



ConCiencia

MAGAZINE

Global
Partnerships

Feral Cats
In Punta Pitt

Gills Club

Marine and
freshwater creatures

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Fourth Edition





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CREDITS

COMPILATION AND EDITION:

Sofia Tacle
Karina Vivanco
Kelly Weaver

COVER DESIGN AND LAYOUT

Emilia Sotomayor
Carlos Gavela / Archipelago Films

PRINTING

Gragvi - El poder de la impresión

 Galapagos Science Center  @galapagosgsc

 Galapagos Science Center -GSC  GSCGalapagos

 Galapagos Science Center (GSC)  galapagosgsc

 www.galapagossience.org



ConCiencia Magazine: Fourth edition

Editorial comments by Amanda Thompson
and Carlos Mena, GSC co-directors

We're excited to present the 4th edition of *ConCiencia*. Inside, you'll find examples of the groundbreaking research, innovative educational initiatives, and engaged community outreach projects being led by GSC faculty, students, and staff.

In this issue, we highlight the work being done by our International Galapagos Science Consortium partners to advance science and conservation and provide immersive, experiential educational opportunities for students. For example, the article **Is pollution impacting the most vulnerable seabird species in the Galápagos Islands?** describes the work being done by researchers from University of the Sunshine Coast to understand how plastic pollution affects the health of populations of at-risk lava gulls, flightless cormorants, and Galápagos petrels. **ISLAVET: A program of collaboration, education, fieldwork, and science** describes the NC State and USFQ faculty-led program that has introduced over 165 US and Ecuadorian veterinary students to the Galápagos' natural beauty, immersed them in a different culture, taught

safe wildlife handling techniques, and contributed valuable scientific data for wildlife health and conservation.

Other articles highlight our educational initiatives, which range from providing opportunities for girls in the Galápagos to learn about science, the ocean, and the island's flora and fauna (**Gills Club: An experiential adventure into science**), to laboratory training for USFQ Galápagos students (**Sharing my experience in the Join Science Program**), or providing mentored research fellowships for graduate students from UNC (**William R. Kenan, Jr. Charitable Trust awards \$1.5 million to launch a fellowship program and propel research in the Galápagos**). These projects are just a few of the many activities of the GSC which impact over 2500 residents annually in Galápagos and many more around the globe.

As this issue shows, the ongoing collaborations between GSC researchers, our partners, the Galápagos National Park and the community will ensure a healthy, sustainable island ecosystem for generations to come.



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The Galapagos Science Center (GSC), run jointly by the University of North Carolina at Chapel Hill and the Universidad San Francisco de Quito in Ecuador, is the only university science facility of its kind on the Galápagos Islands. For over 10 years the GSC has been a hub of collaborative and interdisciplinary research, education, and community outreach. The GSC is committed to advance science and conservation in the Galápagos Islands and to extend a richer, more complete understanding of island ecosystems and the threats to their sustainability to the world.

The 20,000-square-foot GSC houses four state of the art laboratories, each with a dedicated research focus: terrestrial ecology, marine ecology and oceanography, microbiology and genetics, and data science and visualization. The GSC is located in Puerto Baquerizo Moreno, San Cristóbal Island, Galápagos Archipelago.



Our Goals

The Galapagos Science Center is an interdisciplinary research facility whose mission is to lead in the understanding of human and environmental interactions on a local and global scale through integrated scientific research, experiential education, and community outreach.



Research

Develop interdisciplinary research projects for the conservation and sustainability of the Galápagos Islands and globally through 5 basic pillars: environmental change, community & human health, conservation, oceans, and biodiversity.



Experiential education

Provide hands-on learning experiences for local and international students across an array of interdisciplinary research projects thanks to partnerships with the Galápagos National Park Directorate and other local public institutions.



Community Outreach

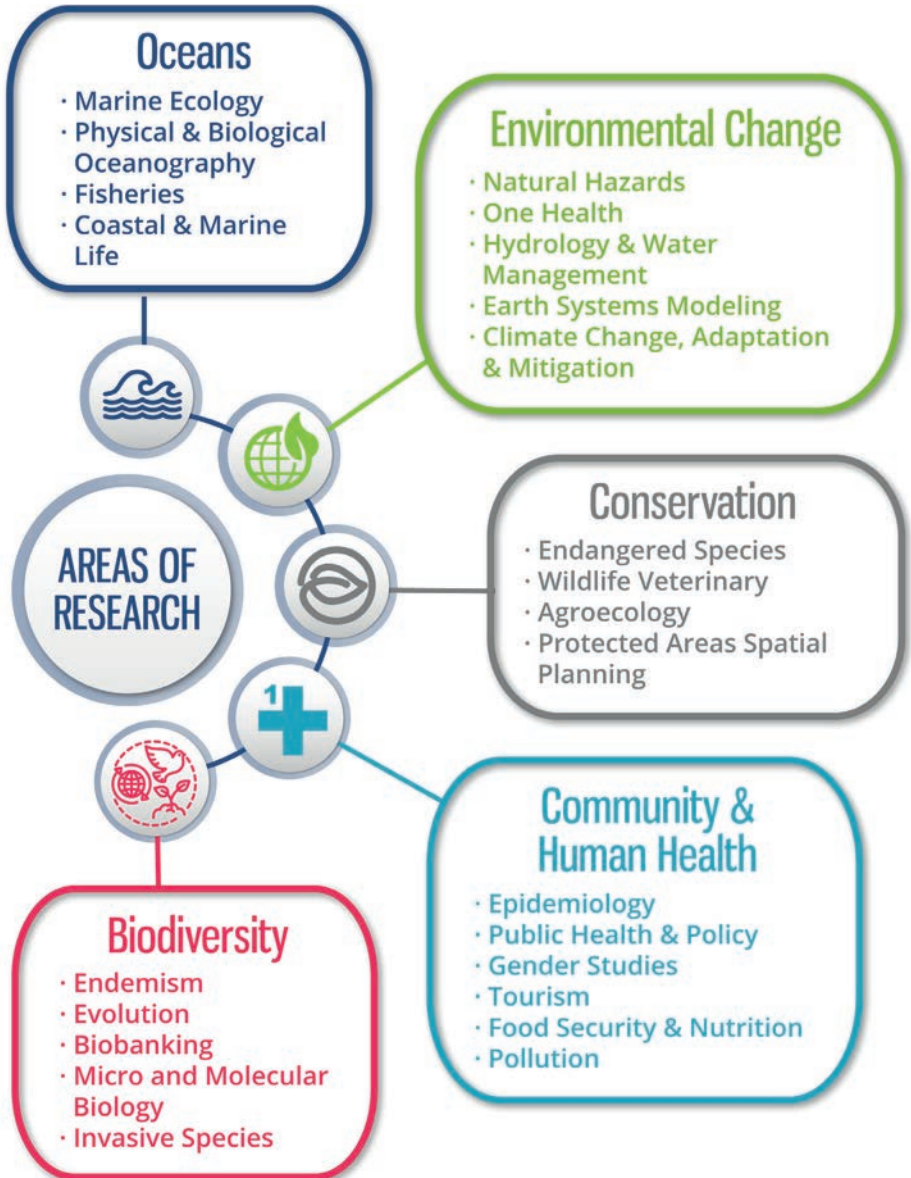
Contribute to sustainable development and greater environmental awareness in the local community to better understand the complex interactions among people and the environment in which they live.



