Archipelago-wide rewilding of Galápagos giant tortoises

A decision-making activity to guide archipelago-wide rewilding of Galapagos giant tortoises

End Users

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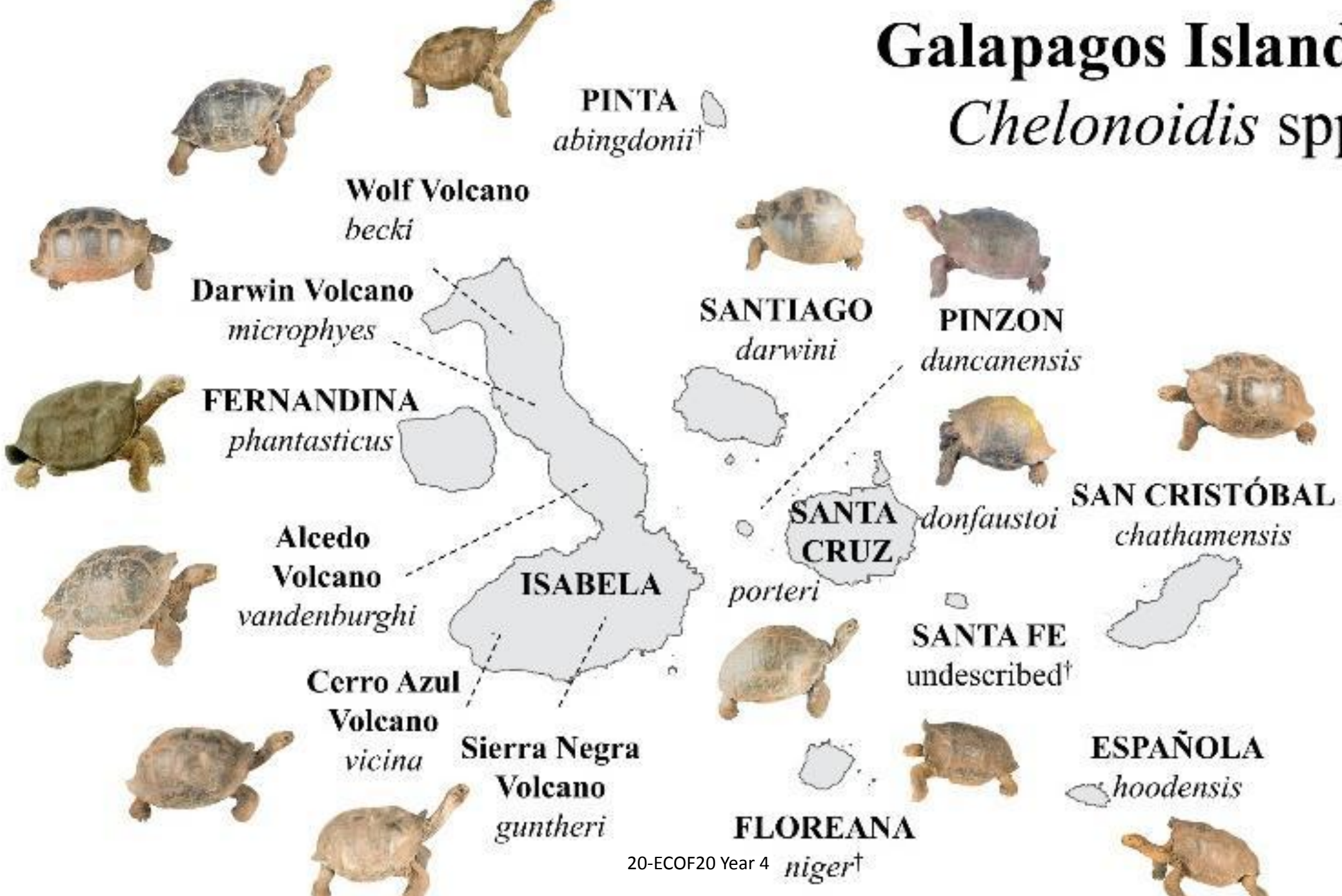
Co-PI, SUNY ESF / Galapagos Conservancy

20-ECOF20 Year 4

Galapagos Islands

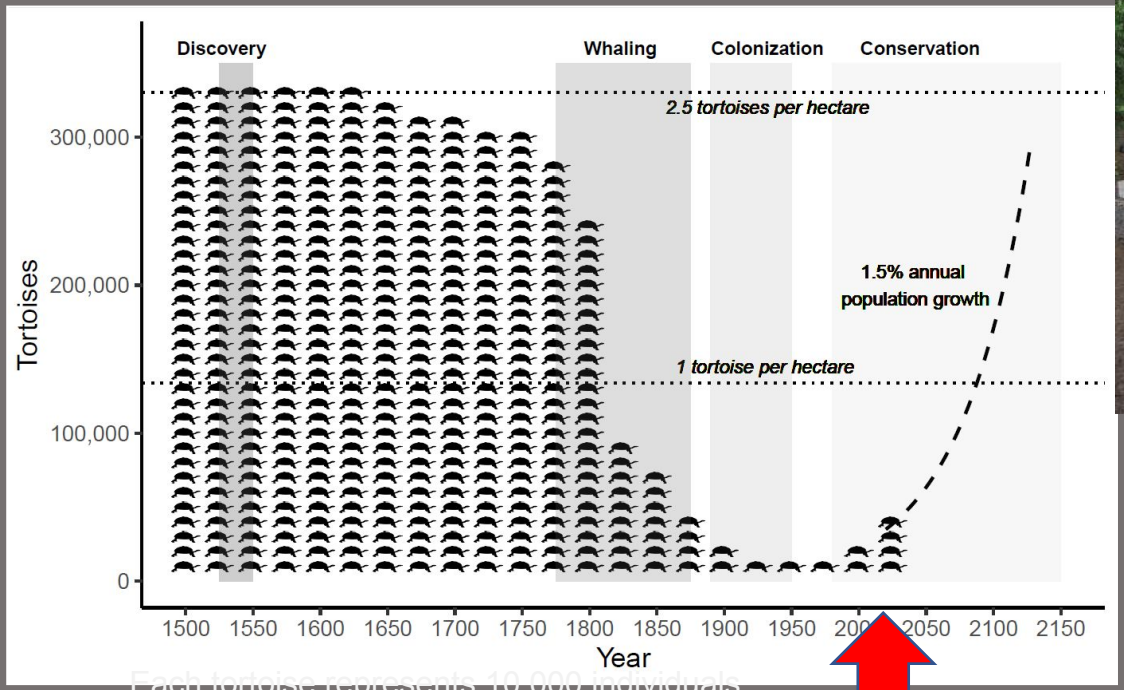
Chelonoidis spp.

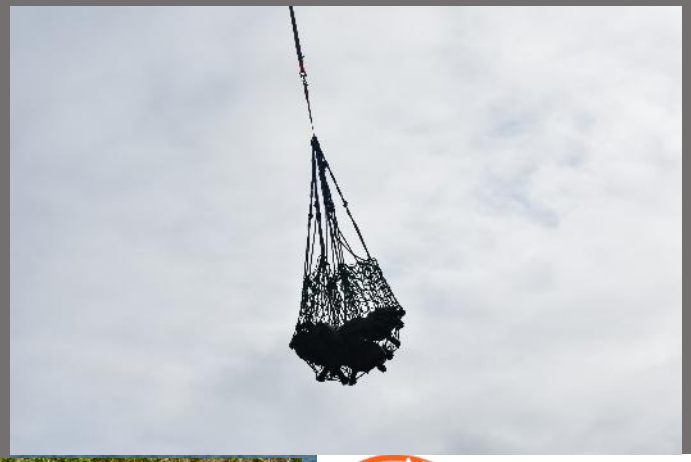


Project Motivation & End User Need

Goal: Create an integrated decision support system that will guide decision-making on the "<u>where and when</u>" to rewild tortoises considering:

expected future climatic conditions while meeting multiple objectives including probability of population establishment, ecosystem status, biodiversity enhancement, economic outcomes, and operational costs





