Biggest Bang for Your Buck

USING NASA EARTH OBSERVATIONS TO MAXIMIZE ISLAND-OCEAN ECOSYSTEM BENEFITS FOLLOWING INVASIVE MAMMAL ERADICATION

Elke Windschitl and Miroslav Honzák, Geoffrey Roberts, Bradley Cosentino, Joseph O Sexton, Harrison McKenzie-McHarg, John W Wilson, Min Feng, Alison Thieme, Neha Hunka, David Will

Island Conservation
Nature. Oceans. People.

HOBART AND WILLIAM SMITH COLLEGES

UNIVERSITY OF MARYLAND

FLINTpro

terraPulse

ASU™

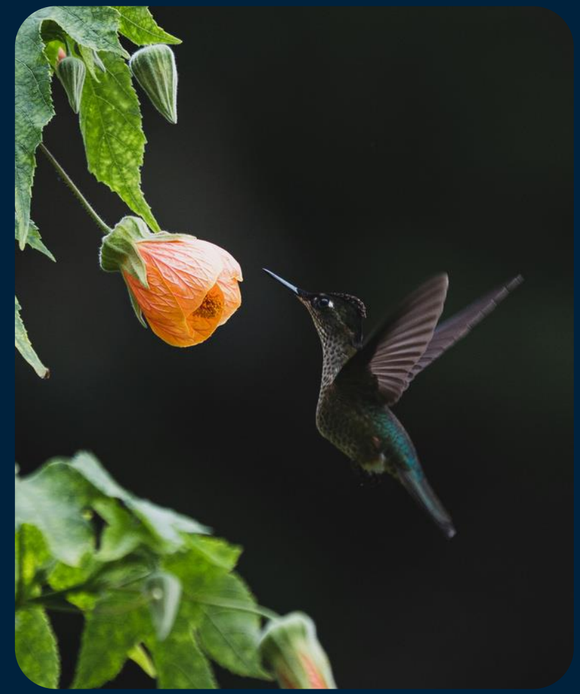
Biggest Bang for Your Buck Agenda

01 | Background

02 | Our Framework

03 | Case Study

04 | Future Directions



01

Background

01 BACKGROUND

Islands face threats from invasive species & climate change

Islands are hotspots of diversity and uniqueness

Eradicating island invasive species is a proven intervention

Fewer than 20% of eradications have measured impact

Eradication can improve ecosystem resilience

2011

Restoring native vegetation ✓

2012

Restoring nutrient cycling ✓

2014

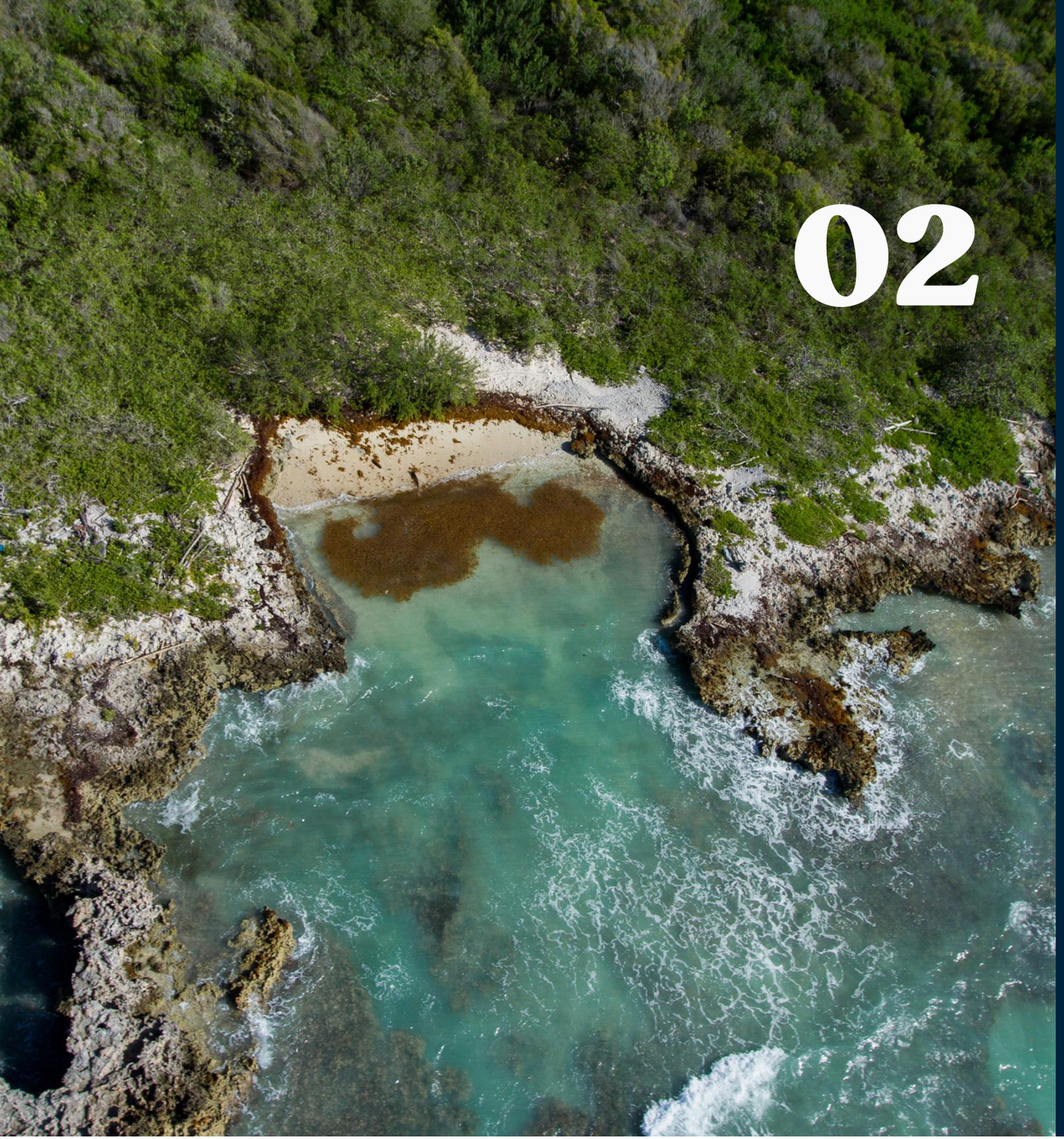
Positively altering native carbon stock ✓