Global Partnerships

Create a scientific network that is powered by a diversity of thoughts, perspectives, techniques, approaches, visions, and a data infrastructure that are leveraged through integrative science to create a collaborative global network of institutions and scholars for the innovative study of island ecosystems.

Interdisciplinary research that furthers science and contributes to the conservation and sustainable development of the Galapagos is our number one priority. The GSC brings together international researchers to tackle the grand challenges of our time and, in turn, inform policy decisions. Since 2011 we have conducted over 100 research projects across 5 main areas of research. Throughout this edition of ConSciencia we will highlight research across these areas and showcase their impact.



1.

Global Partnerships: International Galapagos Science Consortium

What is the International Galapagos Science Consortium?

The International Galapagos Science Consortium is a collaborative, global network of institutions working together to study island ecosystems and their sustainability utilizing the unique resources of the Galapagos Science Center (GSC).

The Consortium serves as a platform for international research partnerships to advance science and conservation; an immersive, experiential recruitment opportunity for students; and an avenue for progressing global impact and service.





Why Join the Consortium?



Research & Education

Access the world-renowned GSC on San Cristóbal Island, as well as research opportunities on mainland Ecuador, across South America, and in the Pacific Ocean.



Practical Support

Overcome international hurdles and navigate operational logistics in Ecuador and the Galápagos Islands with the Consortium's expertise and connections.



Expanded Reach

Share your findings with a global audience with the help of our communications team.



Global impact

Collaborate with partners to develop solutions for challenged ecosystems worldwide.

If you want to know more please visit



2.



University of the
Sunshine Coast
Australia

Is pollution impacting the most vulnerable seabird species in the Galápagos Islands?
Understanding the health, population trends and effects of marine debris on the most at-risk seabirds in the Galápagos





Author: Alice Skehel

As the world's population grows in a new human-defined geological epoch called the Anthropocene, industries must expand and innovate to provide sufficient resources for the 8.1 billion people alive today. Pollution is created in every aspect of life including energy, transport, agriculture, fisheries, food production and health. Conventional waste management practices on a global scale fail to prevent pollution from entering the environment. This has disastrous impacts on wildlife, causing lethal short-term implications and unknown sub-lethal long-term effects.

Seabirds are repeatedly identified as high risk from the effects of pollution. They are powerful indicators of ecosystem health since they are long-lived, have high survival rates,

are high in the food-chain and gather around production hotspots. Endemic species, with small populations, are reaching tipping points and at-risk of population crashes and in extreme cases, extinction. The endemic species of Galápagos are more vulnerable, as many face declines around El Niño Southern Oscillation Events, which are becoming more common due to climate change. The local community of Galápagos and the National Park are passionate about protecting the islands, but alongside this resident population, the amount of tourism and industries is increasing. So not only are the islands vulnerable but they can be a strong case study to demonstrate the successes and failures of conservation methods and implementation of policy, to be an example for how to reduce pollution on a global scale.



In this project we have chosen three at risk endemic seabird species to monitor how their populations are potentially being affected or are adapting to a life alongside pollution. These species include; lava gulls, flightless cormorants, and Galápagos petrels.

Our research objectives for this project include: identifying how the inclusion of plastics in cormorant nests impacts mating and reproductive success; analyzing population size and connectivity of the lava gull through color banding, spatial mapping and genetic analysis of live and museum specimens; and determining the levels of harmful chemical pollutants in the tissues of our target species to then compare to their general health.

The project began in 2018, and conclusions are expected to be finalized by July 2026. This project is multidisciplinary and includes health assessments, contaminants analysis on multiple tissue types, behavioral and survey data, whole genome sequencing, and literature reviewing. So far, in birds in the Galápagos, a diverse range of pollutants have been identified but the significance of this on a population scale is not yet clear and the lava gull population status appears to be much more vulnerable than declared by the International Union for Conservation of Nature (IUCN). We hope through this research to provide direction to the Galápagos National Park Directorate and other conservation bodies on the most important types of plastic and or chemical pollution to regulate particular areas of concern for seabird species.

Collaborators:

Key institutes involved in this research are the Galapagos Science Center, Universidad San Francisco de Quito, University of the Sunshine Coast (Australia), North Carolina State University (USA), Charles Darwin Foundation, University of San Francisco (USA) and California Academy of Sciences (USA).

Professors involved include; Dr. Kathy Townsend and Dr. Dominique Potvin who specialize in pollution or birds and provide advisory support across all research questions, Dr. Carlos Valle, Dean of Biology at USFQ, an expert in seabird handling, cormorants and statistics, Dr. Gregory Lewbart and Dr. Diane Deresienski both skilled veterinarians who provide advice on assessing seabird health, Dr. Juan Pablo Muñoz Perez who recently finished

his PhD on Galápagos and the plastics problem, Dr. Jaime Chaves a genome sequencing expert, Dr. Leo Zurita Arthos the Galápagos Petrel expert, and Dr. Gustavo Uzcategui Jimenez a veterinary expert specializing in the flightless cormorants.

This work is also supported by many local and international field assistants, including students from USFQ, NC State and University of Houston. The naturalist guides of Galápagos are an essential source of knowledge and are supported in the field and with re-sighting lava gulls.

This project is funded by the Galapagos Conservation Trust, Universidad San Francisco de Quito, University of the Sunshine Coast and the Galapagos Barcode Project.



3.

NC STATE
UNIVERSITY

**ISLAVET: A program of
collaboration, education,
fieldwork, and science**





Author: Greg Lewbart

SLAVET is an annual program designed for veterinary students, graduate veterinarians, and other veterinary health professionals. The effort is a collaboration between the Galapagos Science Center on San Cristóbal Island, North Carolina State University College of Veterinary Medicine, Universidad San Francisco de Quito, University of North Carolina at Chapel Hill, and the Galápagos National Park Directorate. The program combines field and laboratory research focused on wildlife health and conservation with multi-island excursions to the mutual benefit of the participants and the archipelago's natural history, wild resources, and native species.

The primary objectives of ISLAVET are: Introduce participants to the natural beauty and wonder of the Galápagos; Immerse the participants in a culture most likely very different from their own where they can meet new people, learn the power of relationship building, and challenge themselves to succeed out of their comfort zone; Teach the participants safe capture, handling, and sampling techniques of a variety of Galápagos wildlife species, and; Produce valuable scientific data that can be peer-reviewed published to advance our knowledge of wildlife health and conservation.