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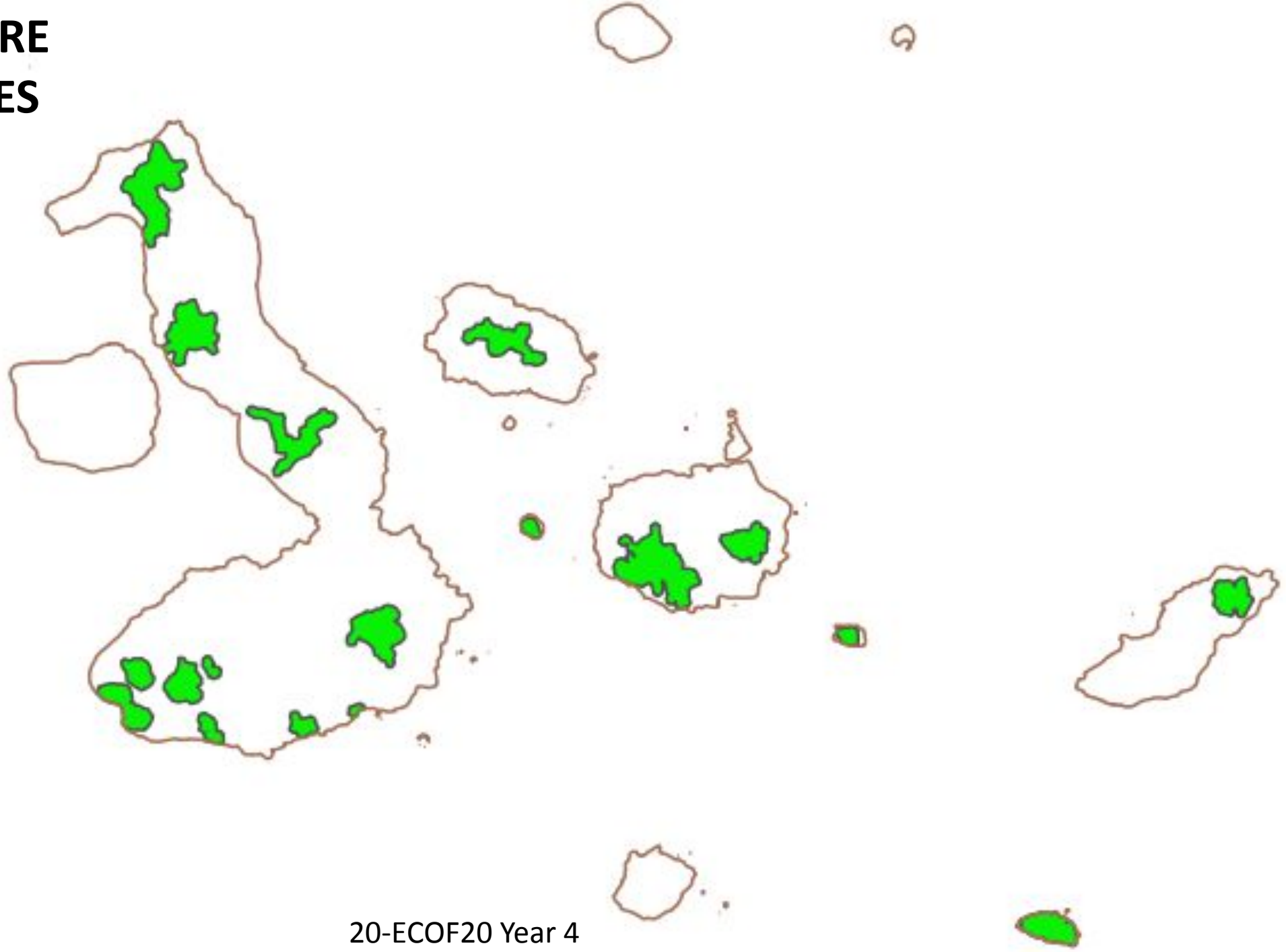
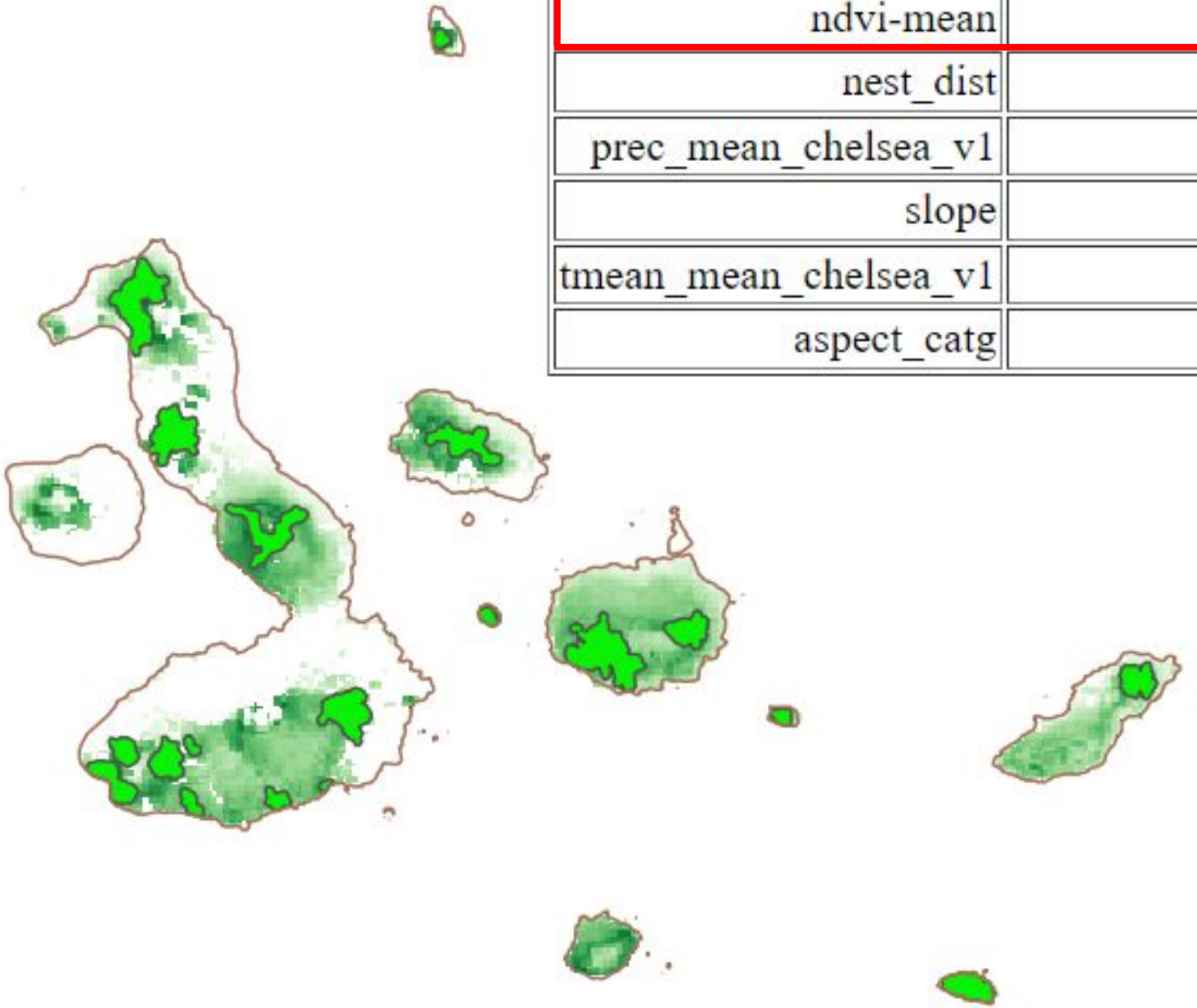
WHERE ARE TORTOISES NOW?



WHERE COULD TORTISES BE REWILDED?

