of Darwin's finches, the Little Vermilion Flycatcher, the Galapagos crake, Lava gull, Barn owl, Galapagos hawk, mockingbird, snake and the giant tortoise.



ADVANCING RECOVERY OF THE LITTLE VERMILION FLYCATCHER IN SANTA CRUZ

The Little Vermilion Flycatcher, *Pyrocephalus nanus*, is one of the most threatened bird species in Santa Cruz Island where fewer than 30 breeding pairs are estimated to remain. CDF, the Galapagos National Park Directorate (GNPD), and the University of Vienna have been collaborating to recover the almost extinct population of this species on the island using an integrated management approach.

In 2022, seven new fledglings were added to the small population, bringing the total to 21 new juveniles in the last 3 years. Juvenile Little Vermilion Flycatchers have expanded their distribution range and are colonizing newly restored areas on Santa Cruz Island. This species has even returned to the tourist visitor site of Los Gemelos where efforts to protect the *Scalesia* forest from invasive blackberry are progressing. These positive developments highlight the importance of continuing the integrated management actions to help recover the population.



Photos: © Carlos Espinosa / CDF

7 new fledglings of Little Vermilion Flycatcher



34 acoustic monitors placed in the field



Photos: © Juan Manuel García / CDF



Read more



11ha of habitat under experimental management by CDF and GNPD

HOPE FOR THE CRITICALLY ENDANGERED MANGROVE FINCH

The Mangrove Finch is the rarest bird in the Galapagos Islands with approximately 100 individuals remaining in the wild. In February 2022, a field team comprised of CDF scientists and the Galapagos National Park Directorate (GNPD) rangers set off for a 9-week trip to the remote northwest part of Isabela Island. The team recorded 12 breeding pairs and an additional 12 solitary territorial males, found 25 nests, and monitored 19 to determine nesting success.

A total of **16 nests were treated with insecticide** to reduce parasitism from Avian Vampire Fly



Read more

12 Mangrove Finch breeding pairs recorded

7 Mangrove Finch estimated to have fledged

larvae, and **at least seven Mangrove Finch chicks fledged during the season.** Moreover, young juveniles were recorded in August and December, indicating a positive sign for the population's recovery.

Additionally, the team collaborated with Rainforest Connection to develop an acoustic monitoring tool that will enable us to conduct distribution surveys over longer periods of time and across the species' historic range without needing to be physically present on Isabela.

PROTECTING GALAPAGOS LANDBIRDS FROM THE AVIAN VAMPIRE FLY, *Philornis downsi*

Approximately 75% of the small Galapagos landbirds, including 12 species of Darwin's finches and the Little Vermilion Flycatcher, are under threat from the invasive Avian Vampire Fly, *Philornis downsi*. This fly lays its eggs in bird nests and its larvae feed on the blood of young hatchlings. Controlling this fly is fraught with challenges because bird nests are hard to reach and methods need to be safe for birds.

CDF and the Galapagos National Park Directorate (GNPD), with a large group of international collaborators, have been leading efforts to find effective techniques in the short-term that could help protect hatchlings while they continue to investigate large-scale and sustainable control techniques.

One short-term method currently in use involves the injection of an insecticide into the base of a bird nest where the fly larvae live, but this method is logistically challenging and involves using tall ladders or climbing up trees.

In 2022, together with the University of Vienna and the GNPD, we continued to investigate the self-fumigation technique, first trialed in 2021, which looks at the possibility of birds helping themselves to nesting material that has been treated with a low-impact insecticide. We found that **70% of the 144 nests monitored had some treated material** and that overall the number of *Philornis* larvae was lower in these nests. The next step is to find a way to increase the amount of material taken to the nests so that we can improve bird reproductive success.

For the long-term, with the University of Minnesota, the Escuela Superior Politécnica del Litoral (ESPOL) and the National Institute of Biodiversity (INABIO), **we are evaluating parasitic wasps found on mainland Ecuador for their potential to be used in a biological control program against this deadly fly.** Colonies of two parasitic wasps, *Conura annulifera* and *Trichopria sp. novus* (a species new to science) have been established in the laboratory and are under study to see if they would pose a risk to Galapagos species in the event they are used in a biological control program.

484 bird nests monitored on mainland Ecuador for parasitic wasps that attack *Philornis* species.

18 self-fumigation stations installed in the *Scalesia* forest of Santa Cruz.



A *Philornis downsi* adult fly.



21 early-career biologists participated in field and lab work and received training in a wide set of activities.

Photos: © Juan Manuel García / CDF



Photos: © Juan Manuel García / CDF

ADVANCES MADE TO CONTROL THE INVASIVE YELLOW PAPER WASP

The yellow paper wasp, *Polistes versicolor*, is an invasive species in the Galapagos Islands that impacts both native biodiversity and human activities. Together with a researcher from Universidad Estatal del Sur de Manabí and the Galapagos National Park Directorate (GNPD), we have been investigating control methods that can be used in the short-term in priority areas such as tourist visitor sites and in areas with endangered species.

One short-term control method that was tested in our laboratory in 2022, was a semi-solid bait made of fermented banana. Initial tests showed that when the bait is placed inside a semi-enclosed plastic yellow bait station it was attractive to *Polistes versicolor*, but not to native species. Additionally, we learned that wasps stand guard at the entrances of the bait stations to prevent other insects from accessing the 'food'.

Laboratory tests allowed us to determine the concentration of insecticide that should be mixed with the bait for wasps to ingest, transport to the nest, and feed their larvae, thus eliminating the entire colony. In 2023, we will field-test the banana bait treated with the insecticide to evaluate how effective it is under natural conditions.



Bait made of fermented banana



Read more



SAVING *Scalesia cordata* FROM EXTINCTION ON ISABELA

The *Scalesia cordata* conservation project was initiated due to the noticeable decline in populations of this endemic species in southern Isabela over the past few decades. Conservation and management actions in collaboration with the Galapagos National Park Directorate (GNPD) are focused on increasing the number of trees in park and private lands, and educating the Isabela community about the species to make them champions of its conservation.

Since 2021, we have been conducting search expeditions and using aerial images to locate new *Scalesia cordata* trees. Significant progress was made in mapping trees in 2022, with 620 adult trees identified across 15 sites, up from some 255 in 2021.

We have been monitoring the growth and survival of existing trees, and controlling

invasive plants to increase the natural regeneration around *Scalesia cordata* trees. In 2022, 183 trees were marked in the field and more than 400 seedlings are now being monitored both in the field and at the GNPD greenhouse on Isabela. We've expanded the control of invasive species to remote areas, only reachable by horses or boats, to help facilitate seed germination and natural regeneration of *Scalesia cordata* here as well.

Meanwhile, restoration efforts continued in 2022, with more than 10,000 *Scalesia cordata* seeds sown in the GNPD greenhouse and over 1,000 seedlings produced. We are beginning to see encouraging results, with the natural regeneration of more than 250 seedlings observed at 5 different sites in 2022. There is hope for the future of this beautiful species!

8 expeditions with park rangers to *Scalesia cordata* sites

10,000+ seeds sown in the GNPD-Isabela greenhouse, and 1,000 seedlings produced

183 trees and 400 seedlings marked and permanently monitored

620 adult trees found at 15 sites

250+ naturally regenerated seedlings observed at five study sites

GALAPAGOS VERDE 2050: AN AMBITIOUS ECOLOGICAL RESTORATION ENDEAVOUR

THE GALAPAGOS VERDE PROGRAM IS AN ECOLOGICAL RESTORATION INITIATIVE WHICH IS DIVIDED INTO SEVEN CORE PROJECTS TAKING PLACE ON SEVEN DIFFERENT ISLANDS WITHIN THE ARCHIPELAGO.

BALTRA - ECOLOGICAL RESTORATION OF ARID ECOSYSTEMS

Baltra is one of the most degraded islands in the archipelago. Here, we focus on restoring 15 keystone species, using North Seymour Island as a reference ecosystem. In 2022, we planted 596 seedlings from three species with a 42% overall survival rate. We also collected an additional 4,200 seeds of seven species to begin seedling production in 2023.



Fruits and seeds from keystone species collected in Baltra Island



RESTORING *Opuntia echios* IN SOUTH PLAZA

The endemic species *Opuntia echios* is an essential source of food and shade for land iguanas in South Plaza. In 2022, we planted 230 individuals, doubling the population size of 2014, when monitoring first began, to 835 individuals. By using ecological restoration technologies to accelerate recovery, we achieved an average growth of 6,8 centimeters per year, more than triple the average growth rate under natural conditions.

ECOLOGICAL RESTORATION OF KEY SPECIES ON ESPAÑOLA ISLAND

We conducted an ecological restoration experiment on Española Island to determine the best strategy for restoring the majestic cacti *Opuntia megasperma*. In 2022, we planted 250 seedlings and 250 cladodes, and sowed 4,500 seeds. We also sowed 2,000 *Opuntia megasperma* seeds in the Galapagos National Park Directorate (GNPD) greenhouse of Santa Cruz to ensure a healthy pool of seedlings for future transplants. Finally, we conducted plant and invertebrate inventories and collected 126 specimens of 59 plant species and 448 insects to establish a baseline for understanding the diversity and interactions between plants and insects on the island.



© Paul Mayorga / CDF

RECOVERY OF THREATENED SPECIES

In 2022, we conducted an in-situ germination experiment on Española Island using 1,200 seeds of the endangered *Lecocarpus lecocarpoides*. Additionally, we repatriated 10 plants to Punta Manzanillo, which currently has only one naturally occurring plant. Another 23 plants are in a nursery and will be transplanted in 2023.

We treated the critically endangered *Galvezia leucantha* promptly for a scale insect plague from the *Coccus* genus (introduced). This species has less than 30 individuals left in Northern Isabela.