ISLAVET started in March, 2016 with a group of 16 NC State veterinary students led by Dr. Gregory Lewbart and supported by Juan Pablo Muñoz-Perez and Daniela Alarcon-Ruales. This was a modest effort with the group doing excursions on San Cristóbal, Isabela, and Santa Cruz. An NC State veterinary student named Abigail Wisnet (now Armwood) approached Greg Lewbart in the summer of 2015 with the idea to bring veterinary students to Galápagos, as she had done a study abroad on Isabela during her undergraduate career.

The trip turned out to be a success and plans were made to repeat the experience in 2017. In February, 2017, 3 weeks before departing for Galápagos, Juan Pablo called Greg to share that the National Park was requesting health assessments



for a group of the tortoises at the tortoise breeding center on San Cristobal. Greg had done this for the National Park in prior years. When asked if the students could participate, the National Park replied in the affirmative, and for the first time that March the students provided hands-on assistance with health assessments and sample collections. The program has continued to include annual tortoise health assessments along with a variety of other veterinary-related projects. It was during this trip that Juan Pablo coined the term, "ISLAVET."

In addition to tortoise health assessments, past and current projects include health assessments of sally lightfoot crabs, scalloped hammerhead sharks, black-tip sharks, lava lizards, marine iguanas, sea turtles, and lava gulls. There are also projects involving cetacean population assessments and x-rays of marine iguanas to determine the mechanism of "shrinking" in response to El Niño events.

Participants:

To date we have had 165 participants representing both Ecuador and the United States. The veterinary students, which account for about 75% of participants, have come from five different veterinary schools. The primary faculty in support of the program are Juan Pablo Muñoz-Pérez, Daniela Alarcón-Ruales, Diego Páez-Rosas, Carlos Valle, Diane Deresienski, and Gregory Lewbart.





4.

Contribution of herbivorous fish to rocky reef assemblages in different upwelling conditions

Authors: Juan Manual Álava
and Mike Kingsford

The Galápagos is influenced by contrasting major current systems that shape the Archipelago's marine communities. Both nutrient rich cold waters and nutrient poor warm waters bath these equatorial islands. There are locations where topographically induced upwelling occurs, making nutrients available at the surface. It is known that the levels of upwelling vary greatly in the islands and these conditions have a great influence on the composition of marine assemblages that include macro invertebrates and reef fish species.





and in the field we collect data while SCUBA diving. Fish are counted in visual transects and estimates of their size is obtained. Further, we also collect some species from which we extract tissue and skeletal samples. In the laboratory, we use the otoliths to age fishes, and stable isotope analysis for trophic ecology. Additionally, we record local conditions in different sites, including algae cover, temperature, and composition of the substrate.

Even though we still have a long path ahead of us we have some interesting preliminary results. In terms of algal biomass, the sites with high upwelling conditions have abundant macroalgae, while those are less abundant in sites with mid upwelling and virtually absent in locations with low upwelling

Our ongoing study is focused on understanding how the variation in environmental conditions influence the ecology of rocky reef fishes. Our objective was to study three main aspects of the fishes living in the Galápagos as follows: the demography of two wide-spread territorial reef fish the ringed tail damselfish (*Stegastes beebei*) and the yellow tailed damselfish (*S. arcifrons*); the variation in biomass of reef fishes at different depths; and the flow of energy in food chains, from plankton or algae to higher levels of the food web, having the Galápagos grouper (*Mycteroperca olfax*) as the apex predator in our model. We use different tools for our study,



settings. In contrast, fish biomass does not follow this pattern. The most abundant species of herbivore fish, the razor tail surgeon (*Prionurus laticlavus*) has higher biomass in sites with relatively warm waters. Also, the yellow tail damselfish is pickier in terms of habitat preferences, living in reefs with a gentle slope and choosing shallow waters, while the ringed tail damselfish is present almost everywhere in the archipelago.

Habitat variation is significant in the Galápagos rocky reefs and our study will provide relevant information on how fishes are affected, which is of relevance for decision makers, stakeholders, naturalist guides, and visitors alike.

Collaborators:



Our team consists primarily of Distinguished Professor Michael J. Kingsford from James Cook University (Australia), with a prominent career as a researcher and academic in reef fish ecology in temperate and tropical waters, and Juan Manuel Álava Jurado, an Ecuadorian biologist with experience working with fish, especially elasmobranchs during his undergraduate period, and rocky reef fishes since his Masters, now a PhD student under Mike's supervision. We must mention that both on the field and on the laboratory, there have always been several volunteers and researchers helping us.



Inland aquatic ecosystems of the Galápagos Archipelago, the hidden diversity of habitats and macroinvertebrates

**Authors: Andrea C. Encalada, Daniela Rosero-López,
Karla Barragán, Daniel Escobar-Camacho**

Inland aquatic ecosystems in the Galápagos Archipelago encompass brackish and freshwaters in lotic and lentic environments. These ecosystems result from intense and long climate-induced erosive processes over geological formations from the active volcanic hot spot underneath the ocean. Lentic and lotic ecosystems can be permanent or temporary in the Galápagos Archipelago, meaning that water can be permanent throughout the year or temporarily present in response to seasonality (Figure 1). Despite the variety of inland aquatic ecosystems across the islands, the importance

of habitats and macroinvertebrates have been reduced to water provision for drinking supply and to waterborne species “carmelitas” (Diptera: Simuliidae). In this context, the overarching goal of this research relies on describing the hidden diversity of habitats and macroinvertebrates in inland aquatic habitats of the Galapagos Archipelago. This objective is not just a scientific endeavor but a necessity for a comprehensive understanding of the role of aquatic ecosystems in the island’s dynamics and the key services they provide to people.



Figure 1. Habitats in the Galápagos Archipelago aquatic ecosystems, including permanent streams in San Cristobal (a, d, e), permanent and temporary ponds in Santa Cruz (b, c), and temporary springs in Isabella (f). Photo credits: Karla Barragán.

To achieve this goal, the Aquatic Ecology Lab (LEA) and the Biosphere Institute have conducted a two-year spatiotemporal sampling in the main islands of San Cristóbal, Santa Cruz, Isabela, and Floreana. Our team, comprising an aquatic ecologist, an ecohydrologist, an ichthyologist, and a biologist, have sampled physical and chemical parameters of water

and the diversity and abundance of macroinvertebrates in permanent streams and lakes, as well as temporary springs and ponds (Figure 2). Macroinvertebrates in aquatic ecosystems include larvae and some adults that can be sampled in the benthic zones and the surface of bodies of water. Once samples are collected with Surber and D-nets for quantitative

and qualitative assessment, we clean and count individuals for taxonomic identification in the field and laboratory using stereoscopes.