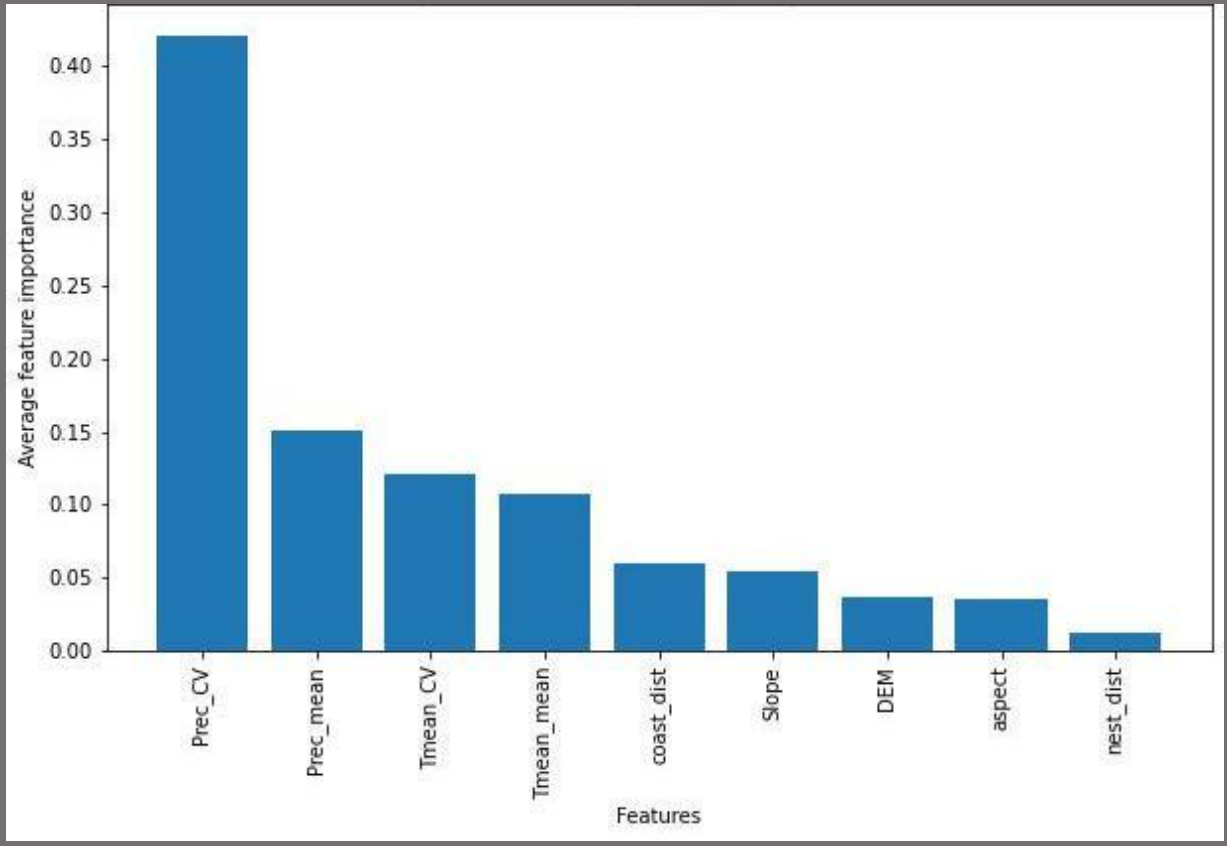
Species Distribution Models

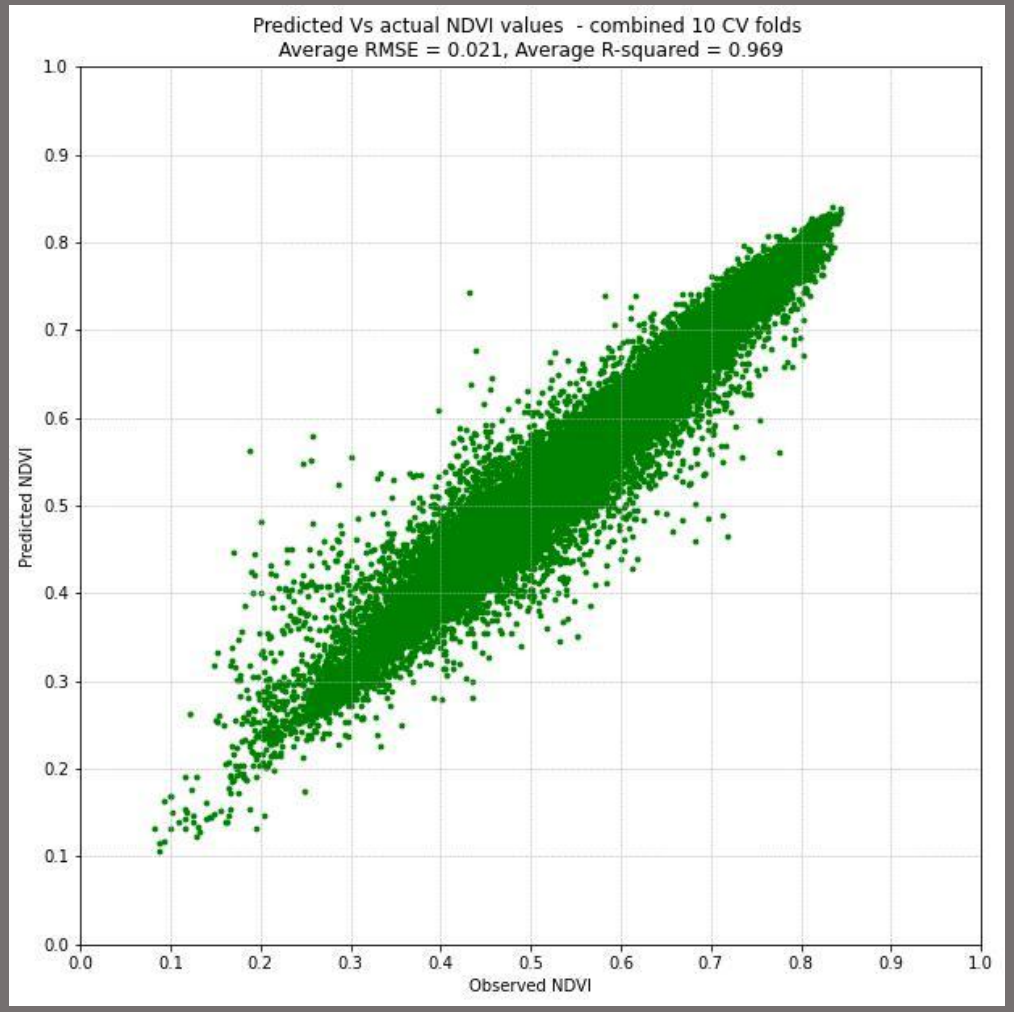
Variable	Percent contribution
ndvi-mean	59.9
nest_dist	27.3
prec_mean_chelsea_v1	3.9
slope	3.4
tmean_mean_chelsea_v1	2.8
aspect_catg	2.7