Furthermore, we identified potential locations of the critically endangered *Scalesia retroflexa* in Santa Cruz Island. So far, we have confirmed the presence of 23 individual plants in Punta Nuñez, which seems to be the last remnant of this species on the island.

RURAL ECOLOGICAL RESTORATION

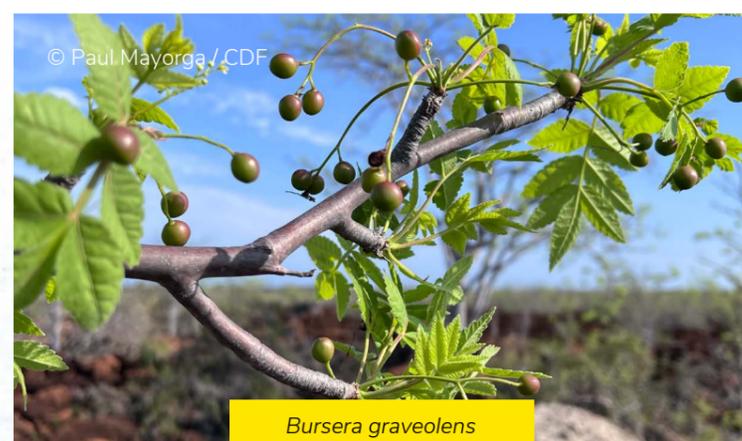
In 2022, we planted 596 endemic and native plants on 13 agricultural farms across the islands of Santa Cruz, San Cristóbal and Floreana, achieving a 73,5% survival rate.

Furthermore, we calculated that a single 5-meter-tall Darwin's daisy tree, *Scalesia pedunculata*, can sequester 10 kilograms of atmospheric



© Patricia Jaramillo / CDF

Scalesia affinis



© Paul Mayorga / CDF

Bursera graveolens

carbon during its lifespan in the agricultural-highland zones of Santa Cruz and Floreana. We also discovered that the use of water-saving technologies could double carbon sequestration by Darwin's daisy trees.

URBAN ECOLOGICAL RESTORATION

We planted a total of 216 plants of 6 native and endemic species in urban areas of Floreana and Santa Cruz in 2022. Of the 735 plants planted in urban areas since the project began in 2014, we have achieved an average survival rate of 55%. We also installed five vertical gardens containing between 72 and 540 plants of 12 different species. Furthermore, we stocked the greenhouse in Floreana with more than 1,311 plants of 25 different species.

ECOLOGICAL RESTORATION AT SPECIAL USE SITES

We planted 162 plants of 4 native and endemic species in the old gravel mine "Cerro Colorado" in San Cristóbal, achieving a survival rate of 98.5%. We also achieved a survival rate of 84% among the 249 plants from 10 different species monitored at Baltra's old garbage dump, and a survival rate of 95% among the 200 plants from 18 species monitored at Floreana's black gravel mine and garbage dump.



© Rashid Cruz / CDF

Lecocarpus lecocarpoides germination under lab conditions

MONITORING INVERTEBRATES AS AN INDICATOR OF ECOSYSTEM HEALTH

Terrestrial invertebrates play important ecological roles in ecosystems: pollinating flowers, dispersing seeds, decomposing organic matter, oxygenating soils, improving water quality, and controlling agricultural pests. About 1,500 endemic terrestrial invertebrates have been registered in Galapagos to date. At CDF, we monitor terrestrial invertebrate communities on several islands to detect changes in their abundance and composition over time, as an indicator of ecosystem health.



Coelosternus leporinus, an introduced herbivorous beetle associated with banana crops. Collected in the agricultural zone of Santa Cruz (Photo: K. Vera, CDF)

50,768

endemic, native and introduced terrestrial invertebrates identified in Santa Cruz

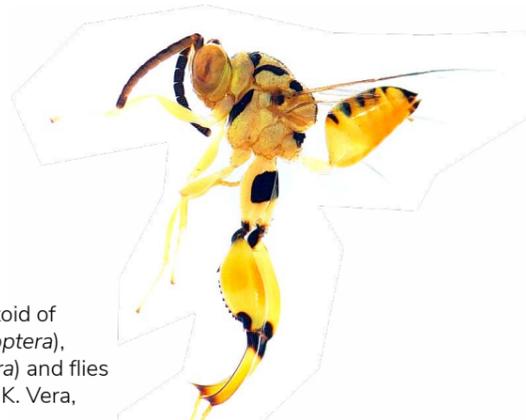
SANTA CRUZ

On Santa Cruz island, we are monitoring changes in the community structure of terrestrial invertebrates in the threatened *Scalesia* forest at Los Gemelos. By comparing abundance and species richness in areas invaded by blackberry (*Rubus niveus*) versus controlled areas, we are able to evaluate the impact of this invasive plant on terrestrial invertebrates—an important food source for other animals, such as Darwin's finches. Up to the end of 2022, we have processed and identified 50,768 endemic, native and introduced terrestrial invertebrates.

We are also studying little-known groups in Galapagos, such as microwasps from the insect order Hymenoptera. These species parasitize other insects and are known as parasitoids. In 2022, 2,768 microwasps were processed and identified to the lowest taxonomic level possible. Knowing more about these microwasps will allow us to better understand their role in Galapagos ecosystems. These studies will also help us to identify species that are natural enemies of, and are helping to control, invasive and pest insect species, such as insects associated with agricultural crops.



Kapala sp., parasitoid wasp of ants. Collected in the *Scalesia* forest at Los Gemelos.



Conura sp. parasitoid of butterflies (Lepidoptera), beetles (Coleoptera) and flies (Diptera) (Photos: K. Vera, CDF)

FLOREANA

As part of the ambitious Floreana rewilding project, we will be monitoring changes in the abundance and diversity of the invertebrate communities, both in protected and agricultural areas. Up until 2022, we have collected 12,687 terrestrial invertebrates, setting up a baseline for the monitoring that will take place once the invasive species eradication activities are underway and as the rewilding Floreana project progresses.



Springtails are an important part of the animal biomass and bioindicators of soil conditions. Collected in the agricultural zone on Floreana. (Photo: K. Vera, CDF)



Toxomerus crockeri, endemic pollinator fly, whose larvae are known to prey on pest insects. Collected in protected *Scalesia cordata* habitat (Photo: K. Vera, CDF)



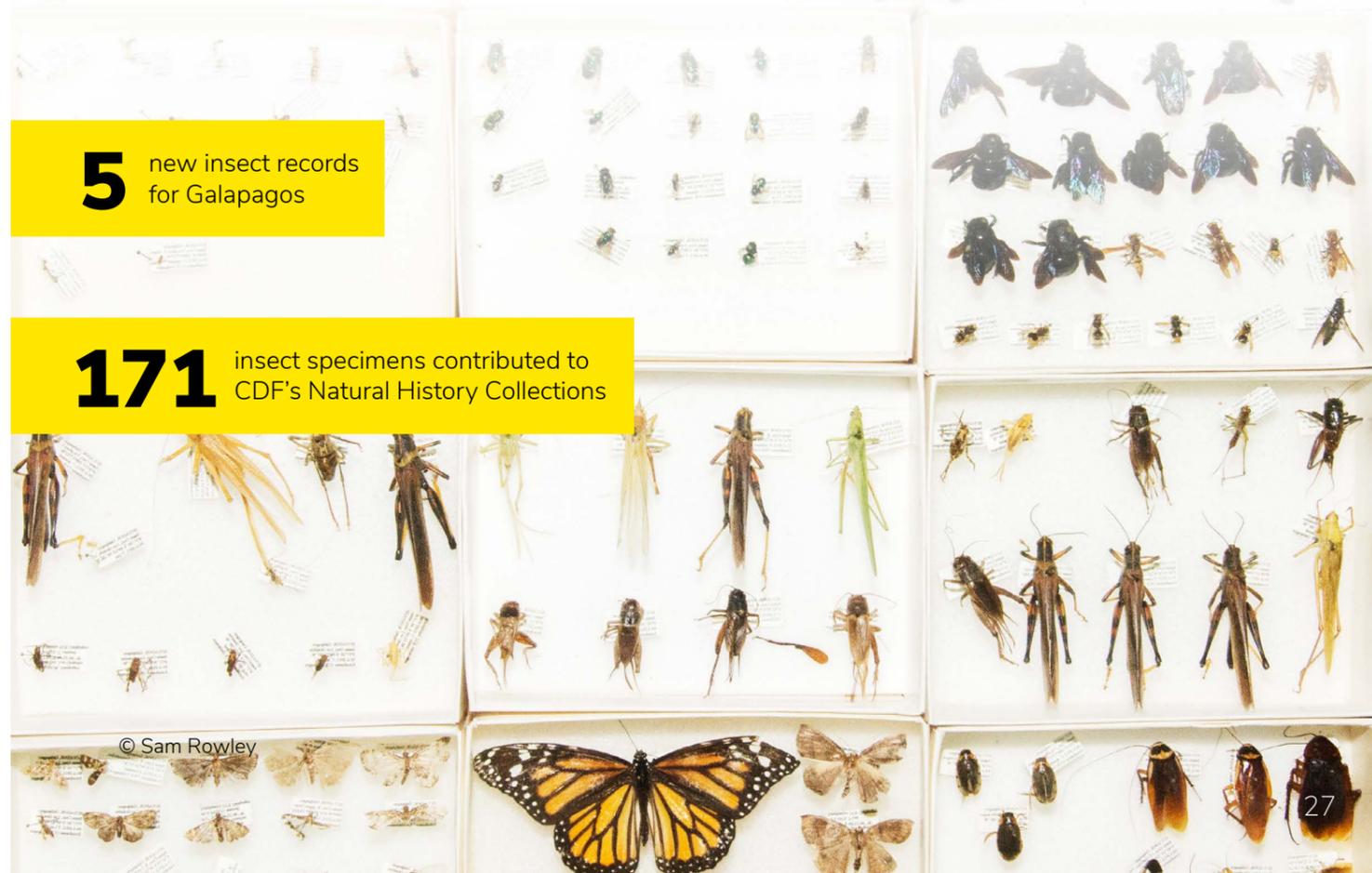
Zagrammosoma lineaticeps, a microwasp (Hymenoptera) that parasitizes butterflies and flies (specimen stored in the ICCDRS reference collection (K. Vera, CDF)

ISABELA

On Isabela, we are working to identify insects associated with *Scalesia cordata*, an endemic and endangered plant species. We are particularly interested in learning about pollinators of this rare plant. Of the 1,820 terrestrial invertebrates collected around *S. cordata* trees in 2022, the most abundant groups were wasps and ants (Hymenoptera), followed by flies and mosquitoes (Diptera). While wasps and flies are important pollinators, ants, especially the tropical fire ant *Solenopsis geminata*, can be a problem in the *Scalesia cordata* populations, since they not only feed on the plant but also defend colonies of scale insect pests in return for honeydew produced by these insects.