Among the project's main results, we found lentic ecosystems ranging from saline to freshwater in permanent and temporary ponds of Isabela, San Cristobal, and Santa Cruz, as well as the only permanent lake (El Junco) on San Cristóbal. Permanent and temporary freshwater streams are present only

in San Cristóbal and Floreana Islands. A particular diversity composition of aquatic communities excludes three globally distributed orders: Ephemeroptera, Plecoptera, and Trichoptera. The diversity then consists of different genera of Dipterans, Odonata, Coleoptera, Hemiptera, and several groups of Gastropods (Figure 3). The evolutionary path of most aquatic macroinvertebrates in the Galápagos Archipelago is associated with the types of habitats and the



Figure 2. Field sampling of macroinvertebrates and water chemistry in permanent ponds of freshwater ecosystems in Santa Cruz (a), brackish ecosystems in Isabella (b), and permanent ponds and streams in San Cristobal (c, d). Photo credits: Karla Barragán and Daniela Rosero-López.

dispersal ability of some groups, such as dragonflies (Odonata). Other groups, like Dipterans (Simuliidae) and Coleopterans (Elmidae), are known for having trajectories associated with human mobilization (i.e., water in boats, fruits, and vegetables). A potential interchange of ecological roles is played by the Hemiptera and Diptera taxa, which are widely distributed in both lentic and lotic ecosystems. These findings suggest a constrained trophic network portrayed by a particular island diversity that is yet to be described. Finally, the Galápagos Archipelago harbors a highly valuable diversity of aquatic habitats and macroinvertebrates that deserve to be fully appreciated to understand the dynamics of aquatic ecosystems beyond water provision.

Collaborators:

Our research project has involved international collaborators researching salinity in aquatic ecosystems across different latitudes, including Professors Marcelo Ardon and Alonso Ramírez from North Carolina State University. Additionally, our research group has been enriched with collaborators in the field of environmental DNA to understand macroinvertebrate diversity, including Professor Dave Lytle, and in the field of parasites diversity in aquatic ecosystems, Professor Anna Jolles, both from Oregon State University.

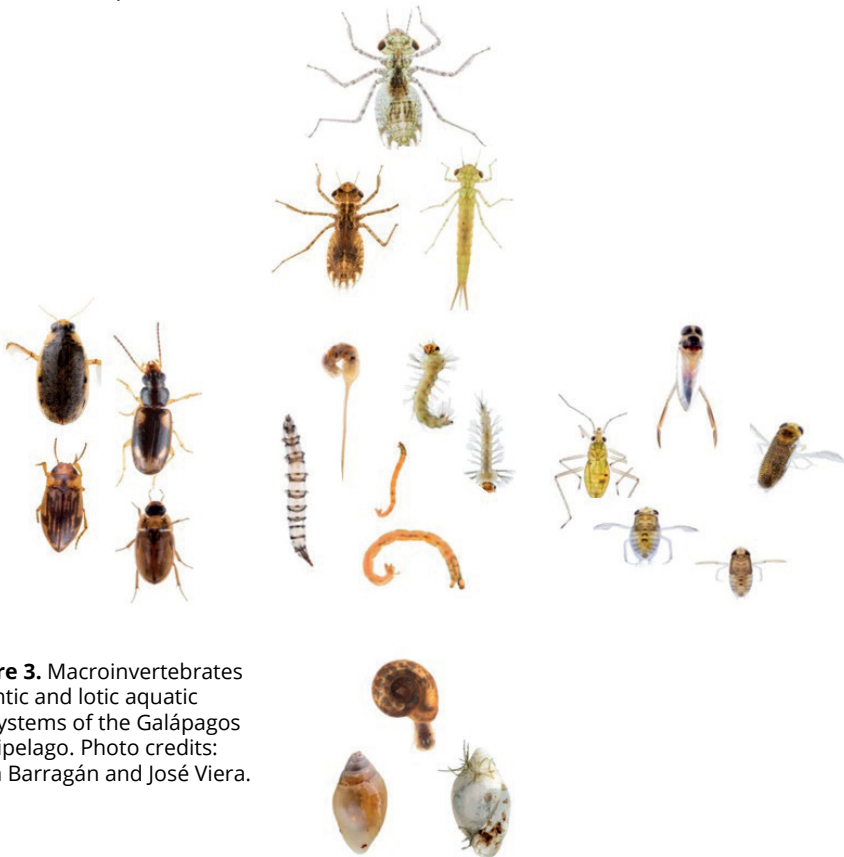


Figure 3. Macroinvertebrates in lentic and lotic aquatic ecosystems of the Galápagos Archipelago. Photo credits: Karla Barragán and José Viera.

Feral cats in Punta Pitt, is their eradication possible?

Authors: Marjorie Riofrío Lazo and María Andrade

In the Galápagos Islands, introduced cats and rodents are among the main threats to wildlife. Their impacts are challenging to evaluate due to interactions with other co-introduced species. Since 2022, the Universidad San Francisco de Quito (USFQ), through the Galapagos Science Center (GSC), in coordination with the Galápagos National Park Directorate (GNPD), has developed a project on San Cristóbal Island to understand the population dynamics and evaluate the impacts of these introduced mammals in priority conservation areas. Several students of the Galápagos campus have been carrying out research derived from this study as part of their degree work under the direction of the project leader.

The research of María Andrade, USFQ student of the Environmental Management career, is the first to evaluate the effect of predation by feral cats on the fauna present in Punta Pitt, San Cristóbal Island. This tourist site is characterized by having nesting colonies of marine iguanas, green turtles, red-footed boobies, and other seabirds. The research team traveled to Punta Pitt in July 2023. The fieldwork included the participation of USFQ researchers and a veterinarian from the Oceanographic Foundation from Valencia, Spain. In addition, it had the logistical and financial support of the Galapagos Rescuing Foundation and the collaboration of park rangers during the captures. The study complied with the ethics and animal management protocols approved by the GNPD and USFQ.



From the analysis of stomach contents, it was determined that cats base their diet on vertebrates, including in their diet mainly rodents (*Rattus sp.*), lava lizards (*Microlophus bivittatus*), Galápagos snake (*Pseudalsophis eibli*), and birds. However, they also consume spiders and beetles to a lesser extent. Although the cats were found throughout the study area, their major presence was recorded in the territories

with nesting colonies of birds and marine iguanas. A low abundance of feral cats was determined in Punta Pitt compared to other sites, which reflects a lower impact of anthropogenic activities in the locality, as well as a level of control of cat populations due to the poisoning campaigns carried out semiannually by the GNPD.