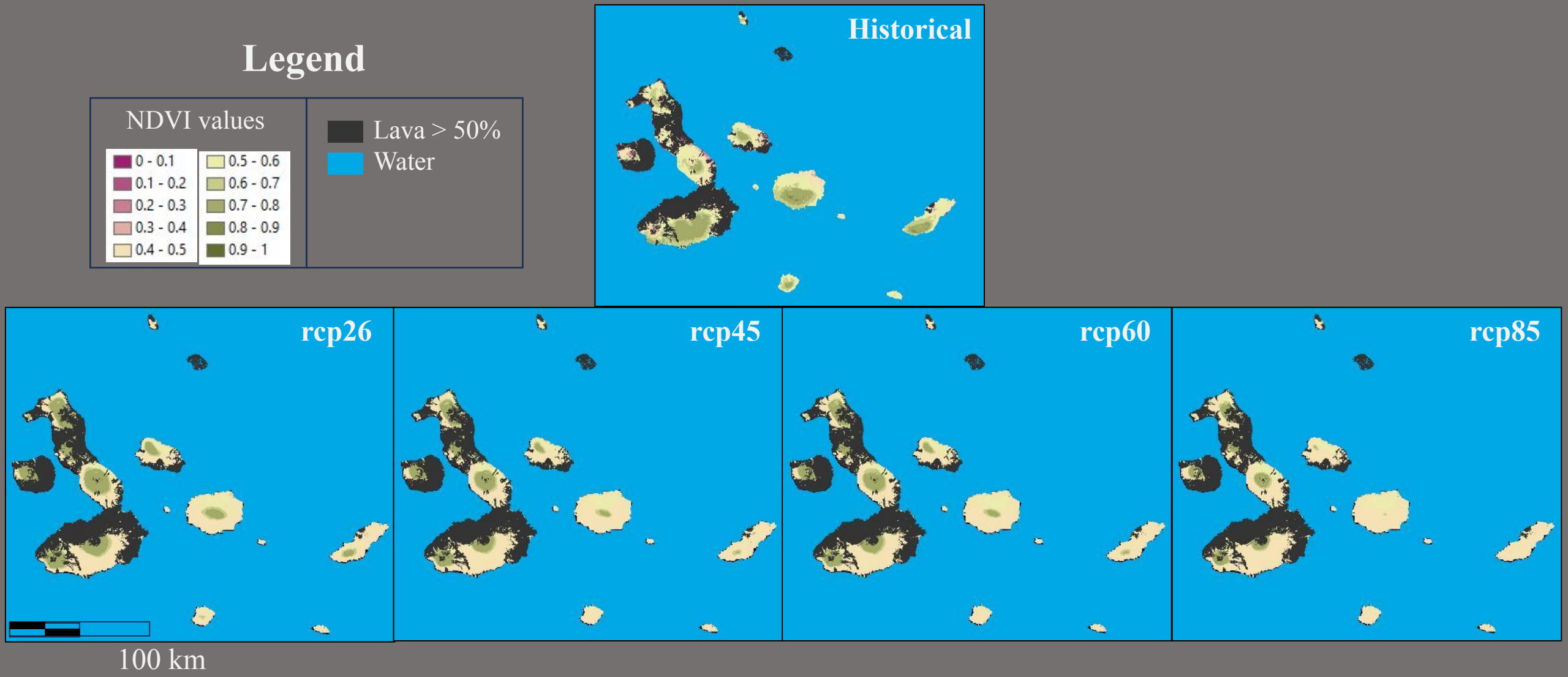
REWILDING TORTOISES INTO WHAT FUTURE?

Vegetation Prediction Model





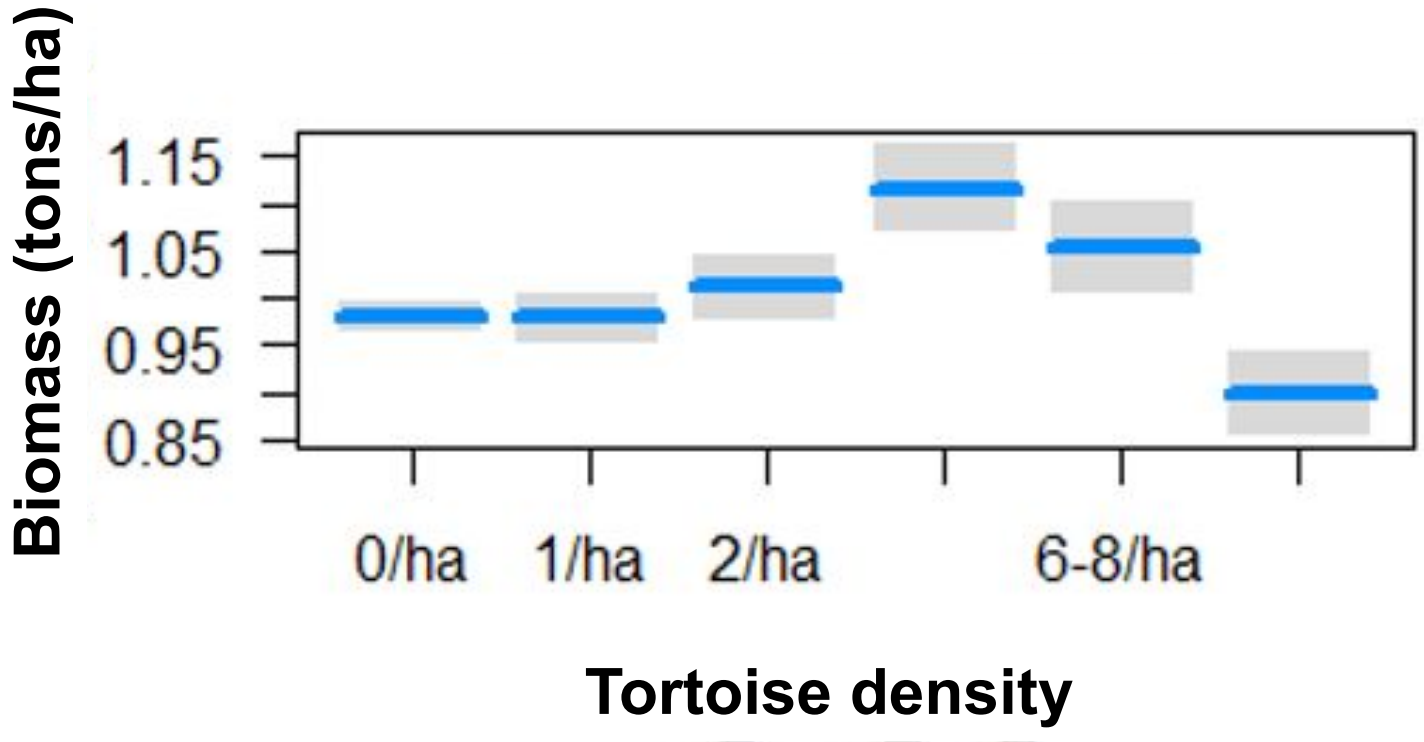
NDVI 2080 Prediction under different RCPs

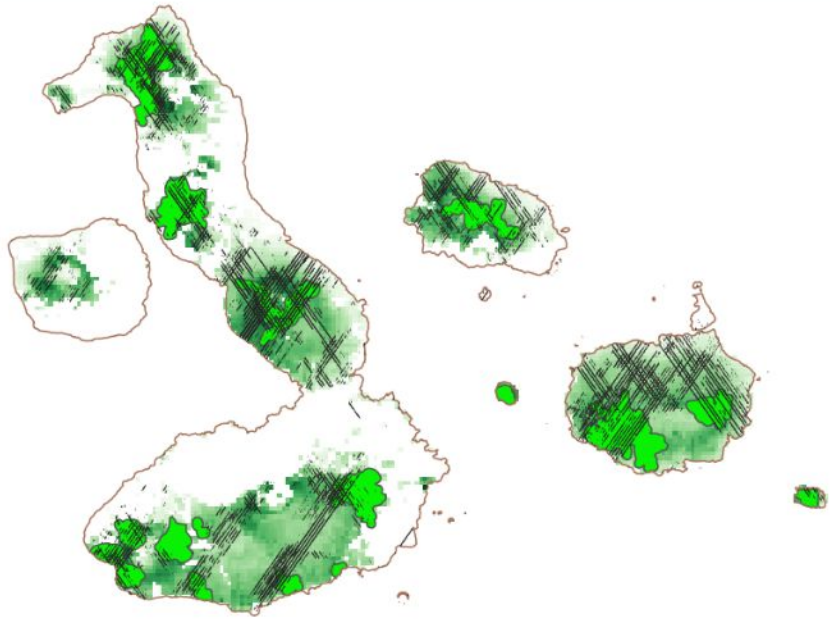


Emission scenarios: Representative Concentration Pathways
RCP26 (lowest), RCP45, RCP60 and RCP85 (highest emissions)

WITH WHAT ECOLOGICAL IMPACT?

