

Galapagos Tortoise Programme



Large male Galapagos giant tortoise on Santa Cruz Island feeding on *Sida rhombifolia* leaves. Photo Stephen Blake.

The goal of **THE GALAPAGOS TORTOISE PROGRAMME** is to assist the Galapagos National Park (GNP) to effectively conserve giant Galapagos tortoises by conducting cutting edge applied science and developing an inspirational tortoise-based outreach and education programme. Our research focuses on understanding the movement strategies of Galapagos tortoises, and their ecological impacts and conservation implications. We use state of the art Global Positioning Systems (GPS) tags to monitor tortoise movements coupled with traditional ecological research including surveys on foot assess the distribution and abundance of tortoise, observations of feeding behaviour, and sampling of vegetation structure and composition. Our research drives an outreach and education programme for school-aged young people on Galapagos, the USA and UK. We collaborate with institutions such as the Galapagos National Park and Ecology Project International to introduce students to practical field-based research, and classroom activities. To increase the effectiveness of our science for conservation, we share our tortoise movement data on the internet at www.movebank.org, and on our Facebook page (www.facebook.com/galapagostortoiseproject). The programme is coordinated by the Max Planck Institute and SUNY College of Environmental Science and Forestry in collaboration with the Galapagos National Park Service, Charles Darwin Foundation, St. Louis Zoo and others.

Where we work

We work on three Islands and with four different species of giant tortoise. These sites were selected because they cover the ecological range over which Galapagos tortoises live, from the arid low-lying island of Espanola to the lofty Alcedo Volcano of Isabela which rises to an altitude of 1100m. We study two different species are studied on Santa Cruz, the island most heavily populated by humans, which allows us to assess the impact of human activity on tortoise ecology.



Fredy Cabrera measures a radio-tagged hatchling tortoise



Adult female Santa Cruz tortoise

Highlights

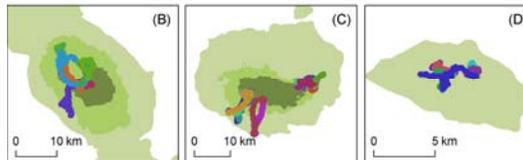
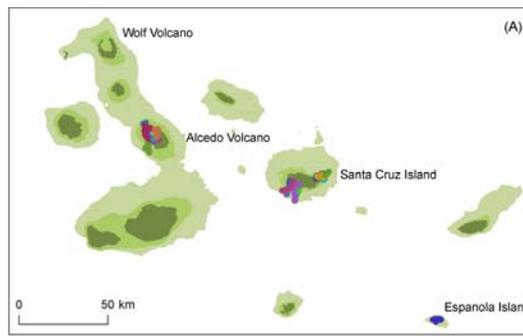
Galapagos tortoises

- Are the largest terrestrial reptiles on earth
- Weigh up to 300kg
- Lifespan over 150 years
- Colonized Galapagos from South America some 2-3 million years ago
- Once occurred on 10 islands. Today, wild tortoises are restricted to just 6 islands
- May have comprised 15 taxa, while today only 10 are recognized

Programme

- Initiated in 2009
- First GPS telemetry study of giant tortoises
- Over 90 individuals tagged and monitored in 4 populations on 3 different islands
- View movement data on www.movebank.org
- Over 600 students have participated in our outreach programme, which includes field and classroom activities
- Media attention includes National Geographic Society, BBC, SKY TV, and Ecuadorian radio.
- Three peer reviewed

Tracking tortoise movements: We use GPS tracking devices to record the hourly location of over 80 tortoises. The GPS units GmbH (Munich, Germany) contain accelerometers which track the fine detail of movement in three dimensions. The tags have a 10 year battery life which will allow us to analyse patterns in movement in relation to ecological and climatological variation over a meaningful time scale. By monitoring tortoises on three different islands we can assess how tortoise movements may have evolved in response to the particular environmental characteristics of each island. For this reason, our research goes beyond giant tortoise ecology, but also allows us to address long-standing questions about animal movement more generally. The different islands and their tortoises provide a natural experimental setting in which to determine the causes and consequences of animal movement.



Tortoise movements over three islands (A), and in detail on Alcedo volcano (B), Santa Cruz (C) and Espanola (D).

Research on ecology and health

We conduct traditional ecological research including monthly surveys of tortoise distribution, quantify tortoise diets in relation to vegetation characteristics, and examine the ecosystem role of tortoises. We collect environmental data both in the field and from remote sensing sources to put tortoise ecology into an environmental context. We conduct physical exams of tortoises, collect blood and dung samples to assess tortoise physical state and use in situ ultrasound of female tortoises to determine reproductive condition in relation to movement strategy.



Ultrasound scan showing developing follicles



Walter Pisco from the Mola Mola Ecology Club with a BBC film crew

Outreach

Our motivation for developing an outreach programme is to translate the results of our research into something meaningful for local communities, from Galapagos children to policy makers. Our research will only be beneficial for conservation if it is understood and can result in positive change in individual behavior and better management decisions. We focus on getting local young people into the woods to experience intimacy with Galapagos tortoises and their habitats to motivate them toward a conservation ethic. We have also publicized our project more widely through media including the National Geographic Society, David Attenborough and SKY TV, BBC and other international outlets

Next steps

In 2014, we will focus on publishing our results to date in high quality scientific journals while maintaining our strong “on the ground” research and education programmes. These should include papers on tortoise diets and the role of introduced species, vegetation change mediated by tortoises along the elevation gradients of Galapagos, and a suite of tortoise movement papers. In the field we will consolidate our research on nesting, reproductive success, and the fate of eggs and hatchlings. We will work with education professionals to advance the “Galapagos Tortoise Education Partnership” that introduces school-aged young people both in the Galapagos, US, and Europe to tortoises and turtles through hands on experience in the research project and completion of customised educational activities.



Tortoise movement ecology

- Some species of Galapagos tortoises migrate seasonally in response to food, temperature, and suitable sites for nesting
- Migrations occur up and down the slopes of Galapagos volcanoes or around crater rims
- Non-migrating tortoises move an average of only 20m per day, but migrating tortoises move about 110m per day.
- The longest migration route we have recorded is 15km one way
- Unlike most migratory species only adult tortoises migrate
- Tortoises have very general diets, and have a strong preference for fruit when it is available.
- Tortoises are proficient seed dispersers, and move large quantities of seeds over large distances.
- Tortoises may be the “gardeners of Galapagos”.

Collaborators

- Galapagos National Park
- Charles Darwin Foundation
- SUNY-College of Environmental Science and Forestry
- Washington University Institute for School Partnership
- Saint Louis Zoo Institute for Conservation Medicine.
- Houston Zoo Inc.
- Swiss Friends of Galapagos
- Galapagos Conservation Trust
- Ecology Project International
- Movebank.org
- E-Obs Digital Telemetry
- NGS-Critercam
- Genstat

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For more information, see

www.gianttortoise.org

www.movebank.org

www.facebook.com/galapagosto-toiseproject