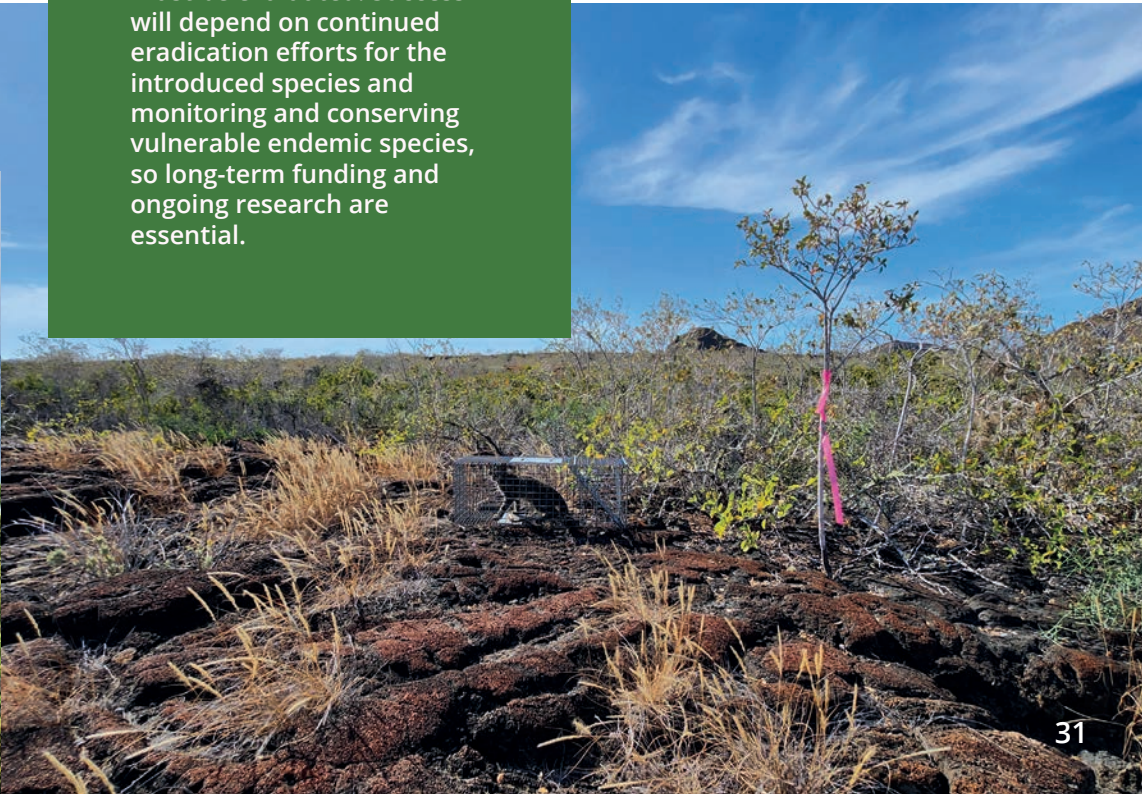


However, for the eradication of this introduced species to be possible, it is necessary to carry out a preliminary evaluation of the area that includes studies of the population dynamics of feral cats and the interrelationships with the endemic and native flora and fauna of the area, evaluate the cost-benefit of different eradication methods, and implement them in a combined and constant manner. The risk of accidental poisoning of non-target species should be assessed, and a damage mitigation plan should be designed. Additionally, the effectiveness of the eradication implemented must be evaluated. Success will depend on continued eradication efforts for the introduced species and monitoring and conserving vulnerable endemic species, so long-term funding and ongoing research are essential.

Collaborators:

The research team associated with the work at Punta Pitt includes: Marjorie Riofrío Lazo - Project leader, Manuel Mejía and Diana Calderón - project research technicians from USFQ, José Luis Crespo - Oceanogràfic Foundation, Valencia, Spain, Rafael Díaz and Franklin Chicaiza - Galápagos National Park Rangers, field support of the Galapagos Rescuing Foundation staff, and María Andrade - USFQ undergraduate at the Galápagos campus.

The project was made possible through funding from USFQ through the COCIBA Grant, GSC through the Galápagos Grant 2023, and the Galapagos Rescuing Foundation.





UNC School of Nursing collaborates with local Galápagos hospital to address professional development needs

Authors: Andy Little and Kelly Weaver

In the summer of 2023, UNC-Chapel Hill's School of Nursing sent faculty and students to continue previous research on the professional development needs of nurses in the Galápagos, thanks to funding from the UNC Center for Galapagos Studies' Seed Grant program.

The School of Nursing began a collaboration with the Universidad San Francisco de Quito (USFQ), Oskar Jandl Hospital on San Cristóbal Island, and Ecuador's Ministry of Public Health in 2016 to assess and address this issue. In their initial needs assessment,

the partnership identified the need to provide nurses with continuing education through the hospital.

"Nurses have a professional responsibility to engage in ongoing education, but hospital leadership must provide appropriate structure and support for continuing education to become part of the culture of an organization," said the study's principal investigator, Dr. Megan Williams, a clinical associate professor at UNC School of Nursing.



Oskar Jandl Hospital, which is the main regional hospital for all Galápagos, does not yet have an effective program for this continuing education. Thus, the Academic-Practice Partnership for Professional Development (ADAPT) Study was born.

Williams explained that the purpose of this study is to both assess what nurses' continuing education needs are, following up from the initial needs assessment in 2016, and to develop a comprehensive program to address these needs at the institutional level of the hospital.

The first stage of the ADAPT study, which the researchers have already completed, was the quantitative portion. The researchers had nurses

fill out a 25-question survey that asked them to identify areas of skills and tasks that they complete on a regular basis and indicate how competent they feel in executing them.

The second stage, which was completed during their visit to San Cristóbal in August 2023, involved four facilitated focus groups to collect subjective perspectives from the nurses working at Oskar Jandl Hospital about what they believe should take the highest priority in the continuing education program.

The third and final stage will consist of an analysis of the results from stages one and two that will direct the planning of the curriculum.

“What we want to do,” Williams explained, “is create a program here in San Cristóbal that will help the nurses stay up-to-date in their knowledge and their skills.”

The creation of the program will be a collaborative effort with the nurses to personalize the curriculum based on their needs and resources.

“We’re really excited about partnering with the nurses,” Williams said. “They have real-life experience, and we can create a program to help support them in their knowledge, build those skills, and keep those nurses feeling confident and competent in critical care areas.”

This collaboration also gives the faculty and students the chance to work with and learn from the amazing nurses at Oskar Jandl Hospital.

Arvizu-Benavidez, one of the students, said, “It has been a great experience learning from the nurses, seeing nursing around the world, and it has truly influenced my passion as a future nurse.”

Williams added, “There’s just a camaraderie...that we can be a team doing what we do best, which is caring for patients and our communities.”

Collaborators:

Williams, who is also a registered nurse, has research expertise in both nursing education and curriculum design. Two other School of Nursing faculty members, Dr. Ashley Leak Bryant and Dr. Natalia Villegas Rodríguez and four nursing students, Lizbeth Arvizu-Benavidez, Brian García, Dana Bjuro, and Amy Kaiser, also collaborated on this project.