5 new insect records for Galapagos

171 insect specimens contributed to CDF's Natural History Collections



© Sam Rowley



© Rashid Cruz / CDF

GALAPAGOS TORTOISE MOVEMENT ECOLOGY PROGRAMME

Since 2009, the Galapagos Tortoise Movement Ecology Programme (GTMEP) has worked with collaborating institutions and the Galapagos National Park Directorate (GNPD) to study the health, movement ecology, and reproduction of giant tortoises—one of the most emblematic animals of the archipelago—in order to inform effective conservation and management actions. Last year was a productive year for the team with some key milestones of note.

For the first time ever, X-ray technology was used in the field to study giant tortoise reproduction. A total of 20 female tortoises from Western Santa Cruz (*Chelonoidis donfaustoi*) were x-rayed with preliminary results suggesting that migratory females lay more eggs and produce more clutches than non-migratory females. The study will be repeated in the summer of 2023 to obtain more robust conclusions.

After discovering the presence of novel viruses in adult tortoises in 2021, this year we conducted a pathogen screening on 50 tortoise hatchlings to see whether they carried viruses from an early



© Joshua Vela

age, and detected the presence of *Chelonoidis adenovirus* in one individual. We also conducted a pathogen screen on 20 adult tortoises, which indicated the presence of agrochemicals in the plasma and feces of tortoises in agricultural areas of Santa Cruz, that requires further investigation.

Some 11 years of tortoise nesting data collected by the Galapagos National Park Directorate (GNPD) were analyzed in 2022 with a view to identifying patterns and correlations. Preliminary analyses suggest that hatchling success is negatively correlated with temperature and average precipitation, and there is high predation by wild pigs, as well as more ant parasitization in La Caseta and La Torta nesting sites.

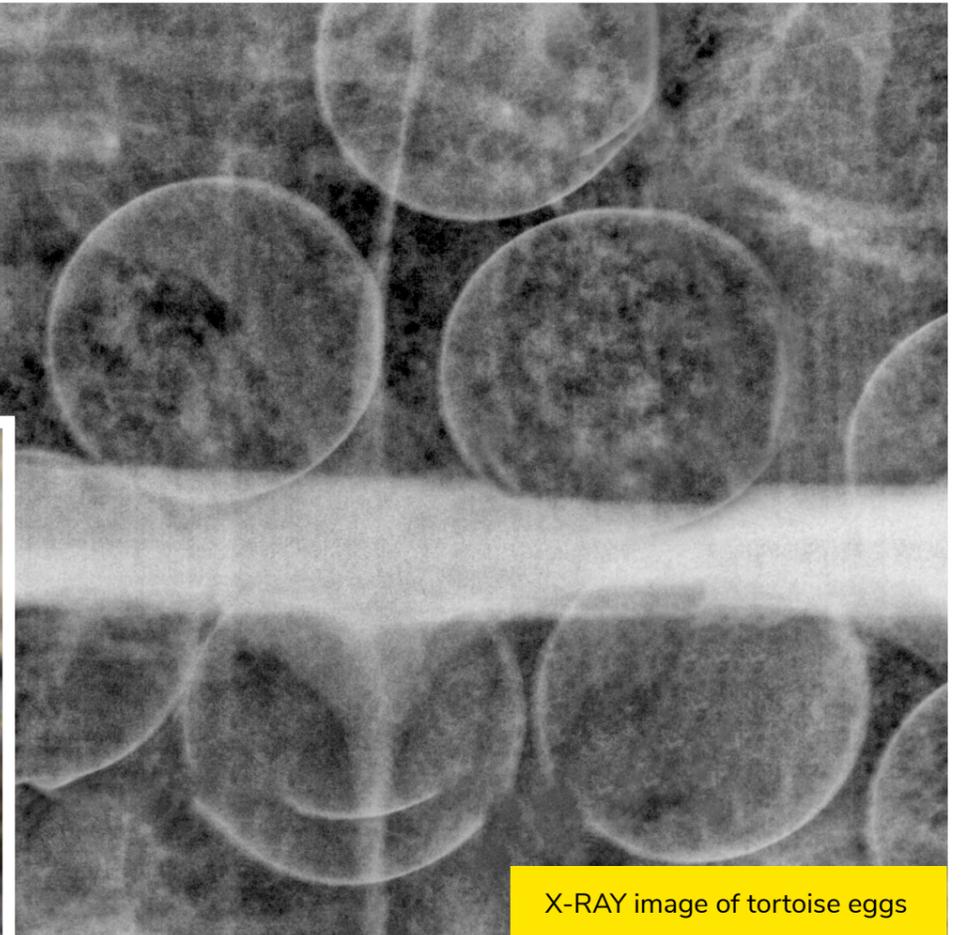
Finally, we continued to track both adult and juvenile tortoises throughout 2022 and conducted our annual trips to Alcedo Volcano and Española Island to download movement data and monitor tagged tortoises. We currently have 33 adult and 16 juvenile tortoises tagged in Santa Cruz, nine in Alcedo and seven in Española.



Watch how our scientists use x-ray technology in the field



© Joshua Vela



X-RAY image of tortoise eggs



20 female tortoises were X-rayed as part of tortoise reproduction study

11 years of tortoise nesting data analyzed

© Joshua Vela

MARINE ECOSYSTEMS

Green sea turtle



IN FOCUS: A VISION FOR CONSERVATION IN THE EASTERN TROPICAL PACIFIC

© Joshua Vela

The Eastern Tropical Pacific (ETP), which extends from southern Mexico to northern Peru, is considered one of the most productive ocean regions in the world. Its biological and biophysical richness provide significant ecosystem services of global importance, including climate regulation, carbon storage, food production and nature-based tourism. In recognition of the exceptional levels of biodiversity in its endemic, native and migratory species, several world-renowned Marine Protected Areas (MPAs) are located here including Galapagos (Ecuador), Cocos (Costa Rica), Coiba (Panama), Malpelo and Gorgona (Colombia).

Despite their immense ecological value, marine ecosystems in the ETP are being steadily degraded due to increasing pressures from human activities. Climate change, marine invasions, illegal, unreported and unregulated fishing, pollution, increased and unregulated tourism, coastal development, and human population growth are among the documented problems posing growing threats to ecosystem health, livelihoods, and to the productivity of coastal zones in the ETP.

The Eastern Tropical Pacific Marine Corridor initiative (known as CMAR) is a visionary concept that aims to promote the conservation and sustainability of marine ecosystems and their services in the ETP by connecting regional MPAs through a multinational transboundary marine corridor. The Charles Darwin Foundation in Galapagos has supported CMAR since its creation in 2004, and the Galapagos Archipelago, whose many ecosystems host a major portion of the marine biodiversity of the ETP, including numerous migratory species, sits at the heart of the ETP and CMAR.

Protected islands and MPAs in this marine corridor are linked by a series of underwater ridges and seamounts that are by themselves key underexplored biodiversity hotspots. These underwater ridges and seamounts represent

veritable highways for migratory species such as whales, turtles, sharks, and other pelagic fish, and understanding how these critical geologic and biophysical features define the migratory patterns of such emblematic species is critical to long-term conservation efforts in and around Galapagos, and within the ETP. Many species migrate between regions for breeding, or to nurse, and ensuring their safe passage as they cross geopolitical boundaries is key.

In November 2021, at the climate conference (COP26) in Glasgow, the President of Ecuador announced the formation of the new 60,000 km² Hermandad Marine Reserve, which holds particular significance to enhancing the ETP's ecological connectivity as it establishes a direct protected link between Galapagos and Cocos Island and represents a critical step in the creation of a larger multinational transboundary marine corridor. The declaration has generated an enormous amount of interest from neighboring countries who have made similar ambitious MPA pledges, and also from numerous philanthropic organizations who see the unique conservation potential of helping to establish a transboundary marine corridor in the ETP.