01 BACKGROUND

Field-based impact monitoring is challenging

Current approaches are:

- Expensive
- Limited
- Not standardized
- Don’t typically evaluate carbon



02

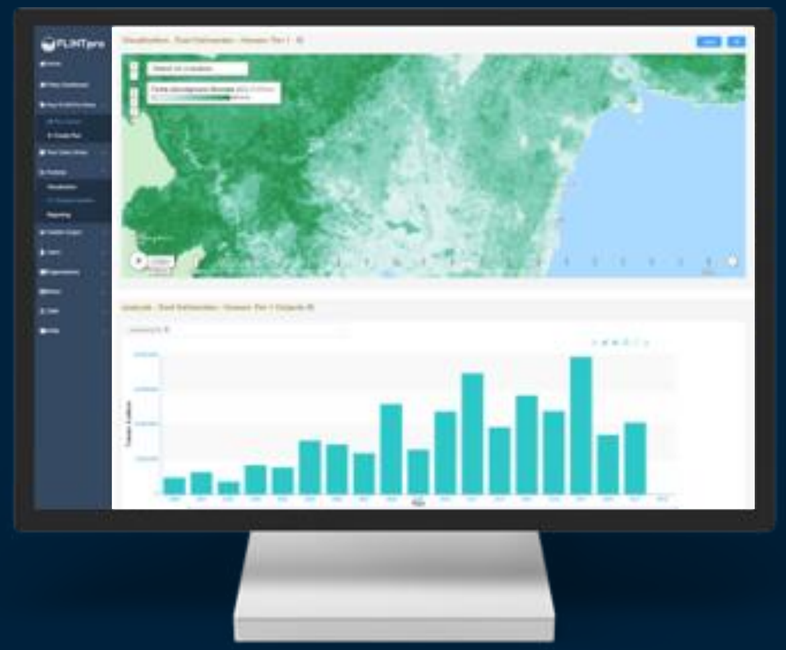
Our Framework

02 OUR FRAMEWORK

We developed a globally consistent vegetation monitoring framework

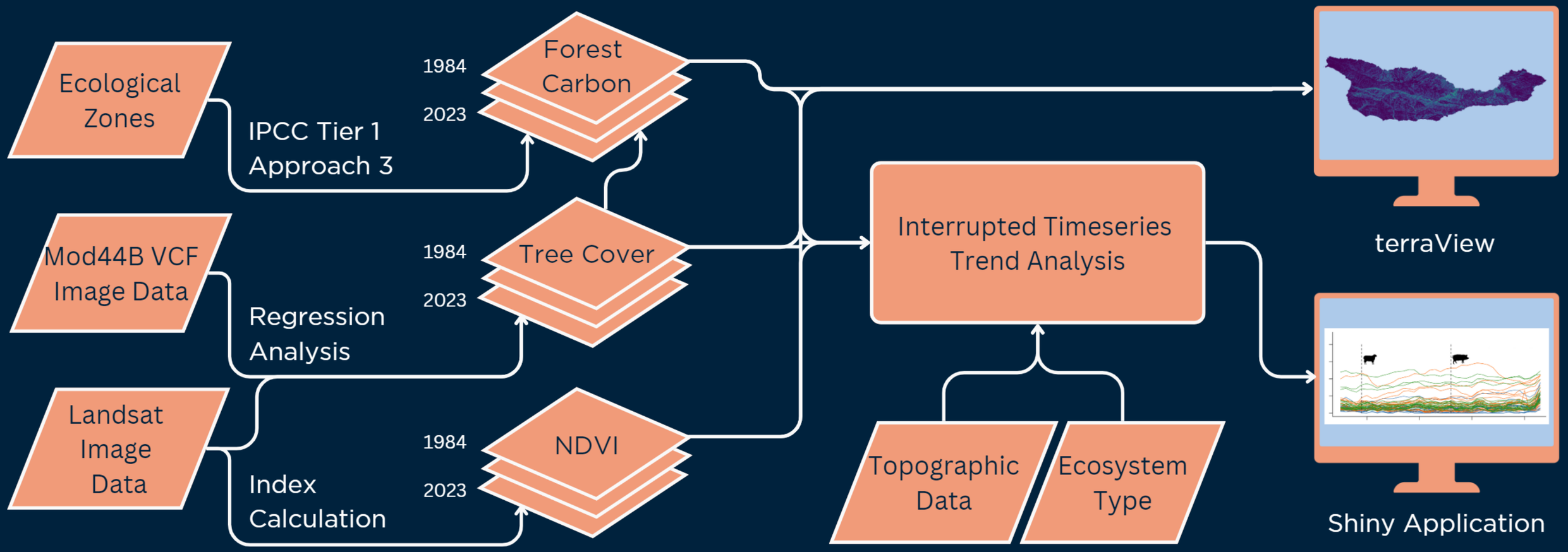
The framework:

- Monitors ecosystem response using standardized measures
- Based on 30-m Landsat data allowing long-term monitoring over 35+ years
- Provides free online access to baseline carbon and vegetation data for 1,000+ islands