Tortoise - Vegetation Model

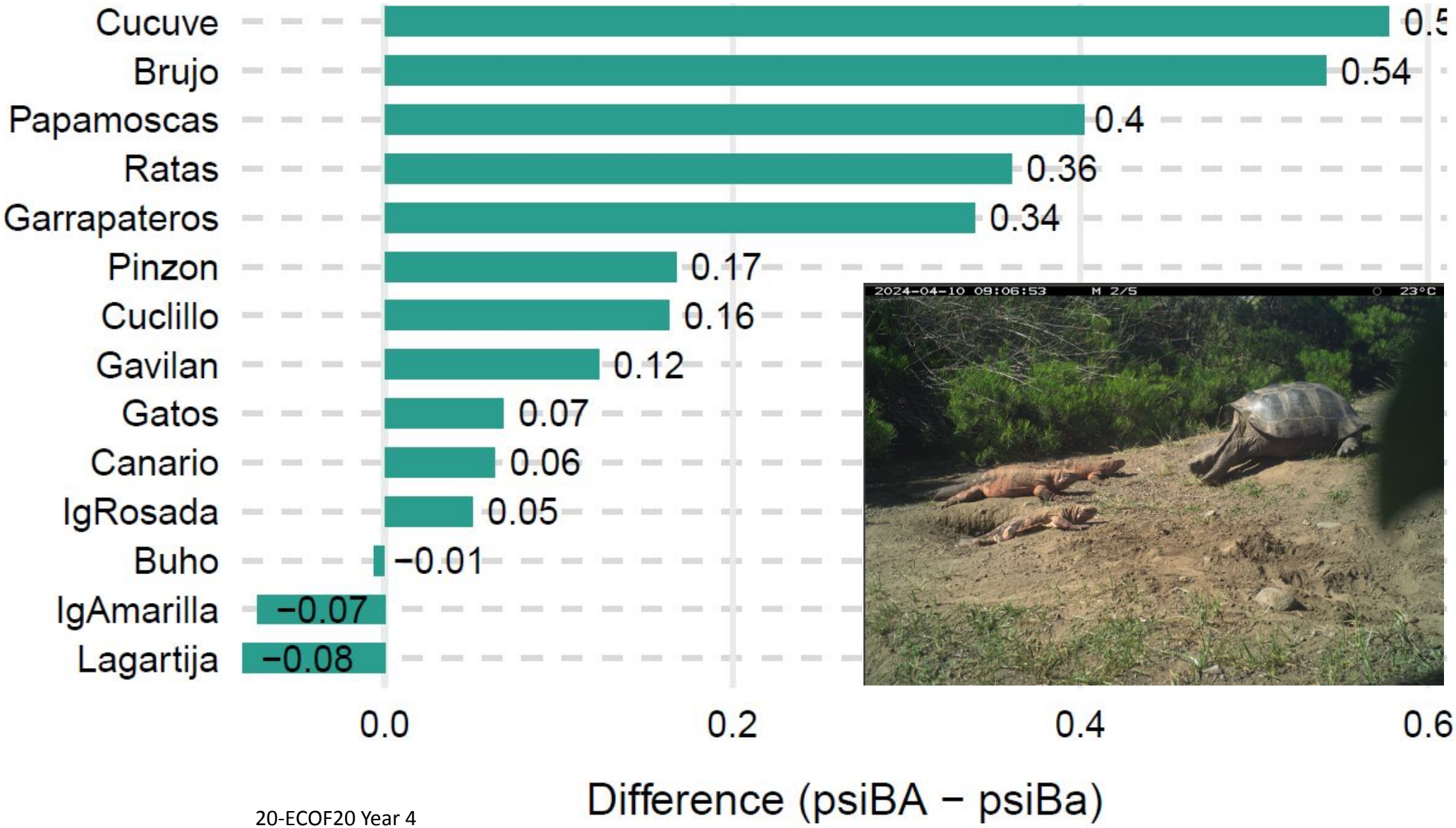




WITH WHAT BIODIVERSITY IMPACT?

Tortoise – Wildlife Model

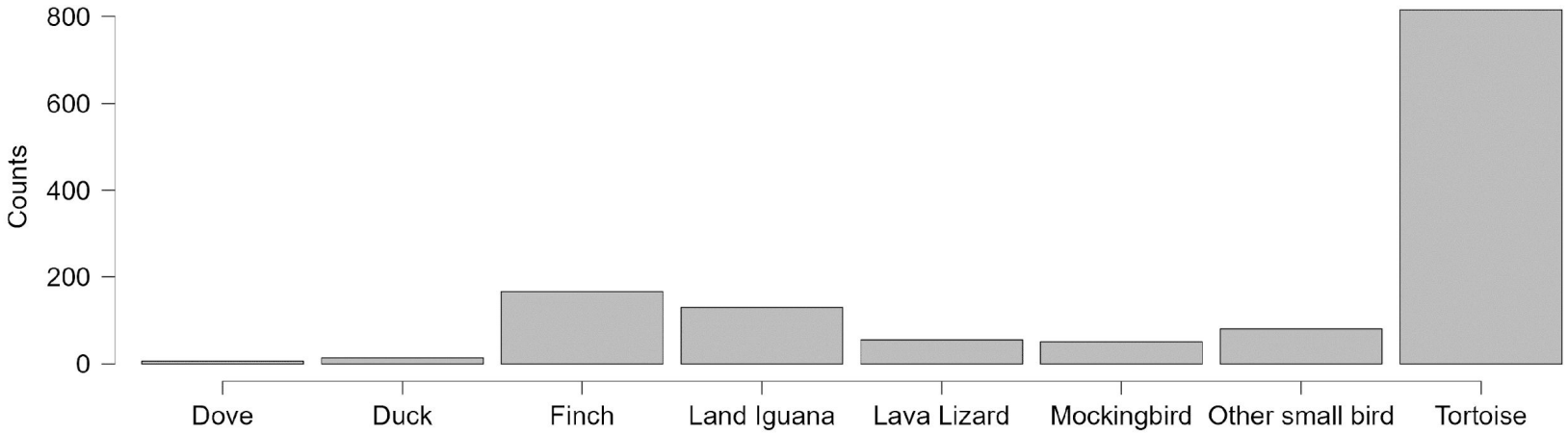
Probability of Species Occurrence if Tortoise Present



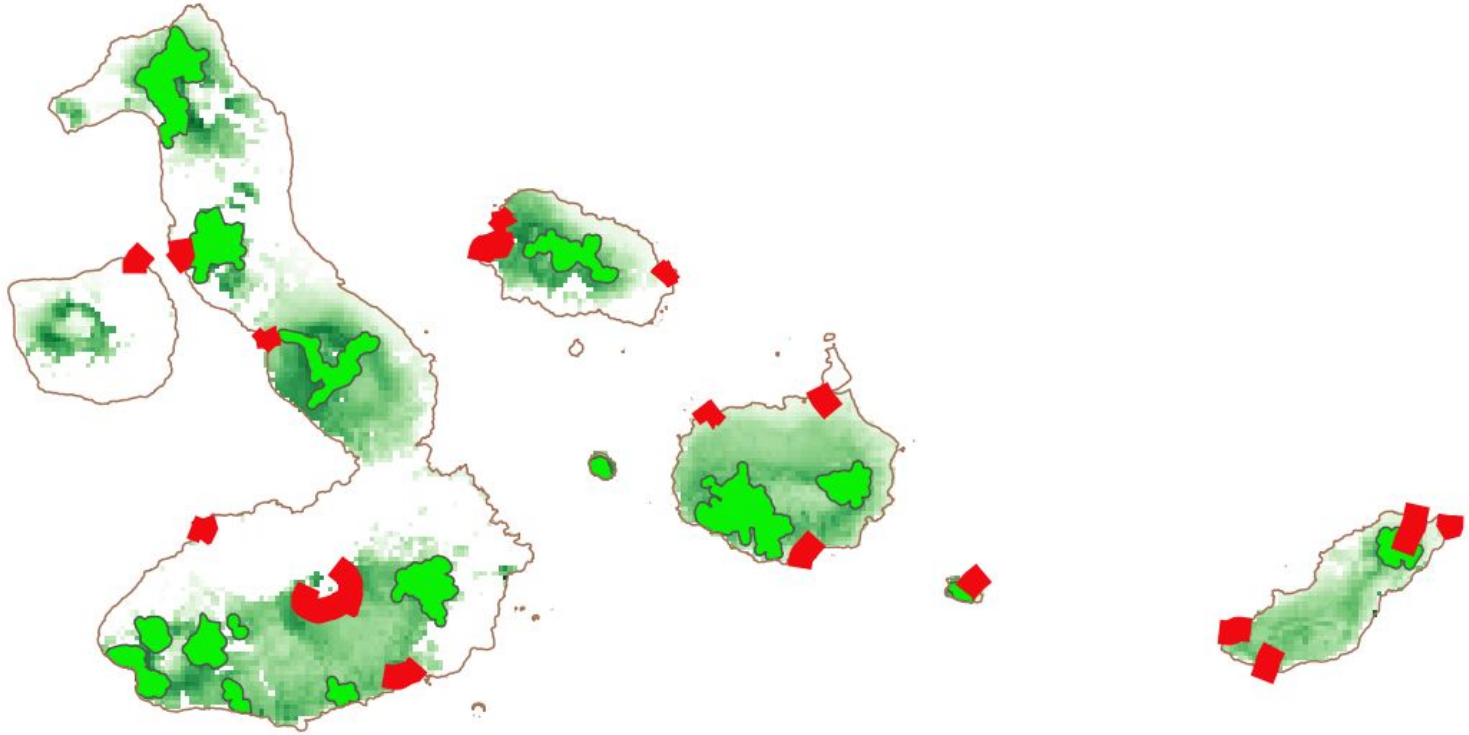
WITH WHAT ECONOMIC IMPACT?