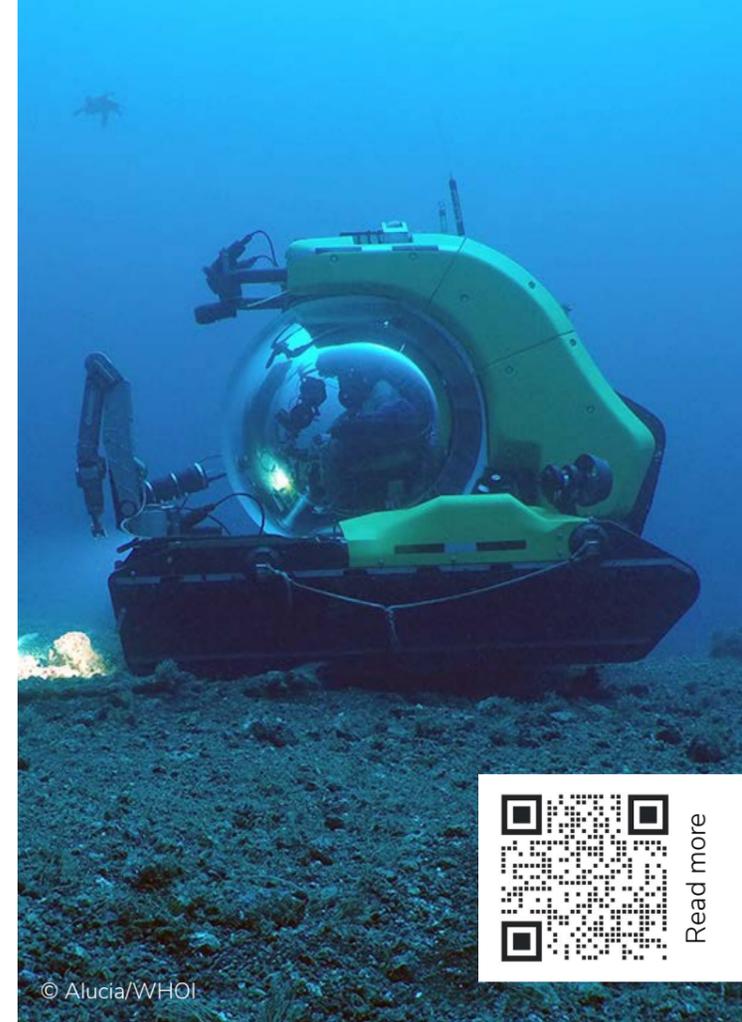
From a scientific perspective, CDF is ideally positioned to lead the process to create a multinational transboundary marine corridor. Unlike any other organization in the region, we have over 20 years of critical long-term baseline marine data, alongside several marine projects (outlined in this report) that undertake research that is critically important to advancing the ETP initiative. Furthermore, CDF scientists were instrumental in the formation of CMAR and continue to be active participants. The ETP marine corridor represents one of the most ambitious marine conservation initiatives in the world and we are fortunate to be ideally situated in Galapagos to be a part of this historic multinational effort to safeguard our oceans.

COLLABORATING TO EXPLORE THE DEPTHS OF THE GALAPAGOS MARINE RESERVE

Off-shore expeditions with strategic partners resumed in 2022 after a two-year hiatus due to the COVID-19 pandemic. Off-shore expeditions with strategic partners resumed in 2022 after a two-year hiatus due to the COVID-19 pandemic. During these expeditions, we made significant strides in our ecological study of deep-water kelp forest communities (50-70m) and expanded our exploration of deep-sea habitats in the Galapagos Marine Reserve.

A highlight was our participation in Mission Blue's Multidisciplinary Expedition on the M/V Argo, during which we had a unique opportunity to dive deeper using a manned submersible and document marine habitats between 50- and 300-meter depths along the island's coastal slopes. A total of 16 submersible dives were carried out providing the project with vertical video surveys that contribute to the growing baseline inventory of deep-sea species and habitats found in Galapagos.

We also joined forces with the Inkfish Foundation for more deep-sea data collection in remote regions of the islands. During this expedition, we undertook five exploratory dives in the vessel's manned-submersible, providing new video survey data and invertebrate species samples that appear to be unknown to the region.

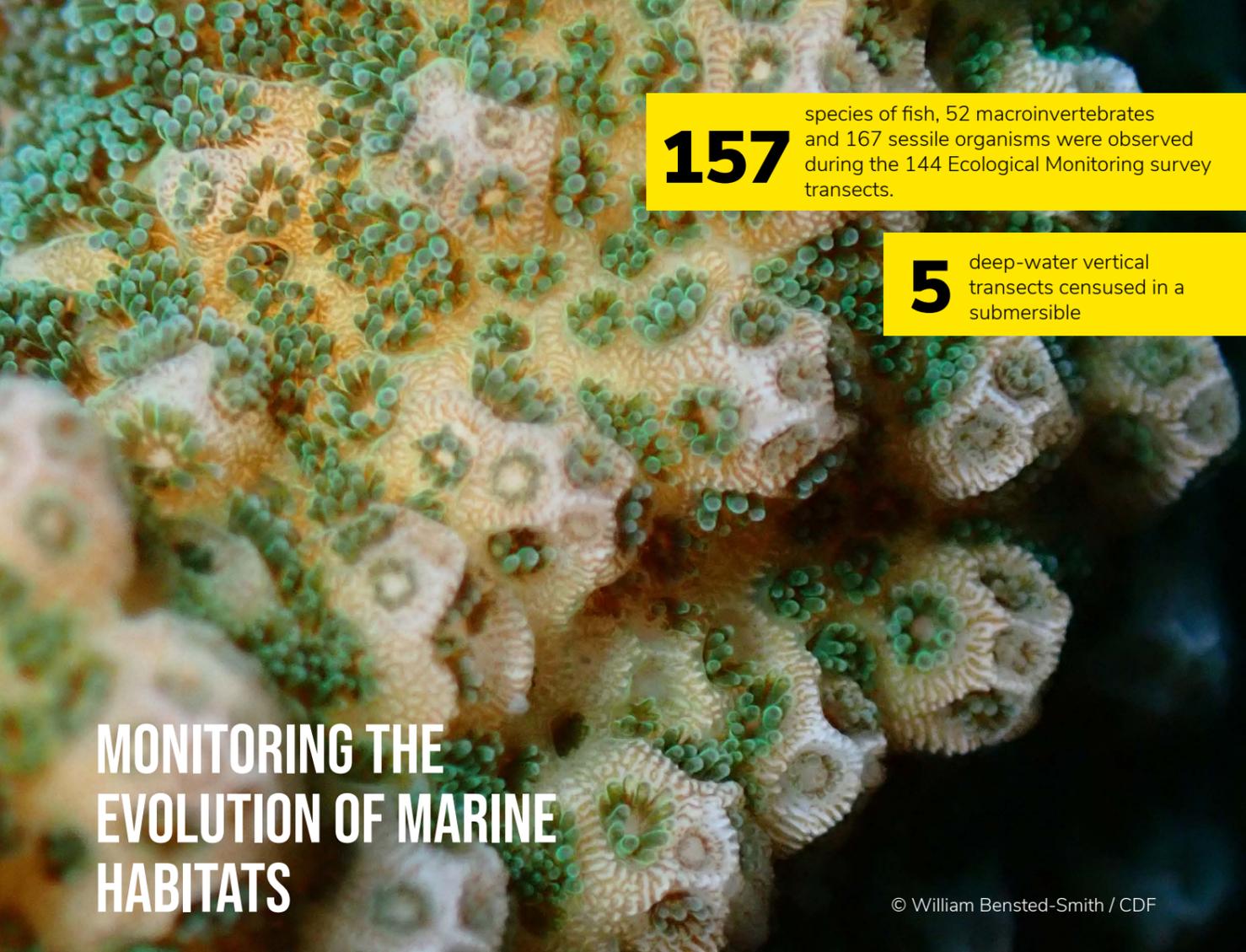


Read more

We also returned to the *Eisenia galapagensis* tropical kelp forest found along the west of Fernandina to collect more data and understand the environmental conditions under which this marine forest is thriving.

Another key alliance with the National Geographic Exploration Lab and Lindblad Expeditions helped us lead a pilot study on the use of affordable deep-sea technology through an archipelago-wide deep-sea fish study using National Geographic's innovative deep-sea camera systems. We ran seven deployments of "baited and weighted" cameras to the sea-floor at depths up to 1,000m, allowing high-definition video recordings of all organisms attracted to the camera system for post-analysis of deep-water fish diversity and distributions which we will do in 2023.

Finally, we **continued to monitor and collect data at two kelp forest sites across seamount summits and coastal drop-offs near Santa Cruz** using small remote-operated vehicles (ROVs). This data allows us to assess the climatic and ecological changes influencing kelp forests during Galapagos' warm and cold seasons.



MONITORING THE EVOLUTION OF MARINE HABITATS

157

species of fish, 52 macroinvertebrates and 167 sessile organisms were observed during the 144 Ecological Monitoring survey transects.

5

deep-water vertical transects censused in a submersible

© William Bensted-Smith / CDF

The Subtidal Ecological Monitoring Program is vital to conservation efforts in the Galapagos Marine Reserve (GMR) as it provides information on the evolution of marine habitats over time in response to pressures such as climate change, El Niño, fisheries, and tourism. In 2022, the team successfully monitored 67 sites and completed 144 transects across 9 different islands. A total of 157 species of fish, 52 macroinvertebrates and 167 sessile organisms were observed.

Technology was a key theme in subtidal ecological monitoring this year, with a number of important applications in the field.

Onboard the Inkfish expedition, the team **completed 5 deep-water vertical transects in a submersible across various sites off the coast of Isabela Island.** These transects help to provide information on the little-known changing physical and biological composition of habitats starting at 600-meter depth. Scientists also used a CTD sensor to **measure conductivity, temperature and depth at 12 sites of interest across 6 islands.**

This data tells us about the physical properties of water down to 100 meters, which combined with the biological data collected from dive surveys provide a more complete image of the health of marine ecosystems across the 5 bioregions inside the GMR.