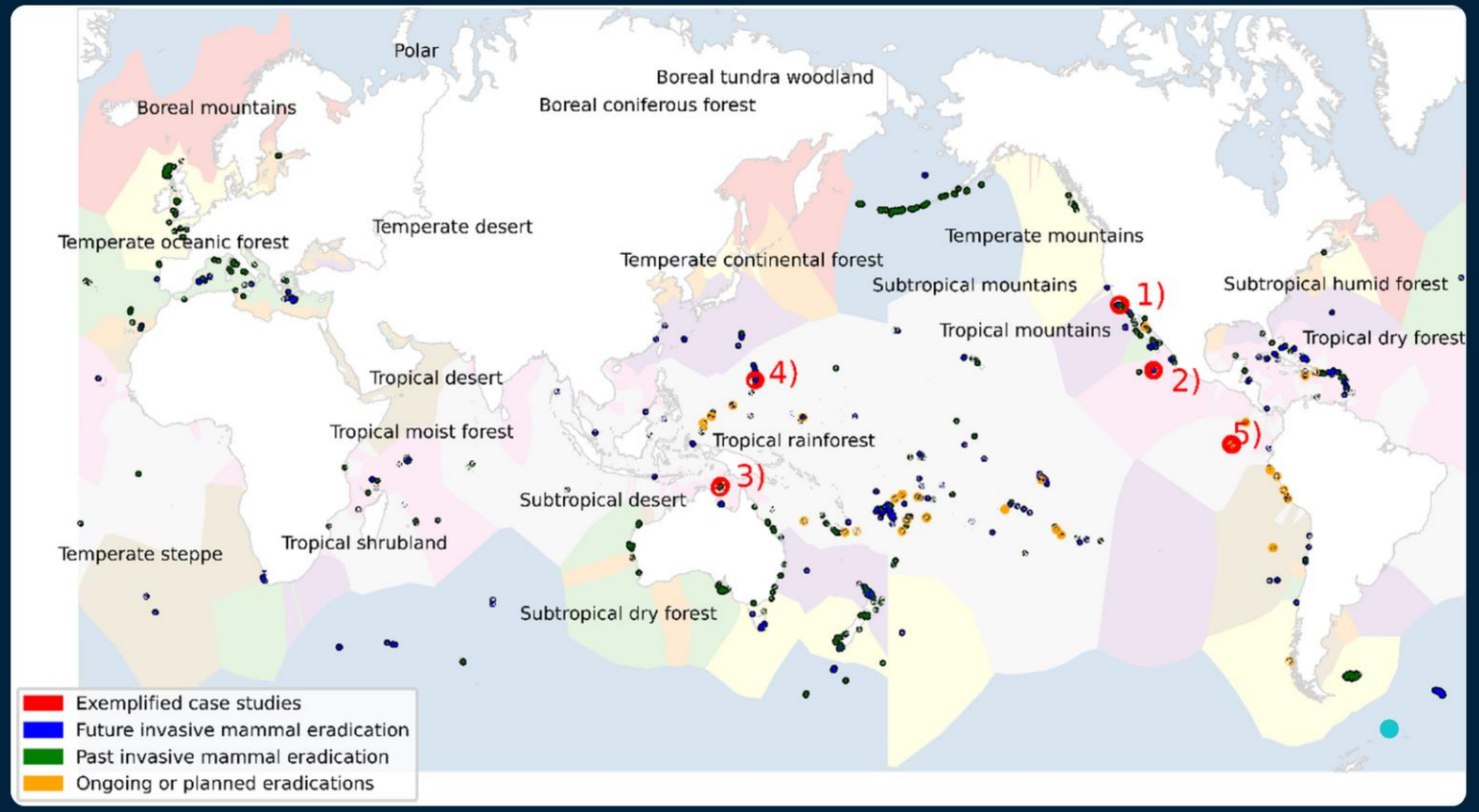


02 OUR FRAMEWORK

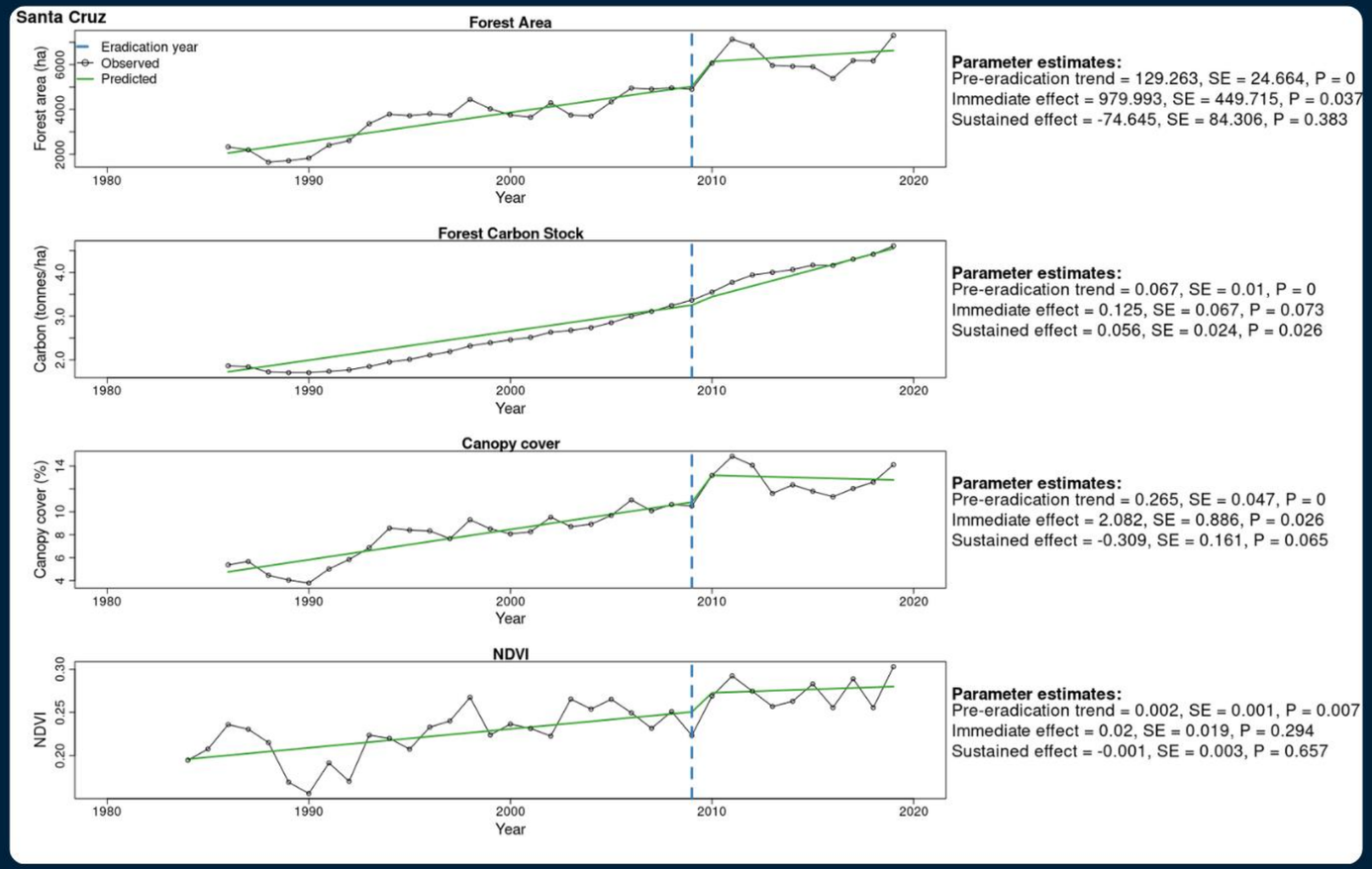
We developed a globally consistent vegetation monitoring framework