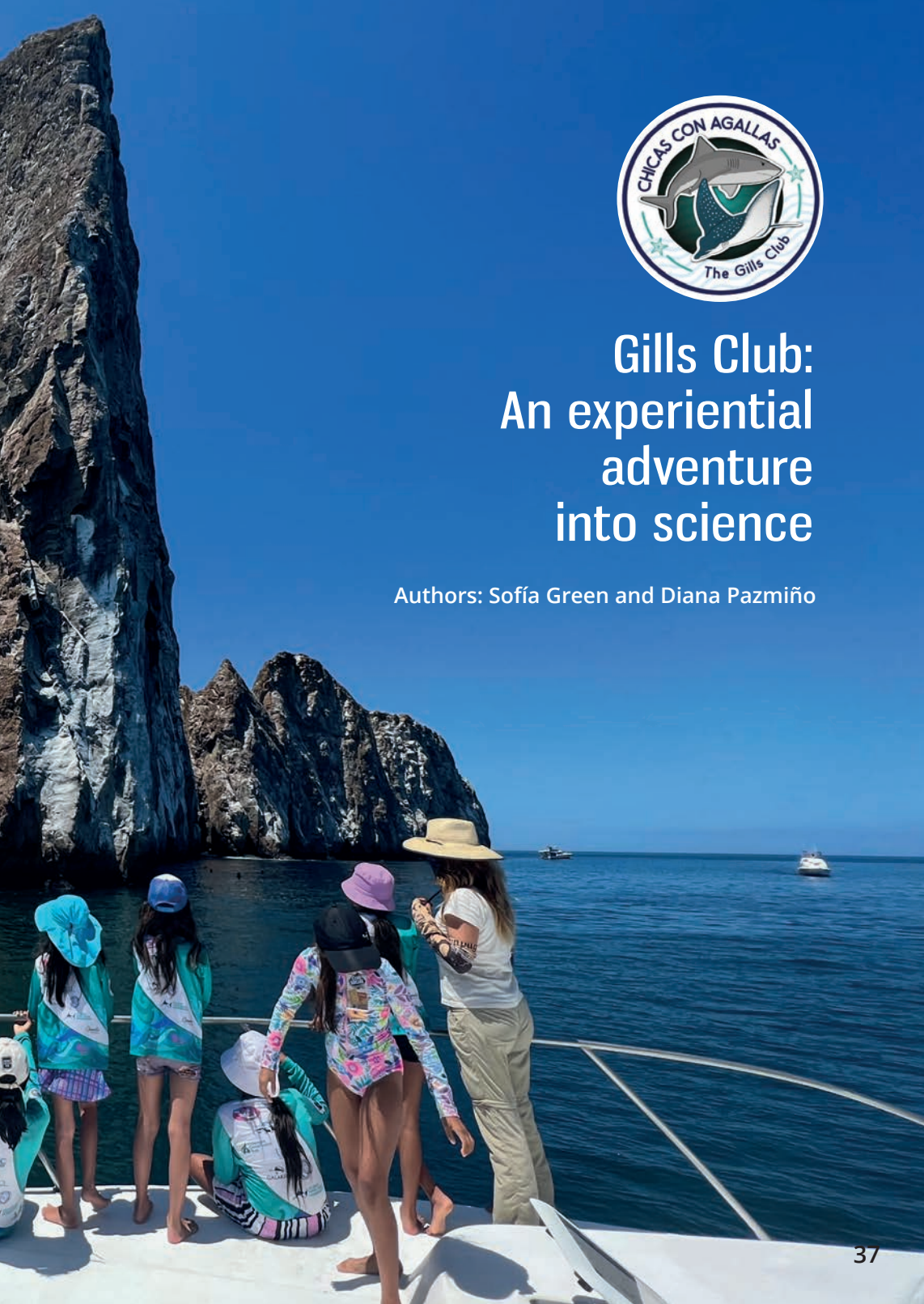
8.





Gills Club: An experiential adventure into science

Authors: Sofia Green and Diana Pazmiño





The Galápagos Islands, known for being a natural laboratory for evolution and for its unique species like the intriguing marine iguanas, the iconic Darwin's finches, and its playful Galápagos sea lions are a jewel known to the entire world. However, the fact that there is a human population living in this volcanic archipelago is less known. Diana Pazmiño, a local islander, grew up surrounded by this magical natural world. Her love for the ocean was instilled from a young age by her dad and brother who would take her snorkeling every weekend with a wide variety of fish, rays, and sharks.

When Diana came back to the islands after finishing her PhD, she realized that not everyone growing up on the islands had the opportunities she had as a young girl to connect with nature. She also noticed that even today the world of science, technology, engineering, and math (STEM) is still predominantly male led. With this in mind, in 2019 Diana and three of her students (Yasuní Chiriboga, Lauren Goodman, and Ángela Palomino) decided to start the Gills Club with the help of the Galapagos Science Center and USFQ, alongside the support of the Galapagos Conservation Trust. This club was inspired by the work being done by other Girls Clubs in the USA. The team adapted their club

to the island environment and turned it into the “Chicas con Gallas” club.

In 2021, replicating the success of the club in San Cristóbal Island, the efforts expanded to Santa Cruz Island, where marine biologist Sofia Green took charge of leading the club’s educational activities. Every month, 12 local girls of each of the two islands ranging from ages 8 to 12 head out on an experiential adventure to learn about science, the ocean, and its incredible flora and fauna. Throughout the year, Gills Club members have opportunities to visit local beaches while learning about the scientific method, experience their first snorkel and learn to identify fish, observe samples in the GSC labs, and learn from the local and international female scientists that also serve as role models. In the past 5 years, 72

girls have participated as part of the club which hopefully instills a positive change in the local community with more girls involved in the field of STEM.

The club also gives the local community the opportunity to connect with the ocean and access sites which may be limited to residents due to high costs caused by tourism. Opportunities like these have been lacking in the recent history of the Galápagos but are beginning to flourish and with it, the local community flourishes as well. The hope is for this opportunity to prevail and grow in the islands of San Cristóbal and Santa Cruz and expand to the other populated islands of the Galápagos Archipelago, Isabela and Floreana, to diminish the gender gap in fields of STEM and to develop a



community of islanders connected to the ocean and living in harmony with nature. These efforts would not be possible without the support of the Galapagos Science Center and the Galapagos Conservation Trust who have supported the project from its beginning, and their collaborators: Craghoppers, Daughters of the Deep, Galapagos Sharksky Travel and Conservation, and Galapagos Best. We also want to thank Jocotoco and the ECOS foundation for the field trip we carried out with the "Marine Guardians" team.

Collaborators:

Our team consists of Professor Diana Pazmiño from USFQ, Sofia Green from GCT, and a number of invaluable assistants including Cristina Vintimilla, Nazareth Narváez, Silvia Zavala, Cisne Zambrano, Andrés Pazmiño, Pablo Alcívar, Ana Carrión, Daniel Armijos, Paúl Yépez, Patty Isabela Tapia, Doménica Pineda, Alejandra Chiriboga, Martín Narváez, Gabriela Rodríguez, Anne Guézou, Chloe King, and Isabel Timpe.



William R. Kenan, Jr. Charitable Trust awards \$1.5 million to launch a fellowship program and propel research in the Galápagos

Authors: Angela Harwood and Kelly Weaver

Esteban Agudo was studying entomology at Simón Bolívar University in Caracas, Venezuela, when a marine biology professor recruited him for a coral reef research project after learning about Agudo's scuba diving skills.