Tortoise Economic Impact Model

~10,000 images mined from Flickr, Classified with ML



Tourism Benefits: % of areas near tourist trails with tortoises



AT WHAT COST?

- Captive rearing and repatriation

Costs		
Captive care (US$/tortoise/year)	Constant	190
Translocation: captivity to Floreana (US$/trip)	Constant	10,000
Translocation: Wolf Volcano to captivity or Floreana (US$/trip)	Constant	100,000
New corral (US$/corral)	Constant	35,000
Genetic testing (US$/sample)	Constant	15

- Control: cattle, dogs, goats, pigs, rats
- Anti-poaching: adults and juveniles

Decision Support Tool

Archipelago-wide rewilding of Galapagos giant tortoises / Restauración de las tortugas gigantes de Galápagos en todo el archipiélago

Simulation setup

Select climate scenario

No Change

Management scenario (.csv):

Browse... No file select

Download Example Management Scenario

Start simulation

Sponsors

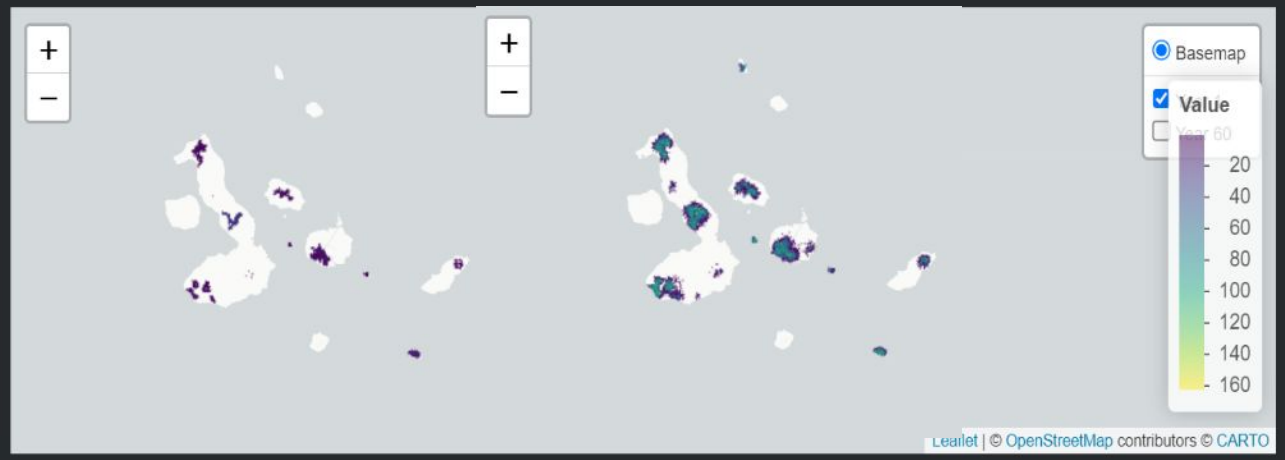
NASA EARTH SCIENCE APPLIED SCIENCES

Bienvenido a la herramienta de toma de decisiones -- Welcome to the decision-making tool

Identificando áreas prioritarias y acciones de manejo para la restauración de las tortugas de Galápagos -- Identifying priority areas and management actions for Galapagos tortoise rewilding