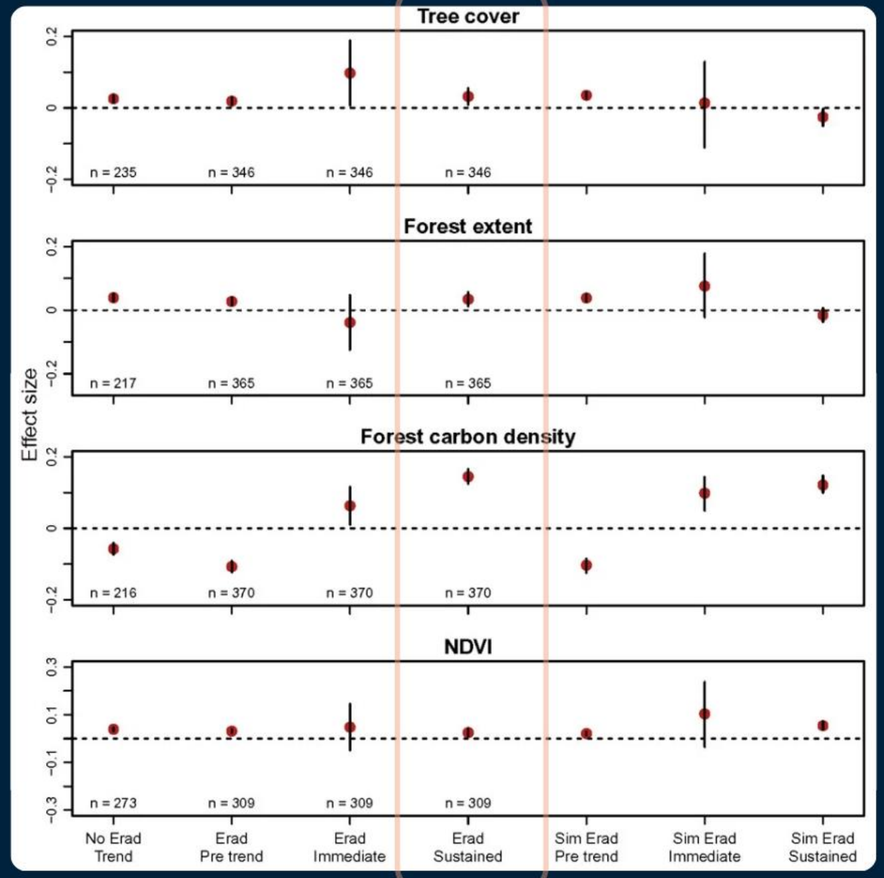


We assessed 1,078 islands worldwide across 17 ecoregions



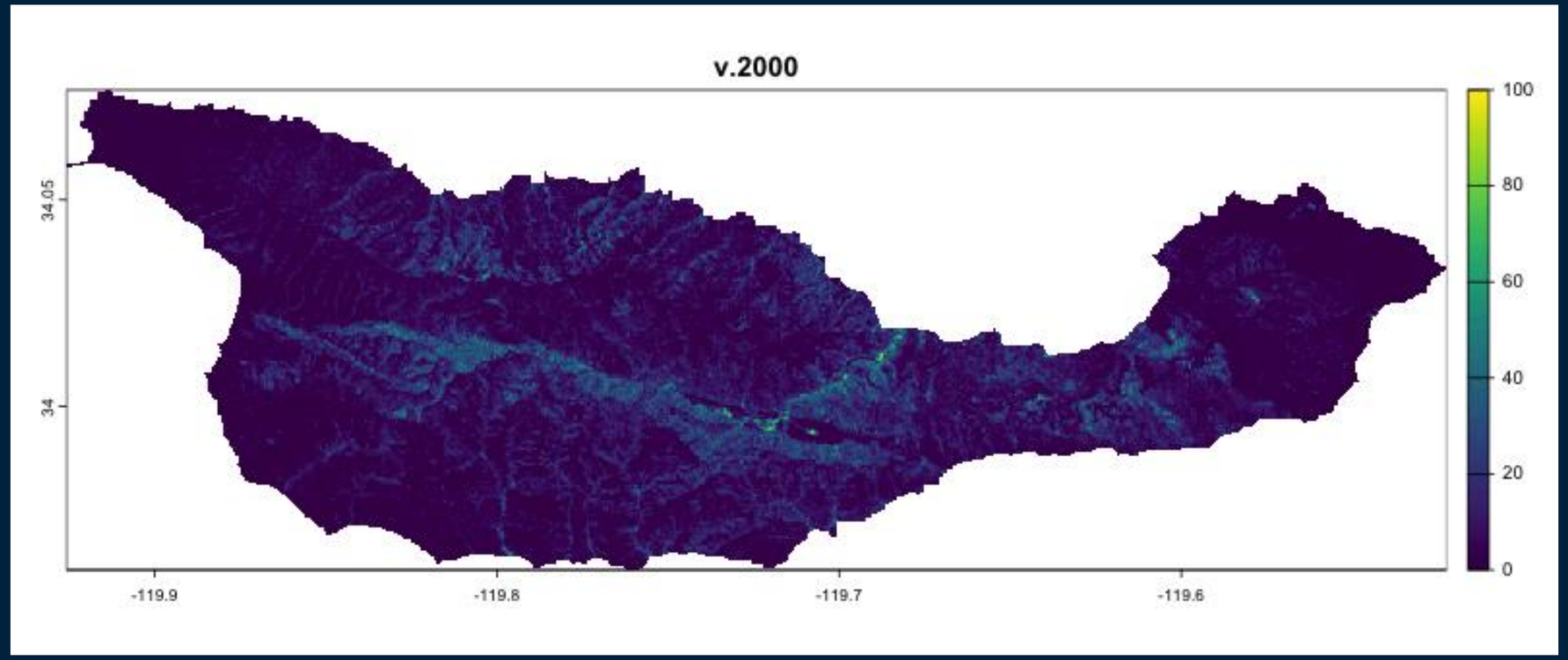
Interrupted timeseries analysis showed