A SOFAR Spotter oceanographic buoy was installed at Darwin Island in March 2022 to monitor the conditions at the last remaining shallow structural coral reef in the GMR, which shows their resilience compared to other extinct reefs in the archipelago. For the first time the team used photogrammetry at scale to **construct a high-resolution 3D model of the corals found at the islands of Darwin and Wolf.** This method not only reduces the required dive time to complete transects, decreasing the risks for divers and allowing for a greater work range, but also increases the precision of data collection and analysis related to disease identification and coral colony sizes, which allows more accurate comparisons of fixed sites over time.

ADVANCING OUR MONITORING OF MARINE INVASIVE SPECIES

73

sites surveyed across 9 different islands

Since 2012, the Marine Invasive Species Program has provided important information about biological invasions and impacts of invasive species at the local, regional, and international level.

During 2022 the team successfully monitored 73 sites across 9 different islands in the Galapagos Marine Reserve (GMR). These surveys allow us to establish a baseline of the marine fouling community's diversity and structure, as well as monitor for non-native introductions. A total of 59 introduced species are reported for Galapagos—in line with reported numbers in 2021.

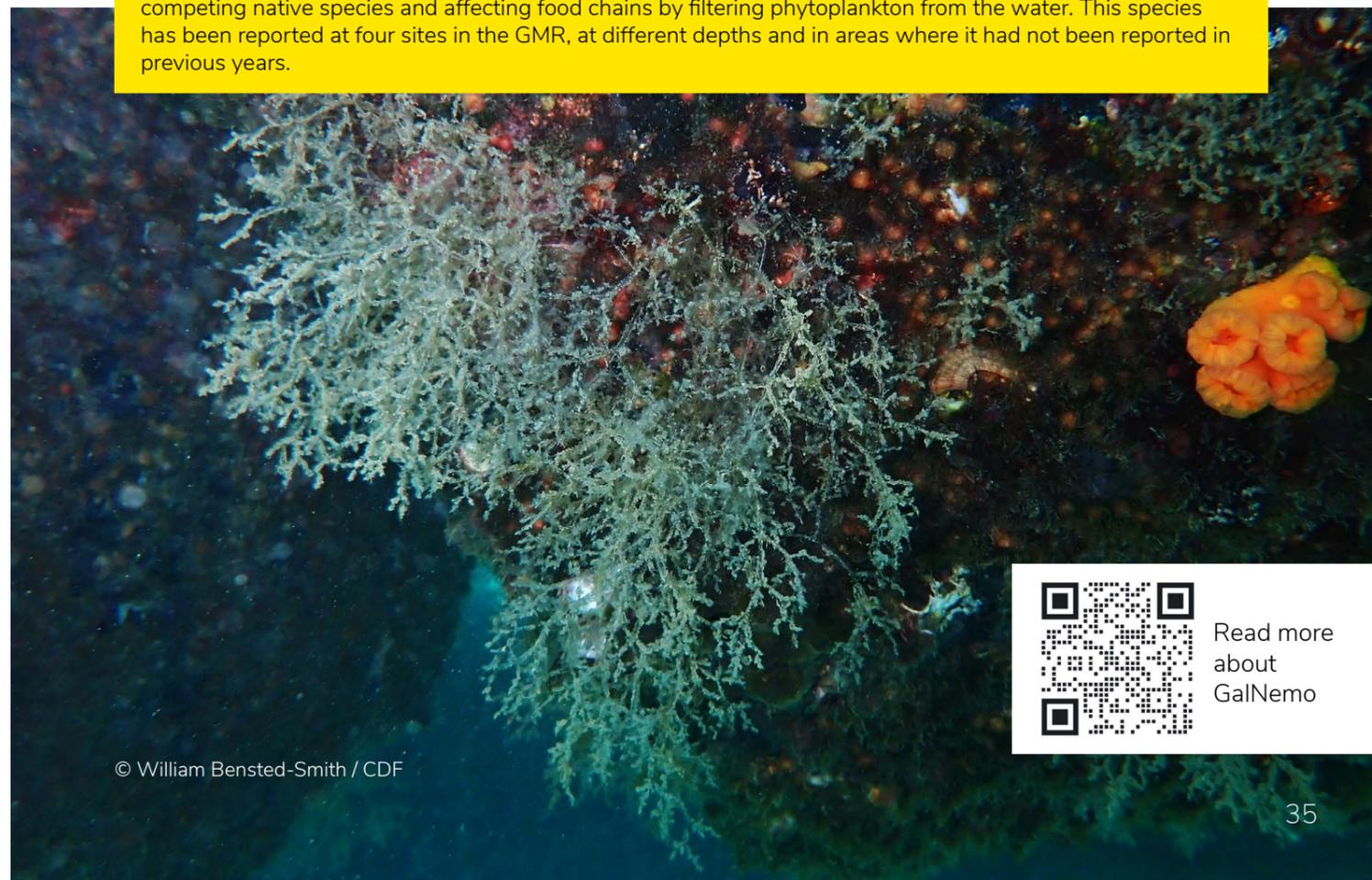
For the first time, settlement plates were collected from the dock in Floreana Island for analysis.

Preliminary results indicate that introduced species are growing on the Floreana settlement plates, among others the ascidian *Botrylloides niger*, *Didemnum perlucidum* and *Bugula neretina*. A list of non-native species has been recorded and more species are still to be identified with the plate retrieval in 2023.

A key milestone in 2022 was **the launch of GalNEMO - the first online tool to share baseline information of the 59 introduced marine species** reported in the GMR. This online platform, developed alongside strategic partners, facilitates the exchange of information between researchers, decision-makers, and other stakeholders that seek to develop effective strategies for the conservation of the biodiversity of the Galapagos.

Species focus: spaghetti bryozoan (*Amathia verticillata*)

This species is a known invader worldwide and can develop into huge aggregations and cause fouling, out-competing native species and affecting food chains by filtering phytoplankton from the water. This species has been reported at four sites in the GMR, at different depths and in areas where it had not been reported in previous years.



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Read more about GalNemo

35

scalloped hammerhead sharks tagged in 2022

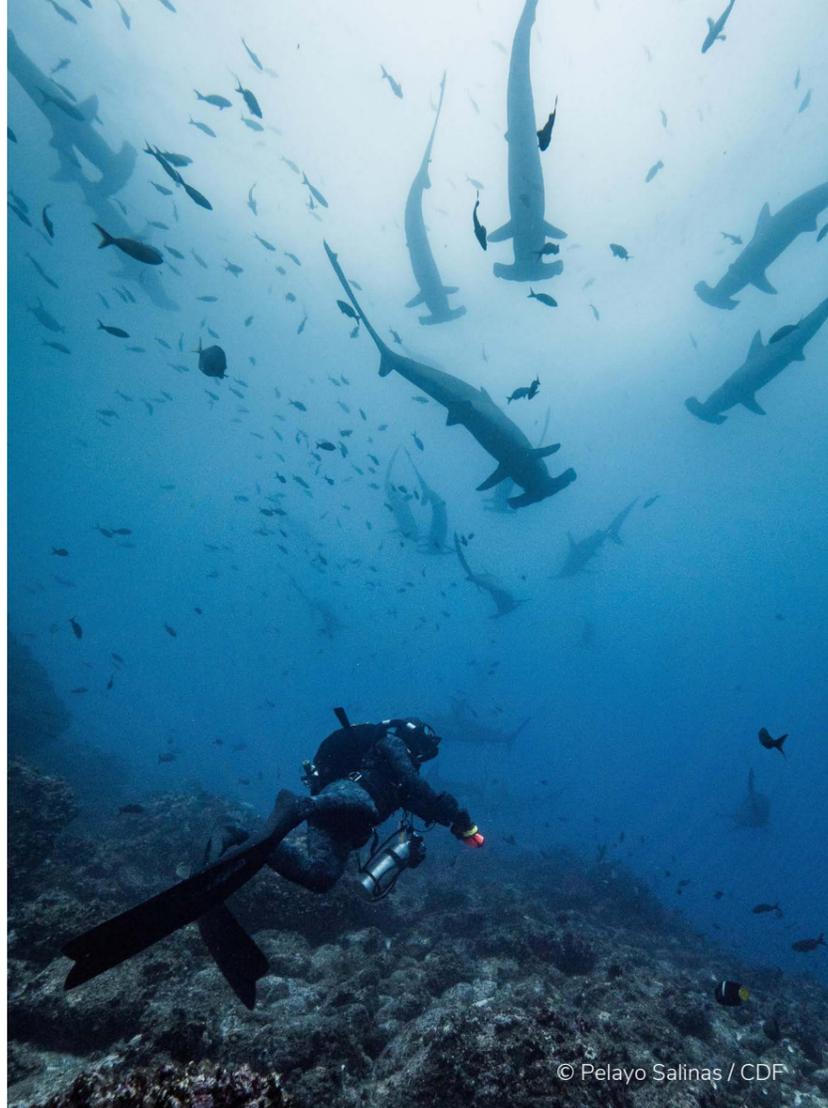
33,000km

distance covered by a female silky shark in 1.5 years

TRACKING SHARKS TO BETTER PROTECT THEM

During 2022, our shark ecology team continued to study sharks within the Galapagos Marine Reserve (GMR) and their movements in and outside the reserve, in an effort to inform effective conservation actions to protect shark populations threatened by overfishing, as well as illegal, unreported and unregulated fishing (IUU).

Three, two-week long scientific expeditions to Darwin and Wolf, as well as multiple day trips were carried out during 2022. These resulted in the **satellite tagging of 35 scalloped hammerhead sharks, the collection of 78 tissue biopsies, and 112 hours of stereo-video surveys.** Such activities provide valuable data on the movement patterns, habitat use, and population dynamics of this critically endangered species. Satellite tracking of female scalloped hammerhead sharks has shown evidence of pregnant sharks tagged in Galapagos migrating to coastal areas of



© Pelayo Salinas / CDF

central and south America to give birth. These findings have important conservation implications as hammerhead sharks are exposed to severe fishing pressure in the surroundings of the GMR, as evidenced by the large number of sharks tagged by our project that have been caught in recent years by fishing boats.