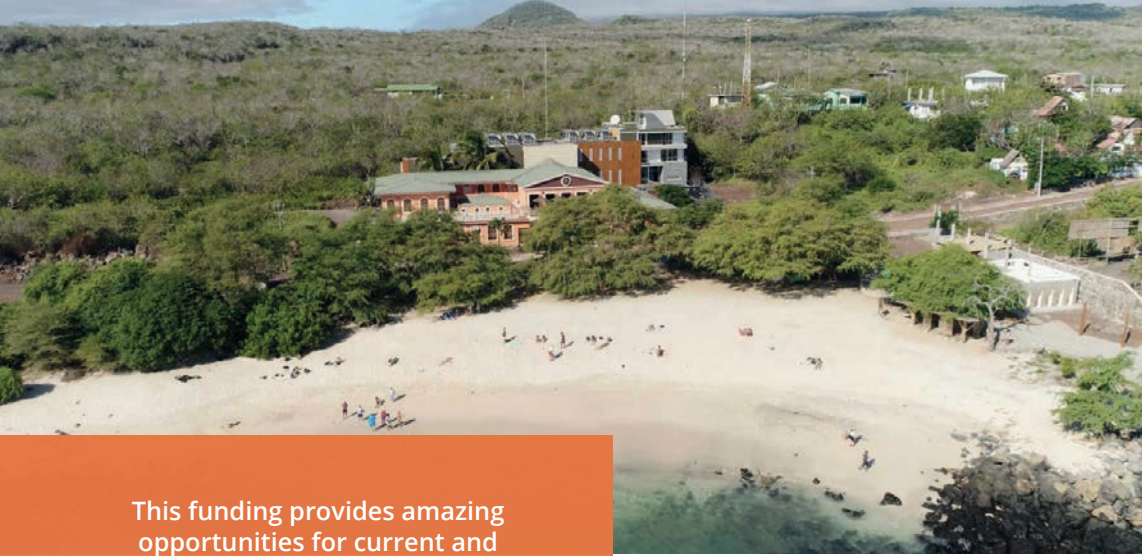


“After that, I was pretty much hooked on marine biology,” shared Agudo, who is now a PhD candidate set to graduate with a doctorate in marine ecology from UNC-Chapel Hill in 2024. The University’s distinctive research opportunities in the Galápagos Islands strongly influenced his decision to pursue doctoral studies at UNC.

“Conducting science in the Galápagos is, of course, the dream for any biologist,” said Agudo, who spent six months in the Galápagos, working on his PhD dissertation with the support of the Galapagos Science Center (GSC). He described the experience as an opportunity “to work in one of the most amazing natural laboratories in the world.”

Now, more students like Agudo will have the opportunity to study and conduct research in the Galápagos. The William R. Kenan, Jr. Charitable Trust awarded \$1.5 million to the UNC Center for Galapagos Studies to create the Kenan Galapagos Fellows Program, which will support three graduate students per year for three years and one post-doctoral fellow per year for two years. The first graduate fellowships will begin in fall 2024.

Author: Juan Pablo Muñoz Pérez



This funding provides amazing opportunities for current and incoming graduate students and postdocs to conduct cutting-edge research, apply what they are learning in the classroom and lab to real-world problems, and impact communities locally, in the state, and globally," said Amanda Thompson, director of the UNC Center for Galapagos Studies and co-director of the GSC.

Since the GSC was founded in 2011, more than 600 students have engaged with the region through study abroad, research and education programs, developing 150-plus undergraduate, master's and doctoral theses from their studies.

This grant also supports expanding the GSC's footprint to enhance research capacity in areas such as clean oceans, biodiversity, ecosystem, and human health. This means more funding for Galápagos research expeditions, research equipment and infrastructure, and staff assistance to collect and disseminate critical climate data to researchers around the globe.

Currently, researchers at the GSC are conducting joint studies around food and water insecurity in the Galápagos; creating a biobank of samples from across the islands to help with preservation and provide new opportunities for studies; running marine expeditions to protect marine biodiversity and understand climate variables; and engaging in work to understand these islands and challenged ecosystems around the world. More than 8,000 Galápagos community members have also participated in outreach programs through the GSC.

"The grant from Kenan Charitable Trust will support the center's equipment and infrastructure, which will allow us to host more researchers, develop better research, and improve local livelihoods and ecosystem conservation," said Carlos Mena, co-director of the GSC and geography professor at USFQ.



10.



Experiential Education PROGRAM

Author: Silvia Zavala

Thanks to partnerships with the Galápagos National Park Directorate (GNPD) and other local public institutions, the Galapagos Science Center (GSC) has expanded its operations to host interdisciplinary research projects. 'Flagship projects' have been strategically selected to provide learning experiences for local and international students. This unique opportunity to gain experience in practical and applied research processes is offered through our Experiential Education Program.

Who is it for?

The options are aimed at USFQ students in Galapagos as well as national and international students from other universities.

What options are available?



Join Science!:

An Experiential Education Program, aimed exclusively at USFQ Galápagos students, whose main objective is focused on inspiring the next generation of Galápagos scientists. It offers a unique opportunity to acquire both practical and theoretical experience across various research field trips, while also enhancing opportunities for building professional networks.



Learning experiences
Hands on scientific research

Learning Experiences:

This option is designed to offer students the unique opportunity to collaborate closely with researchers and actively participate in scientific research. Through hands-on experiences, students will gain a firsthand understanding of scientific inquiry, its challenges, and the excitement of discovery.

The program can be completed through a variety of options, tailored to the experience, profile and particular needs of each student.



a) Junior Scientist

This option is tailored for high school graduates with a keen interest in science and conservation, aiming to prepare them for university studies in related fields.



c) Tailor Made Research Experience

This option has been designed for students with varying academic backgrounds and university experience, offering a customized program aligned with each individual's interests and profile. It also accommodates professors from national or international universities aiming to teach courses on the islands, with a primary focus on scientific research. Led by field experts, the program provides an immersive research environment where participants can develop practical skills, deepen their theoretical understanding, and contribute to advancing knowledge in their field of interest.



FLAGSHIP
PROJECTS

b) Bachelor Scientist

This is an intensive option, designed for bachelor students from international universities who wish to participate in GSC's selected Flagship Projects, thereby expanding their knowledge and gaining valuable experience. Students collaborate with local researchers to engage in scientific inquiries within areas of special interest.

Throughout these years we have involved 622 national and international students. Their contribution to research has been part of numerous scientific articles and publications.

11.

Sharing my experience in the Join Science Program

Author: Dagfin Sotomayor

How did you find out about the Join Science program, and what is the main benefit for USFQ Galápagos students?

Hello everyone, my name is Dagfin Sotomayor. I am 23 years old and I am from San Cristóbal Island. I am currently

completing my degree in Environmental Management at the Universidad San Francisco de Quito, Galápagos campus and for the last 5 years I have been actively involved in environmental projects and research in Galápagos. I started joining the Join Science





program through a friend who recommended me to participate. I learned about some activities my friend took part in on field trips and I was very excited to hear his story. Since that day I have not stopped participating continuously as a volunteer in different research projects here in Galápagos.