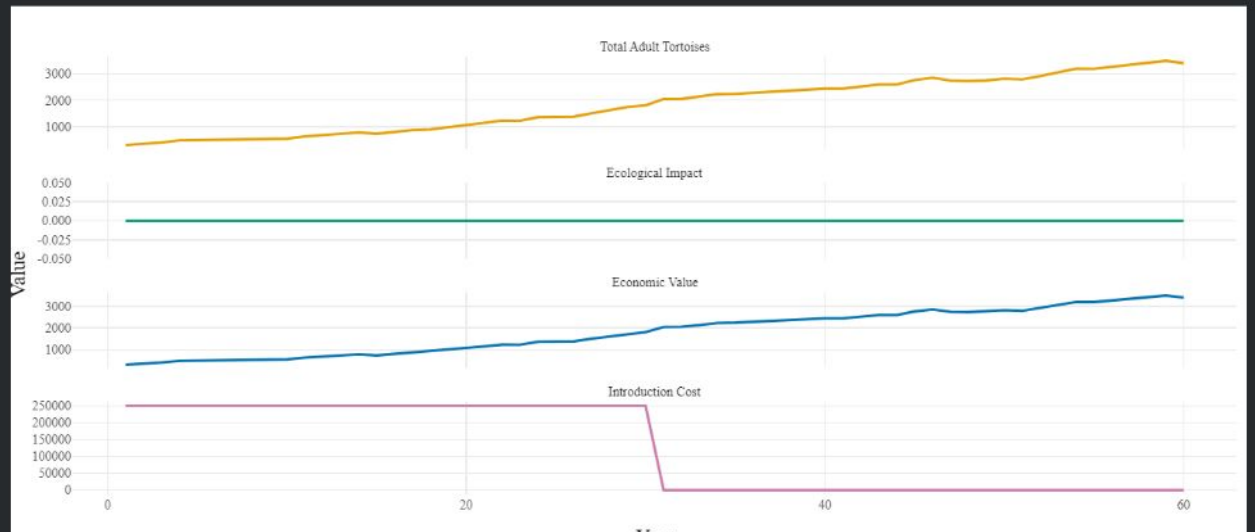
Overview Timeseries Compare All Islands

Simulation overview



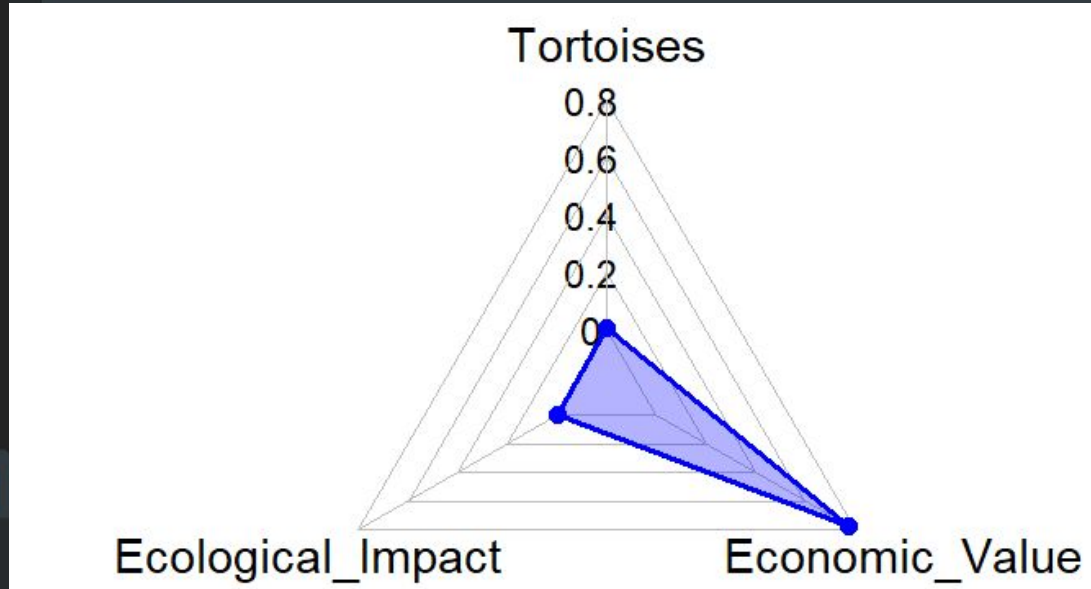
Overview Timeseries Compare All Islands

Simulation overview

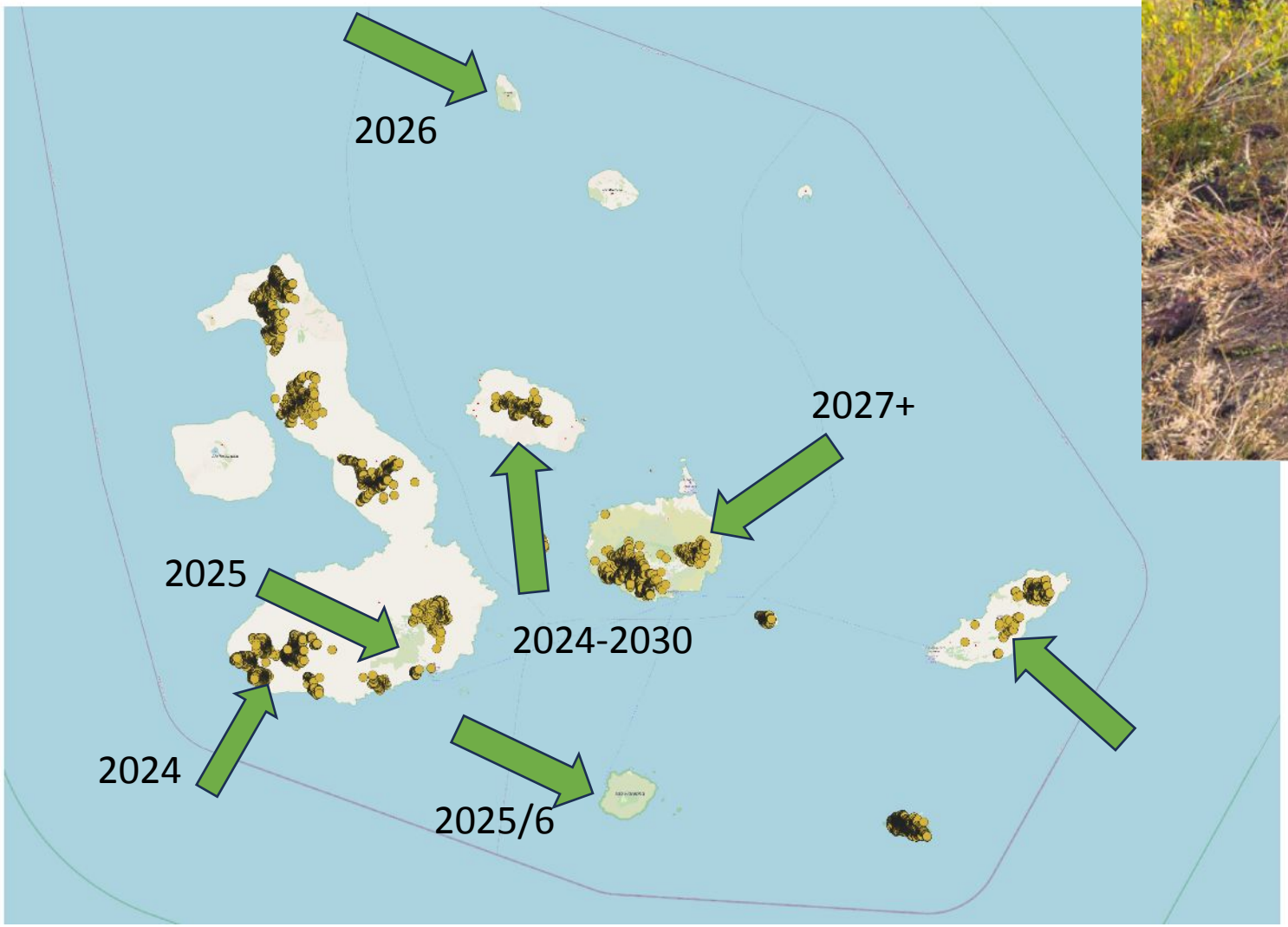


Overview Timeseries Compare

Compare simulations



Implementation



End User Engagement Activities

INTERNATIONAL WORKSHOP

Initiativa Galápagos: Blue-print for tortoise restoration 2025-2050

Dec, 2025 - Jan,2026

EARTH SCIENCE APPLIED SCIENCES

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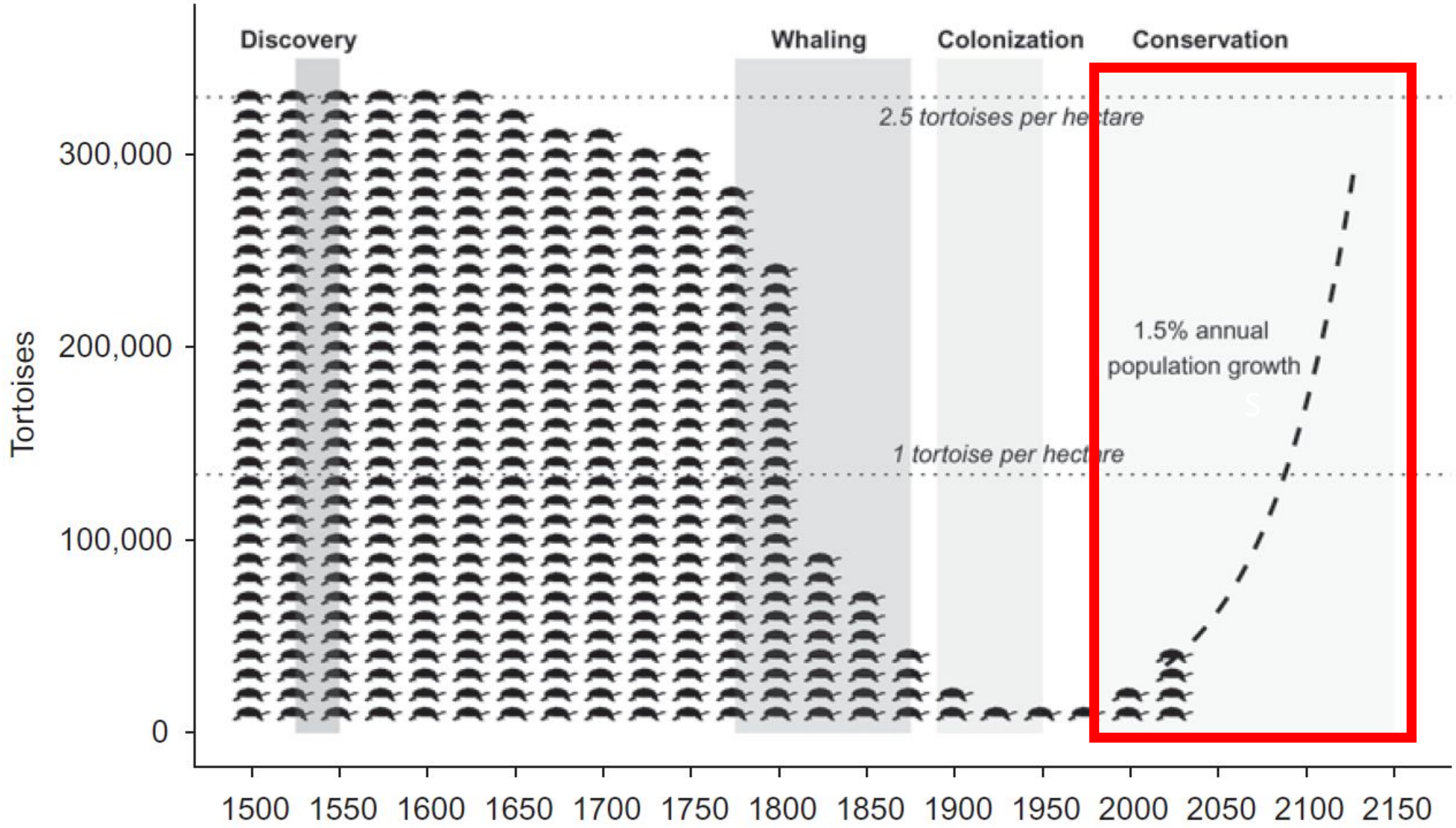
Galapagos Conservancy