We analyzed data on 47 silky sharks tagged with satellite transmitters since 2021, with many sharks tracked for more than a year, and some up to two years. This research has yielded the longest track of a silky shark to date, with one female shark engaged in multiple long-range excursions between the central and eastern Pacific, and **covering a distance**

of ~33,000 km in 1.5 years of tracking! Many of the tagged sharks spend large periods of time outside of the GMR, with evidence of at least three tagged sharks being fished and landed in Costa Rica and Ecuador. These findings highlight the need for ambitious and comprehensive transboundary management tools for improved fisheries management to reduce ongoing silky shark population declines.



Read more about our silky shark tagging!



Photos: © Juan Manuel García / CDF

THE HIDDEN THREATS OF NOISY MARINE TRAFFIC: GREEN TURTLES NESTING IN A BUSY AREA

In 2022, we conducted a one-month pilot project to assess whether the presence of vessels in front of Las Bachas beach—a key nesting site—correlates with the number of female turtles arriving to the beach at night. Underwater noise was recorded using a hydrophone placed in front of the beach, and vessel movement was quantified using data from the vessel monitoring system. In total, 617 turtles were sighted in the 30-day period and an average of 20 females were recorded to arrive at the beach every night. We found that the

number of turtles arriving to the beach decreased 40% on nights and hours when vessel movement was detected in front of the nesting beach, which suggests linkages between marine traffic and nesting behavior.



Read more about the pilot





Read more about the Galapagos Seafood Entrepreneurs Community

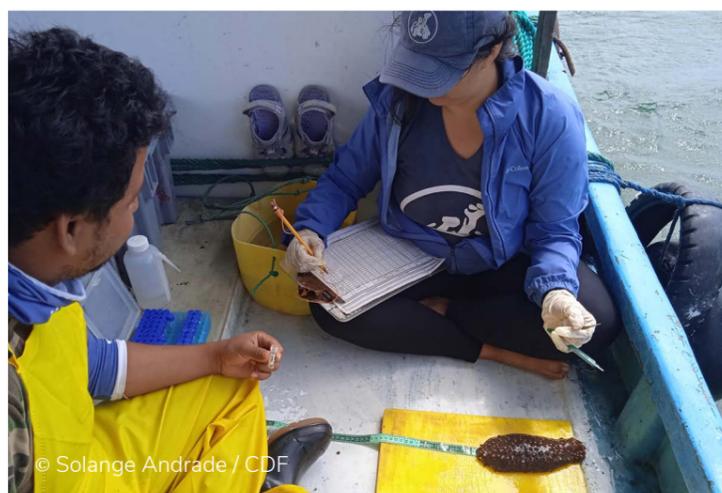


INNOVATING FOR GALAPAGOS' SUSTAINABLE FISHERIES

Last year saw our Interdisciplinary Fisheries Project make significant contributions to the sustainable use of Galapagos' fishing resources. Our innovative research and collaboration with different stakeholders have been instrumental in ensuring that scientific information is considered in the decision-making processes of both the government and the private sector.

One of our most significant accomplishments in 2022 was our **research into the market for credit services for Galapagos' artisanal fishing sector**. Our study found that financial services for fishermen were in short supply, and women involved in fishing-related businesses have better money management skills and higher credit risk appetite than men. Our report suggests that public and private banks should improve their knowledge of the sector in order to design financial services that are better tailored to Galapagos fishermen, and with special attention paid to the women in the industry.

We also conducted the **first-ever evaluation of all of Galapagos' fisheries from an environmental, economic, and social perspective**. The study



© Solange Andrade / CDF

compiled all the existing information on different fisheries, including analysis of the regulatory framework, gender, and climate change. This evaluation report informed discussions held to update the Galapagos fisheries management plan.

Furthermore, we developed a science-based methodology to model the impact of fishing activities on the population of sea cucumbers in an effort to improve sustainable fishing of this once overfished resource. In a big win for the interdisciplinary fisheries team, **the new model was unanimously adopted by local authorities and the artisanal fishing community** who are keen to ensure the recovery of Galapagos' most valuable fishing resource.

Finally, we provided a total of US\$10,000 to four business ideas so they can incubate and accelerate their ventures as part **of the Galapagos Seafood Entrepreneurs Community**, an incubation platform launched in 2021 to foster socially and environmentally responsible ventures committed to transform the islands' seafood system.



School of bigeye jack mackerel

HOW TECHNOLOGY SUPPORTS OUR RESEARCH AND CONSERVATION EFFORTS IN GALAPAGOS

The Galapagos Islands are often associated with incredible ecosystems, unique flora and fauna, and breathtaking landscapes, but not so often with technology. Despite the challenge of limited internet access, scientists and researchers in the Galapagos Islands are finding innovative ways to harness the power of technology to advance their work in the field and in the office.

Our scientists are using sensors, cameras, drones and high-resolution satellite images to monitor wildlife populations and habitats in remote areas, providing indispensable data for conservation efforts. Here's how technology is making a difference in Galapagos:

1

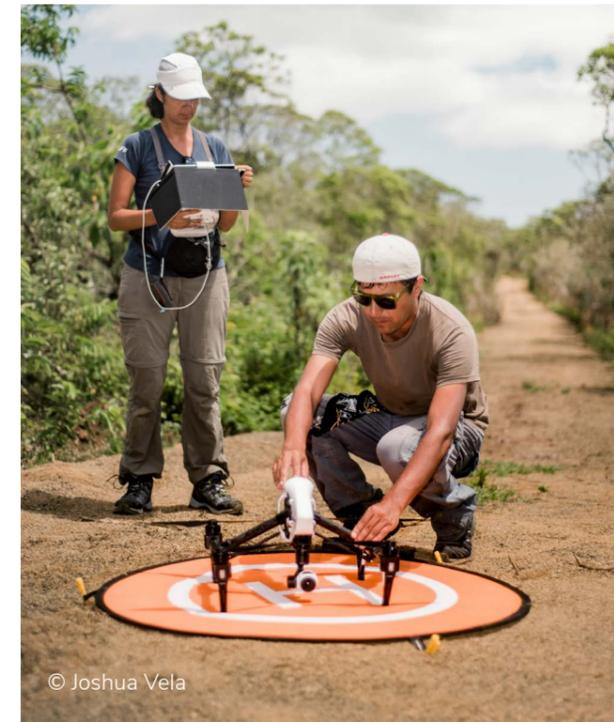
The use of **Remotely Operated Vehicles (ROVs), manned submersibles, and deep-sea drop cameras** are revolutionizing the study of deep-water habitats. These cutting-edge technologies allow for the exploration of previously unknown and inaccessible areas, revealing a wealth of new discoveries, including species of invertebrates, kelp forests, and more. The application of these innovative tools has opened up a vast new realm of possibilities for the study of the deep waters in Galapagos. But ocean technology is expensive and access limited, which is why collaborations with key institutions are key for the CDF deep-sea team to advance their work.



© Joshua Vela

2

Drones and satellite images have played a critical role in several of our conservation projects in the Galapagos, helping us reach remote and difficult-to-access areas with minimal disturbance. For instance, the use of aerial imagery has allowed us to monitor marine turtles, estimate their population and distribution patterns under different conditions, and create a map to show the abundance of sea turtles near nesting beaches. This data, collected with high-resolution and minimal disturbance, has proven invaluable in informing conservation efforts.



© Joshua Vela

Additionally, our scientists have developed and tested a new mapping methodology using **high-resolution satellite imagery** donated by Maxar, to map the location and abundance of blackberry and guava in *Scalesia* forests. This enhanced precision not only improves the monitoring of invasive species, but also enables park rangers to plan control actions more efficiently, saving scarce resources and helping to protect hard-to-access areas in Galapagos.



© Rashid Cruz / CDF

3

Acoustic and satellite tagging are revolutionizing our understanding of shark migration patterns. These tools allow us to track the movements of these emblematic creatures, giving us valuable insights into their habitat use and migration routes. Our recent tagging of 47 adult silky sharks has already yielded exciting results. One female shark covered an impressive 7,000 kilometers (4,350 miles) over seven months, visiting the Galapagos, Isla del Coco, and Malpelo Marine Reserves along the way. This data is crucial in informing and refining conservation plans, ensuring the protection of these species and their habitats.

4

Tracking marine turtles and giant tortoises using **GPS technology** is giving us insights into migration patterns and the challenges they face. For over a decade, the Galapagos Tortoise Movement Ecology Programme (GTMEP) has been studying tortoise migration and its impact on health, reproduction, and environmental change. We use long-lasting solar GPS tags that not only record the tortoises' location, but also gather valuable data on their velocity, acceleration, temperature, and movement patterns.



5,700+ children, youth and adults reached through collaborative outreach campaigns with partner organizations

EDUCATION AND COMMUNITY OUTREACH

THE ENVIRONMENTAL EDUCATION AND COMMUNITY OUTREACH PROGRAM AIMS TO STRENGTHEN THE GALAPAGOS COMMUNITY'S AWARENESS AND EDUCATE THEM ON ENVIRONMENTAL ISSUES IN GALAPAGOS. THE PROGRAM COMES TO LIFE THROUGH FIVE CORE COMPONENTS

SUSTAINABLE COMMUNITY PROGRAM

Aimed at first- and second-year high school students

The program engages students in hands-on experiences related to environmental education, encouraging them to think critically and creatively about sustainable practices. It provides a platform for students to connect with their local environment and become actors of positive change in their communities. We worked with 32 students and 3 teachers from three educational institutions. In total 63 activities were held, covering various topics such as garbage and consumption habits, Galapagos ecosystems, sustainable agriculture, urban cleanups, science and conservation, and theatre.