significant sustained effects





Results vary significantly by local conditions

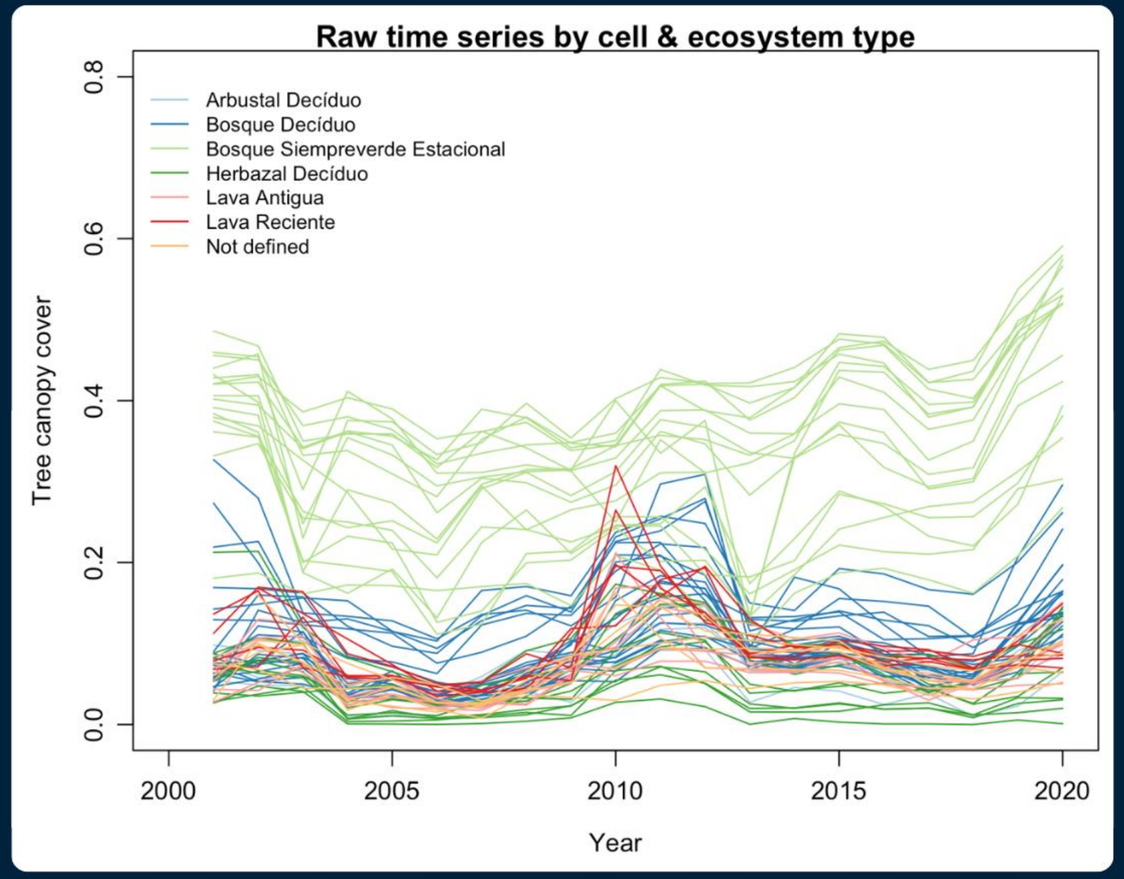
Within islands there may be more significant change