ESF State University of New York College of Environmental Science and Forestry



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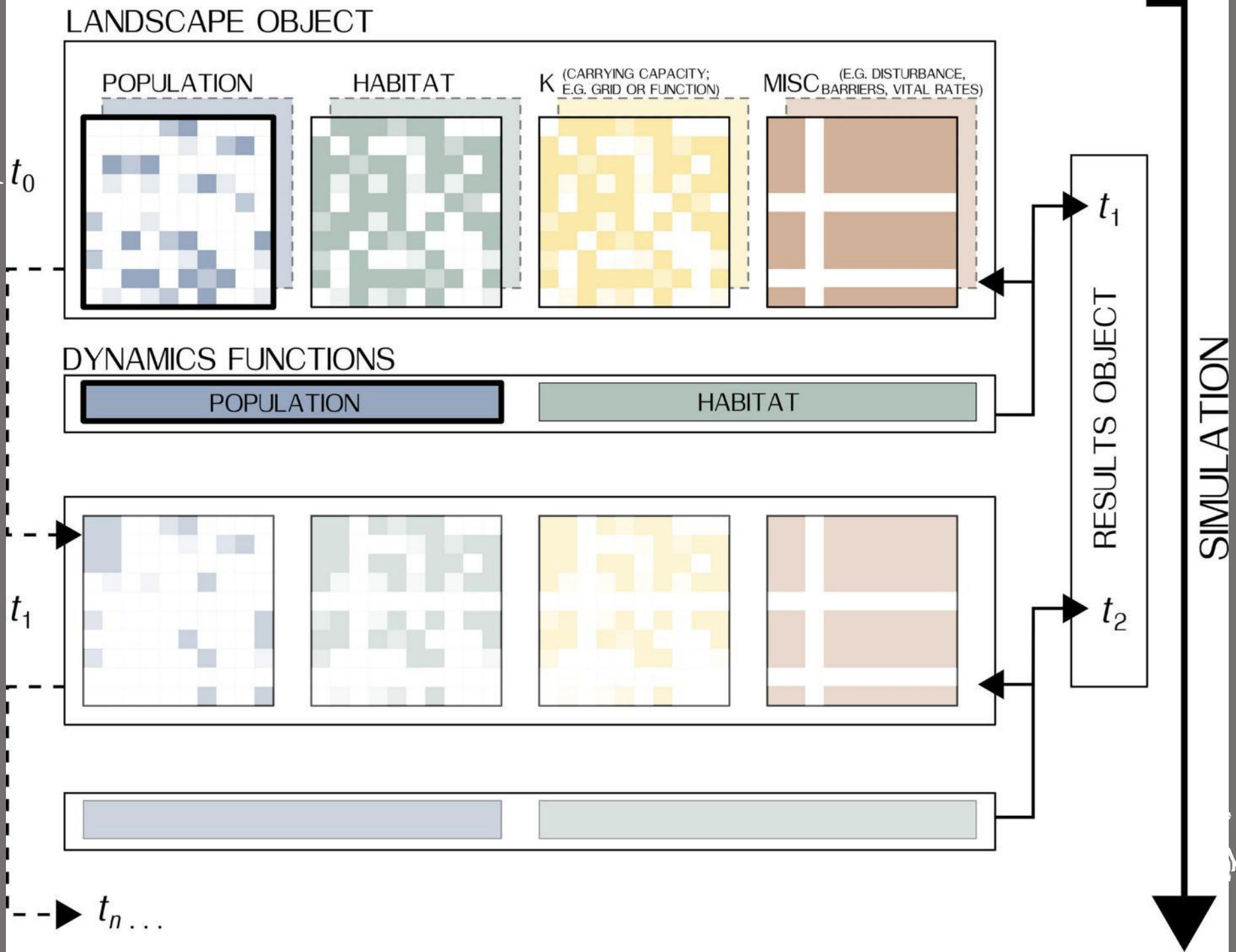
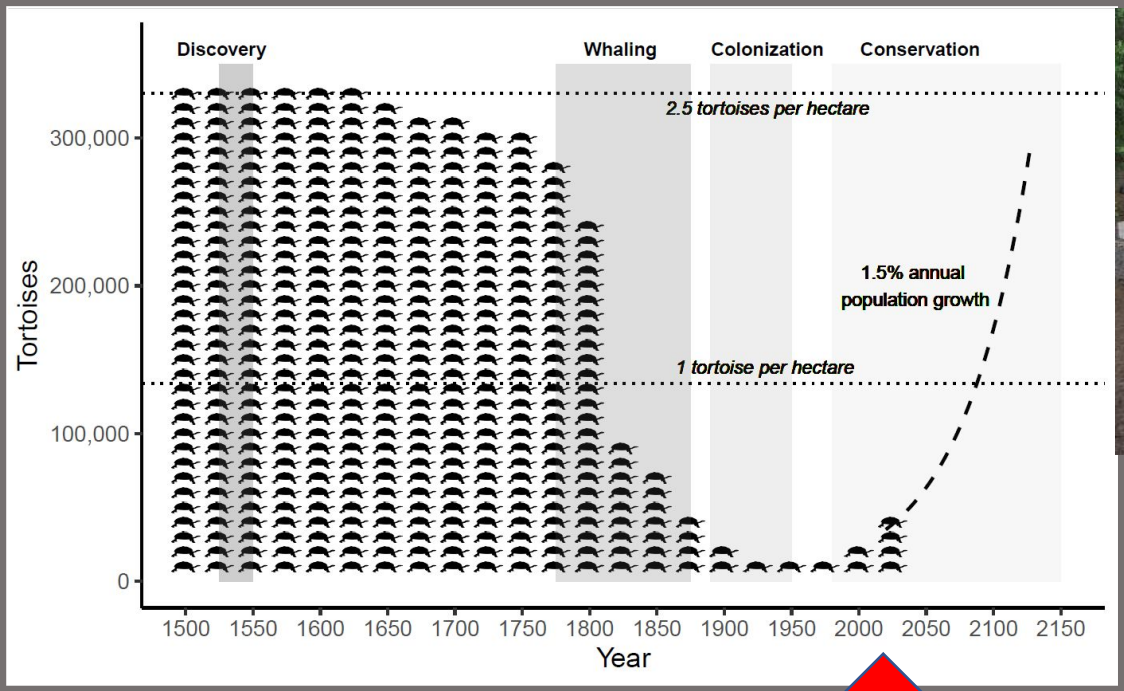


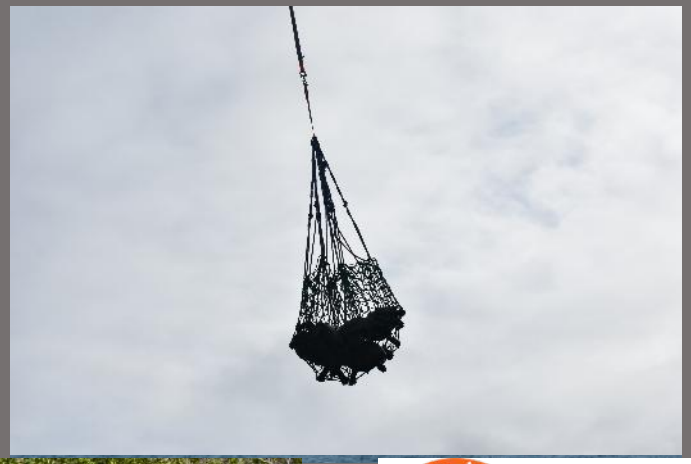
Galápagos Conservancy
galapagos.org

Background

The Galapagos Islands have been the focus of perhaps the largest-scale "rewilding" effort ever attempted on Earth. Over the last 60 years, > 10,000 giant tortoises have been reared in captivity and released to the wild.



Each tortoise represents 10,000 individuals



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