957 children, youth and adults engaged with through CDF's Science Goes to the Community talks

317 children and youth engaged directly through CDF's educational programs

SCIENCE CLUB – SHARK AMBASSADORS

Aimed at 14 to 18-year olds

This program aims to foster a sense of curiosity and wonder of the natural world, as well as provide a platform for youth to develop their leadership skills and become advocates for environmental change in their communities.

Our Science Club was very active this year in Santa Cruz, with 25 youth participating in 75 events, including activities designed in collaboration with CDF scientists. We also formally launched the Science Club on Isabela with a total of 30 youth participating in seven experiential outings related to sharks, sea turtles, and bird watching.

SUMMER CLUB

Aimed at 13 to 15-year-olds

We piloted the Summer Club in Santa Cruz, providing experiential learning opportunities and connection with nature during the summer break. A total of 12 students participated in 10 activities led by 4 'Shark Leaders'. After this year's success, the Summer Club will return in 2023.

NATURAL MORNINGS

Aimed at 5 to 14-year olds

Natural Mornings are a key hands-on learning experience which helps build a stronger connection between formal education and scientific research, promoting a deeper understanding of the importance of preserving the Galapagos ecosystems. We conducted seven tailored science and conservation activities with 214 students and 49 teachers from four educational institutions. We also distributed the book "Sharks of the Galapagos Marine Reserve" to students in 14 local schools.

OPEN HOUSE 2022

Our annual Open House is a celebration of science and creativity that is shared with the Santa Cruz Island community. On July 22nd, CDF scientists welcomed more than 1,000 visitors eager to discover the wonders of the Galapagos Islands and learn the latest about our scientific work and projects.



360 Tour of our Open House 2022



Photos: © Juan Manuel García / CDF

TRAVELING LIBRARIES

Libraries are one of the pillars of education and professional development. In light of the scarcity of public libraries in Galapagos, in 2019, CDF launched its travelling libraries, which aim to bring books to communities across the archipelago. In 2022, our travelling libraries continued their journey from Floreana, to the highlands of Santa Cruz (El Cascajo and Santa Rosa). We also resumed activities in San Cristóbal and Isabela this year.



318

students attended the play
"Salvemos a la *Scalesia cordata*"

OUR LIBRARY, ARCHIVE & MUSEUM

40

original, bilingual, open access articles on the heritage of CDF and Galapagos published on Galapagueana

The CDF Library, Archive & Museum includes three distinct spaces dedicated to the management of knowledge and memory: written and audiovisual documents, archival materials, and archaeological and historical artifacts.

hundreds of hours of unreleased film on VHS, Betamax, mini-videos, CDs, DVDs, JAZ, and other formats. Finally, the process of cleaning and repairing the collection of maps and plans has also begun.

Throughout 2022, we maintained our commitment to the recovery of knowledge and stories, and to their free dissemination. In the Library, in addition to keeping our bibliographic database up to date and offering a search and reference service, we have actively promoted reading as a form of leisure by significantly expanding our collection of fiction. At the same time, we have organized a series of activities to support scholarly writing and outreach.

The Galapagueana digital archive project, launched in December 2021, had some notable products for the year including almost **40 original, bilingual, open-access articles on the heritage of the CDF and Galapagos**. It also launched four original digital books, maintained its physical exhibit, and substantially expanded the Galapagos Historical Bibliography and the Galapagos Chronology, essential sections for understanding human and scientific history in the archipelago.

In the Archives, we have begun the process of recovering personal documents of scientists who worked in Galapagos in the past, and have continued with the digitization of hundreds of photographs and slides, as well as manuscripts and unique grey literature. In addition, the process of digitizing the video collection, which includes

Lastly, the Museum has worked to recover and conserve artifacts that represent the day-to-day work at the Charles Darwin Research Station: from a collection of antique microscopes to various measuring instruments, including a series of wooden signs and audiovisual equipment.

WORKING WITH THE COMMUNITY IN ISABELA ISLAND

In 2022, our office on Isabela Island continued to expand its activities. A notable initiative was the support provided to monitor the green sea turtle population in Playa Grande in partnership with the Galapagos National Park Directorate (GNPD).

Another significant achievement was the publication of the technical report "The History of 'Pescado Azul' in Isabela," which documented the successes, challenges, and lessons learned from the Asociación Mujeres Pescado Azul de Isabela (2001-2008/2010) initiative. This initiative was a landmark in the history of the implementation of development projects with a clear gender focus in Galapagos, and was recognized nationally and internationally as an emblematic initiative in the area of development in Galapagos. Based on the findings of the report, guidelines were developed to improve the design and execution of similar initiatives.



Photos: ©Análía Ayala Plazarte / CDF

In addition to running key educational activities such as the new Isabela Science Club, our Isabela team continued to operationally support the bi-institutional project with GNPD "Saving the *Scalesia cordata*". The team supported the

implementation of community outreach activities, including four theatrical performances of the play "Salvemos a la *Scalesia cordata*" which was presented to 381 students of the Stella Maris School and the Jacinto Gordillo School.



© Carlos Espinosa / CDF

Check out the Galapagueana website:





OUR TEAM

146 full-time employees,
62% from Galapagos

CDF STAFF

Our people are essential to the delivery of our scientific research and to make the day-to-day running of our operations possible. In 2022, we had 146 full time employees, split almost exactly 50-50 between science and administrative support teams, which includes operations, HR, finance, fundraising, marketing and communications and IT, among others.

We have continued to champion women in science and are happy to report that 54% of our science team is female, including 50% of our scientific leadership. In administration, 46% of staff are female. As a key employer in Galapagos, we have a responsibility to hire, train and promote local talent and that is very much the case at CDF with 62% of our staff from Galapagos, 30% national, and 8% international. Approximately 42% of our scientific staff are permanent residents of Galapagos.

VISITING SCIENTISTS

As the largest research station in Galapagos that is also located next to the Galapagos National Park Directorate, we are a partner of choice for many collaborating, associate and visiting scientists looking to advance their research in Galapagos. During 2022, we welcomed a total of 95 visiting scientists from 17 different countries.

VOLUNTEERS

With air travel returning to normal, we were pleased to see volunteer numbers return to pre-pandemic levels. This year we trained a total of 72 volunteers, of which 33% were from Galapagos. More than 70% of our volunteers work in our science teams.



54% of our science
team are women

72 volunteers

95 visiting scientists from
17 different countries

OUR VALUES

- Respect and diversity
- Support
- Excellence
- Discovery
- Bravery
- Collaboration

Devil's crown, Floreana Island

SENIOR STAFF

LEADERSHIP TEAM

- Rakan Zahawi | Executive Director
- Maria José Barragán P. | Science Director
- Johanna Carrión | Director of Institutional Affairs
- Galo Del Hierro | Director of Human Resources
- Renee Monroe | Director of Fundraising
- Ambre Tanty Lamothe | Director of Marketing & Communications
- Phil van Haarlem | Director of Finance

PRINCIPAL INVESTIGATORS

- Stuart Banks | Seamounts
- Charlotte Causton | Invasive Invertebrates
- Francesca Cunninghame | Mangrove Finch
- Birgit Fessl | Land bird conservation
- Heinke Jäger | Ecological restoration
- Patricia Jaramillo | Galapagos Verde 2050
- Gustavo Jiménez | Sea birds
- Inti Keith | Marnie Invasive Species
- Gabriel Vianna | Shark ecology
- Ainoa Nieto | Giant Tortoise Movement Ecology Program
- Macarena Parra | Sea turtles
- Miguel Pinto | Natural History Collections
- Jorge Ramirez | Sustainable fisheries
- Pelayo Salinas de León | Shark ecology
- César Viteri | Sustainable fisheries

FUNDRAISING

In 2022, our conservation research work was backed by an extraordinary community of over **370 individual donors and more than 50 foundations and corporations**, demonstrating an unwavering commitment to our cause. Notably, we welcomed more than 250 new donors who joined us in our mission to protect the Galapagos Islands. Their generosity and support continue to inspire us, and we are deeply grateful for their contributions.

We have been awarded 18 grants and received 26 major gifts in 2022. **We have also forged new partnerships with development agencies like USAID and KfW Development Bank.** Developing these projects is a lengthy process and requires extensive collaboration and a lot of hard work, but the potential impact of these initiatives is truly monumental.

Last year was particularly memorable for us as we launched the Friends of the Charles Darwin Foundation for the Galapagos Islands, a 501(c)(3) nonprofit that makes supporting local conservation research and activities to safeguard the Galapagos archipelago easier than ever before for U.S. based individuals, corporations, and foundations. With this newfound tax-exempt status, we were thrilled to receive a \$1.1 million donation from Re:wild. Additionally, to keep the momentum going, an anonymous donor matched dollar-for-dollar the first \$100,000 raised by the Friends of the Charles Darwin Foundation.

In June 2022, we launched our Sponsor a Species program, providing an opportunity for donors to contribute to projects linked to specific emblematic



Visit the Friends of the Charles Darwin Foundation website!