The greatest benefit of the Join Science program is that you can create your network of contacts and share significant experiences with park

rangers, locals, and international researchers with great reputations in the world of science and learn a lot from them. In addition, you can develop important skills for your professional career such as learning about different methods for collecting data in the field, how to navigate wild areas, and how to work as a team. Finally, what I enjoyed most about these experiences is that I was able to see new places within the Galápagos such as exclusive places for research.



What was your first scientific experience with the Galapagos Science Center scientists like?

I started in 2019 as a field research assistant in the “Galápagos Pinniped Program” led by researcher Dr. Diego Páez-Rosas. In this project we monitored the colony of Galápagos sea lions (*Zalophus wollebaeki*) of El Malecón and La Lobería on San Cristóbal Island. We dedicated ourselves to carrying out censuses on land using

the direct counting method. For this we walked along the coast, making notes identifying the animals by age and sex categories. In each census we recorded the total number of adult males, subadult males, adult females, juveniles, puppies, and indeterminates observed. These data were later used to estimate the population abundance of this species, which is in danger of extinction.

Describe what your laboratory work experience was like related to the Galapagos Barcode project (pre-professional internships)?

In 2023, I had the opportunity to be part of the Galapagos Barcode project, working as a research assistant in the Microbiology and Molecular Biology Laboratory of the Galapagos Science Center. During my participation, I carried out a series of activities that included the application of protocols for DNA extraction, amplification, and sequencing procedures. Additionally, I was in charge of keeping the environmental DNA and tissue sample inventory database updated. I acquired skills in using advanced laboratory equipment and preparing reagents. I also had the opportunity to instruct and supervise the work of new students.



What is the most significant thing or what you most want to highlight that this experience has left you?

What I enjoyed most about these experiences when getting involved in research projects was the opportunity to learn how to carry out data and sample collection activities in the field, but I also learned about how to function in the laboratory by carefully following the protocols and the use of sophisticated equipment. I also really appreciated the possibility of exploring other islands and camping in remote places. This close contact with nature allowed me to appreciate why it is so important to carry out research in the Galápagos, especially to achieve the conservation of this unique space in the world.



12.

Impact over 5 years of the Connecting With Nature Program



Authors: Leidy Apolo and Lesly Cadena

It has been five years since the Galapagos Science Center (GSC) created and implemented a program aimed at the local community through which various initiatives have been developed to promote the conservation and sustainable development of the islands. This program has fostered a sense of collaboration with the

aim of strengthening and maintaining a cohesive community. There are many values that have been included in the development of the activities, based on the premise that if we start with a message that touches us as people, they are open to receiving new knowledge from love and self-care, to empathy and responsibility in caring for others.



The "Connecting with Nature" program (CWNP) bases its activities in the Theory of Change. This theory has inspired many organizations and social groups to create a significant impact around the world. This theory uses a methodology that represents a powerful tool and has provided a structured framework to identify the objectives, strategies, and indicators to measure the success in each project. (1)

The community outreach program began at the GSC in 2019, after recognizing the desire for the community to reconnect with its environment and learn to preserve this precious ecosystem. Since then, the program has involved researchers, collaborators associated with the GSC and the Universidad San Francisco de Quito, local and international students, and above all our community.



(1) The Theory of Change is defined as an approach from a thought-action perspective, applied in strategic processes of significant social change. Carol Weiss and Helene Clark, 1950.

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“We had the opportunity to be part of the field trip to León Dormido and Isla Lobos. What I remember most is the first time my son was able to snorkel in León Dormido. His experience was unforgettable because he saw various species that cannot be seen here in the town beaches since snorkeling here is not the same experience as in León Dormido. Being super close to the rock and listening to the various explanations from the guides was really interesting.” Andrea Chicaiza, participant in an Experiential Outing, where she also learned about the marine animal research process.

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The main goals of the CWNP are to raise awareness about the conservation of unique Galápagos species through storytelling; motivate children, young people, and adults to create and execute conservation and sustainability activities; engage people by increasing opportunities for participation in conservation; and empower young people through quality work practices linked to conservation science projects and through train the community about social work.

To achieve this, during the fifth phase of the program (February 2023 - January 2024), activities were carried out such as reading sessions using stories based on science, thematic events focused on environmental and social issues, a science club for children and young people, experiential outings with people from the community, and internships for local USFQ students. In addition, we celebrated a decade of the annual Shark Day event, and we promoted citizen science as a key tool for the conservation of our biodiversity.

Beyond the numerical results, the main achievements reached in the five years that the program has been running are based on a measured increase in empathy and interest in science and research, in a large part of our local community.



“

“I believe that the message the ‘Reading Sessions with Tessa’ leaves us with is significant, since part of the sessions taught children how to care for garbage and their correct distribution in the bins. Something else that the children will remember is about the turtle nesting season” Johanna Beltrán, a local school teacher who participated in the project ‘Reading Sessions with Tessa, the giant turtle’

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“I loved being able to meet such incredible people, as well as working with the children. One of my favorite experiences was being able to teach them through ‘Reading Sessions with Tessa’. Meeting them was wonderful and I take them in my heart.” Fabiana Hinojosa, CWNP intern who participated in the design and execution of several activities.

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Learn more about the Connecting with Nature Program on our website

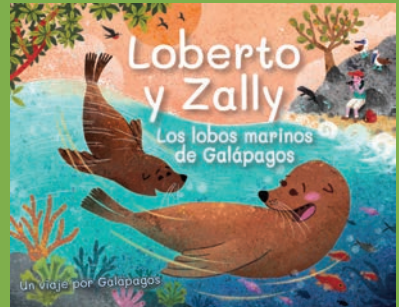
13.

Reading, a key tool to promote conservation

For more than five years, through the Connecting with Nature Program (CWNP) we have implemented several free training and recreational activities for Galápagos families to promote conservation. The “Guided Reading Sessions” are part of this offer, and through comprehensive reading, reflection, and play, children from the community generate critical thinking in relation to the dangers that face some species of the Galápagos.

This educational activity has evolved over time, reaching all the populated islands of the archipelago and the coast of Ecuador, benefiting more than 1,000 boys and girls. The first phase focuses on direct sessions, later we mentor teachers with the aim that they replicate the activities and finally we provide an online version with educational resources accessible to everyone.

In addition, soon we are going to publish new stories that will include new protagonists like albatrosses and sea lions. The ultimate goal is to continue promoting the protection of the species that inhabit the Galápagos.









Beyond the borders

The Reading Sessions have surprisingly grown, becoming an educational virtual space available to everyone. When visiting the GSC website, in its community section, it is possible to find the “Virtual classroom, my friend Marti”. Now boys and girls from anywhere are able to enjoy and learn from all the resources provided. Adults have to follow simple steps to download the educational materials and develop the activity autonomously, adapting to the needs and learning goals of the participants.



To access the Virtual Classroom follow the following link

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