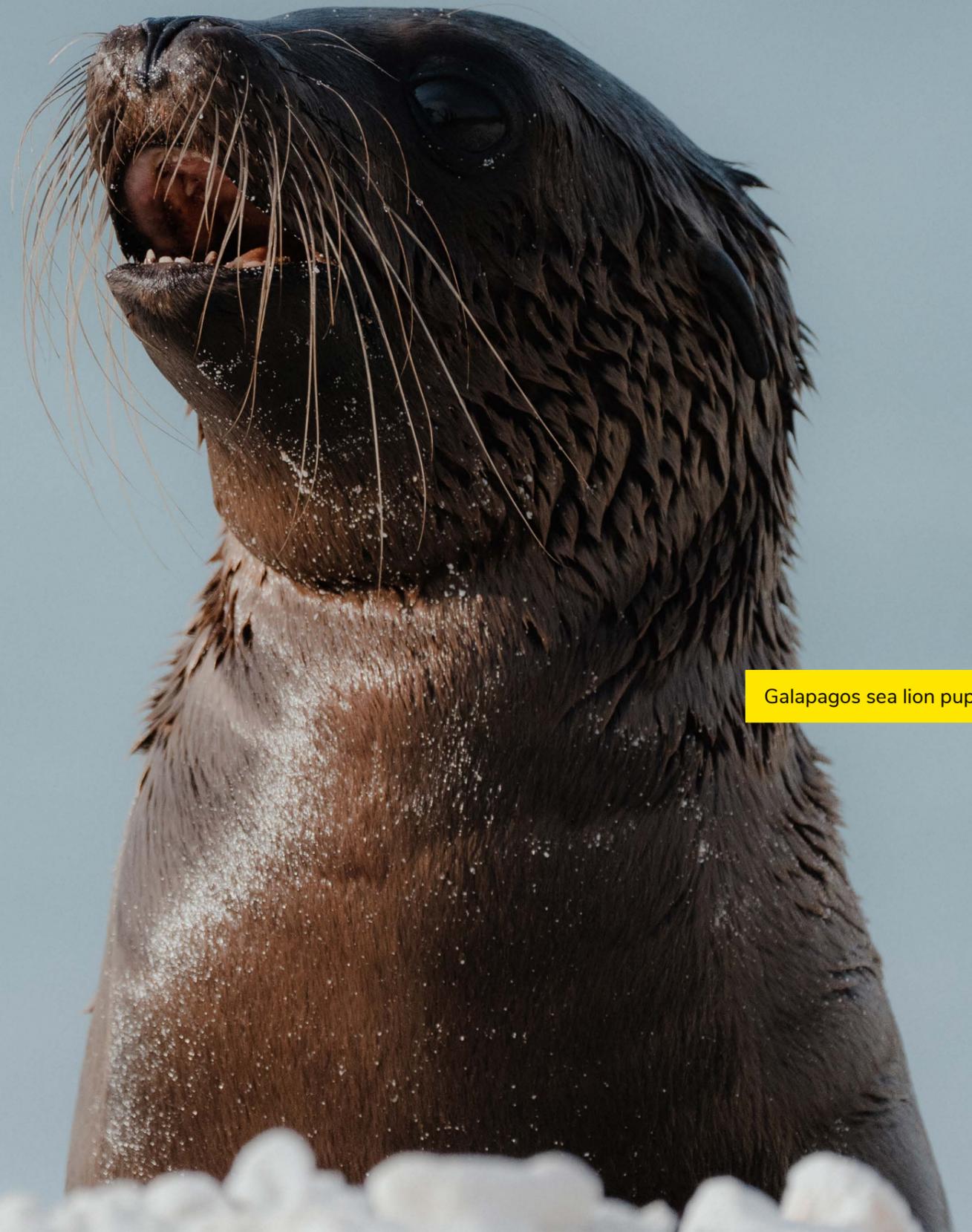
18 grants received alongside 26 major gifts

species, such as the Galapagos penguin and giant tortoise.

November was also a month to remember as we embarked on our first major donor cruise since the pandemic with support from the Gordon and Betty Moore Foundation and Ecoventura. Representatives from the Wyss Foundation, Bezos Earth Fund, Gordon and Betty Moore Foundation, and a major anonymous donor to CDF were in attendance. Since the cruise, the Moore Foundation and Bezos Earth Fund have pledged a \$2 million initial investment in our Deep-Sea Research Program, which will pave the way for the establishment of a regional hub for deep-water research based at the Charles Darwin Research Station.

Furthermore, we are delighted to report that our 2022 year-end campaign proved to be a big success, surpassing all previous years and raising a record-breaking unrestricted amount of \$201,500. We were honored to have received a major gift of \$50,000 from the generous donors Kristin and Sven Lindblad. Their contribution played an instrumental role in making our campaign such a triumph.

We're incredibly excited about the future of our conservation efforts in the Galapagos Islands, and we couldn't have done it without the unwavering support of our amazing community of donors!



Galapagos sea lion pup



PROTECT GALAPAGOS, IMPACT THE WORLD

Become a donor today

OUR DONORS

FOUNDATIONS / NON-GOVERNMENTAL ORGANIZATIONS

Above \$1,000,000

COMON Foundation
Fondo para el control de las Especies Invasoras de Galápagos (FEIG)
Re:wild
Wyss Foundation

\$500,000 - \$999,999

Gordon and Betty Moore Foundation

\$100,000 - \$499,999

Blue Action Fund
Fondation Franklinia
Galapagos Conservation Trust
Lindblad Expeditions-National Geographic Fund
Paul M. Angell Family Foundation
World Bank

\$50,000 - \$99,999

Focused on Nature
Houston Zoo

\$10,000 - \$49,999

Blue Feet Foundation
Friends of the Galapagos Islands Netherlands
Friends of the Galapagos Islands Switzerland
Ishiyama Foundation (in honor of Dr. John McCosker)
Japanese Association for Galapagos (JAGA)
Keidanren Nature Conservation Fund (KNCF)
National Geographic Society
Revive & Restore
Save Our Seas Foundation (SOSF)
St. Louis Zoo
UNESCO

\$1,000 - \$9,999

Cameron Foundation
Galapagos Conservancy Canada
Island Conservation
NTNU University Museum

CORPORATIONS

Above \$100,000

Ecoventura

\$10,000 - \$99,999

Indagare Travel
Johnsonwax del Ecuador S.A.
Maeda Corporation
Pikaia Lodge

\$1,000 - \$9,999

BESS Forest Club
Bracenet & GOT BAG
Galapagos PRO
Hotel La Casa de Marita
Hotel Le Parc
Lindblad Expeditions (in honor of their Travel Advisory Board Members)
Roberto Ochoa
The Verndale Corporation
Tropical Aquaculture Products Inc.
Wilderness Travel

INDIVIDUALS

Above \$500,000

Anonymous donor

\$100,000 - \$499,999

Anonymous donor (2)
George & Susan Krouse
Peter & Kris Norvig

\$50,000 - \$99,999

Sven-Olof & Kristin Lindblad
Eleanor Swanstrom (bequest)

\$10,000 - \$49,999

Amy Blackwell
Darlene Chirman
Donna Cole (in honor of Tamara Cole and Rakan Zahawi)

Ken Collins & Jenny Mallinson
Dennis Geist & Karen Harpp
Ronnie Stewart
Marisa Ignacio Hormel Trust
Priscilla C. Gray Residual Trust (bequest)
The Barry and Mimi Sternlicht Foundation

\$1,000 - \$9,999

Anonymous donor (5)
Anonymous donor (in honor of Prof. William Durham)
Anonymous donor (in memory of Harryet Pon)
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Ellson Family Charitable Trust (in honor of Prof. William Durham)
Marchello Family Fund
Ritz Family Foundation

\$500 - \$999

Anonymous donor (3)
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Paul Ruffles
Melissa Sader
Huub & Amy te Plate (in honor of Wijnand Pon)
Tom & Sam Thompson
Bob Welper
Harold & Joan Feinbloom Family Foundation

AUDITED FINANCIAL REPORT 2022

	2022	2021
INCOME		
Applied restricted income	2,785,633	3,263,295
Unrestricted pledged income	2,570,417	2,321,992
Unrestricted other income	621,532	203,005
Institutional promotions	424,150	208,614
Other income	203,991	111,167
Total income	6,605,723	6,108,073
EXPENDITURE		
Science, conservation and education*	3,944,673	3,771,232
Fundraising	443,961	430,948
Other expenditure	2,419,555	1,883,231
Extraordinary	-59,562	-
Total expenditure	6,748,627	6,085,411
* Science, conservation and education		
Cost of scientific projects	2,395,507	2,623,963
Cost of other projects	337,975	639,332
Services to scientists	276,160	159,702
Laboratory and collections	935,031	348,235
Total	3,944,673	3,771,232

STATEMENT OF FINANCIAL POSITION

ASSETS		
Cas/cash equivalents	4,463,898	2,389,078
Other current assets	779,127	263,474
Non-current assets	3,501,318	3,419,299
Total assets	8,744,343	6,071,851
LIABILITIES AND EQUITY		
Deferred income	4,497,656	1,727,731
Other current liabilities	1,760,129	1,654,303
Employee benefits	674,500	734,855
Equity	1,812,058	1,954,962
Total liabilities and equity	8,744,343	6,071,851

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Galapagos tree finch
chicks in there nest

PROTECT GALAPAGOS, IMPACT THE WORLD

Help us safeguard Galapagos, one of our world's greatest natural treasures, by making a tax-deductible donation today via our website www.darwinfoundation.org. Your gift directly supports our scientists' work at the Charles Darwin Research Station.



We also receive donations via check, bank and stock transfer. For more information, please contact our fundraising team at fundraising@fcdarwin.org.ec

Thank you for making an impact with us!

CHARLES DARWIN FOUNDATION FOR THE GALAPAGOS ISLANDS

The 'Charles Darwin Foundation for the Galapagos Islands', in French 'Fondation Charles Darwin pour les Iles Galapagos', Association internationale sans but lucratif (AISBL), has its registered office at 54 Avenue Louise, 1050 Brussels, Belgium. Trade Registry # 0409.359.103

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Charles Darwin
Foundation
GALAPAGOS

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