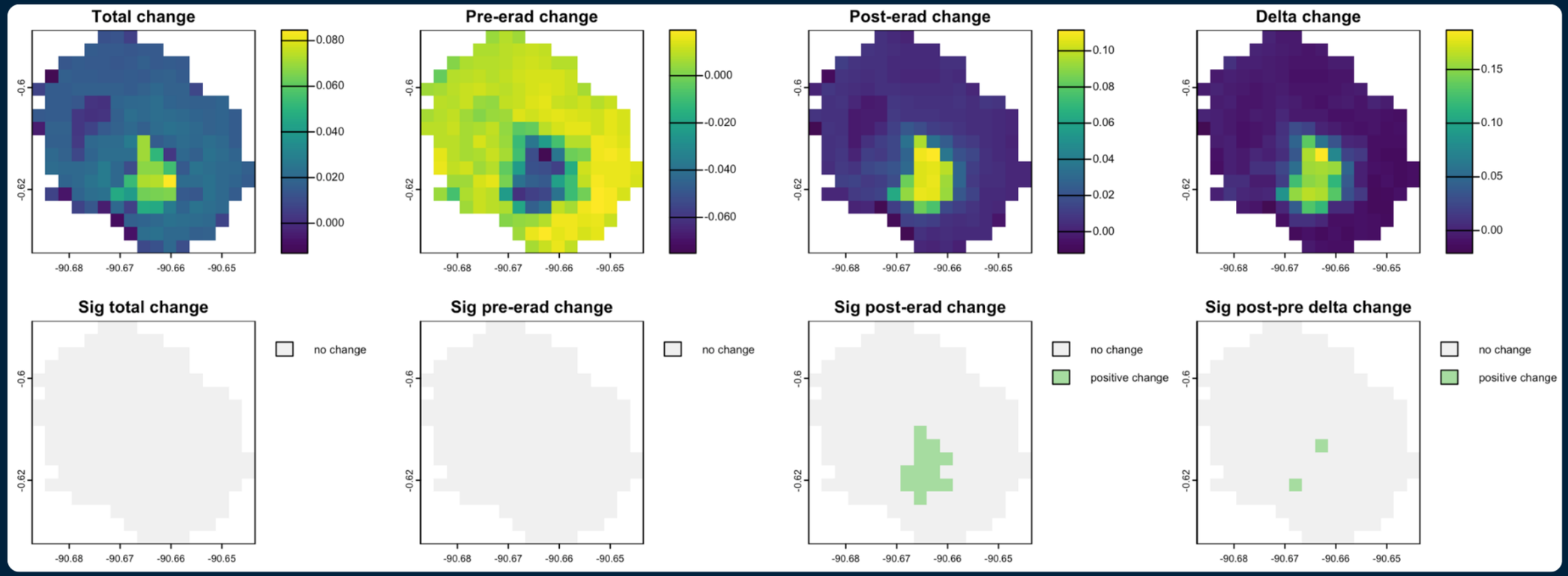
Gif of tree canopy cover (%) on Santa Cruz Island (United States)

Spatially explicit data reveal vegetation trends

Raw time series by vegetation type (showing a random draw of 20 cells per ecosystem) on Pinzón Island (Galápagos, Ecuador)



Spatially explicit data reveal vegetation trends



Total aggregated change in canopy cover by cell - with 95% credible intervals

03

Case Study:

Woodpecker finch reintroductions on Pinzón Island

03 CASE STUDY

Our framework helped inform on-the-ground reintroduction efforts

Problem

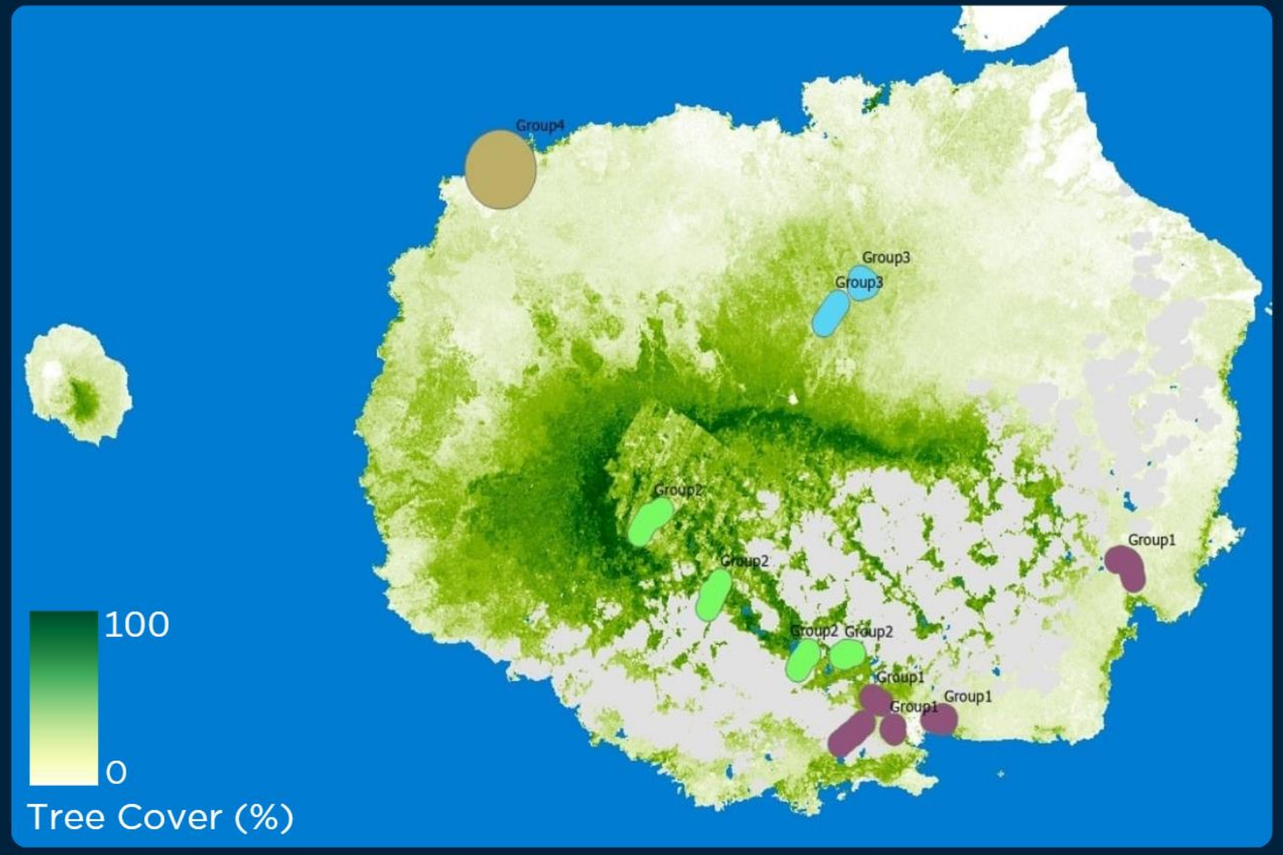
Island Conservation must decide how and where to reintroduce woodpecker finches on Pinzon to increase chances of establishment

Approach

Use suitability (tree cover, tree height, similarity to collection site) to estimate likelihood of establishment + distance to trails (100m)

03 CASE STUDY

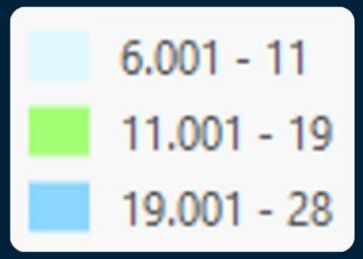
Tree cover data gave insight into finch habitat at potential collection sites



Landsat-derived tree cover (%)				
	Group1	Group2	Group3	Group4
Mean	17.02	41.35	21.12	8.97
Median	12	39	21	9
SD	11.44	15.09	6.86	6.78
Mean - 1 SD	**6**	**26**	**14**	**2**
Mean + 1 SD	**28**	**56**	**28**	**16**

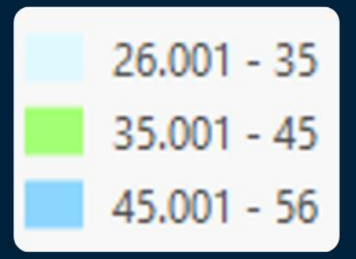
03 CASE STUDY

Comparable habitat informed release site selection



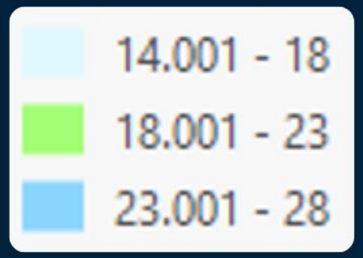
Landsat Optimal TC for Group 1

Landsat Optimal TC for Group 2

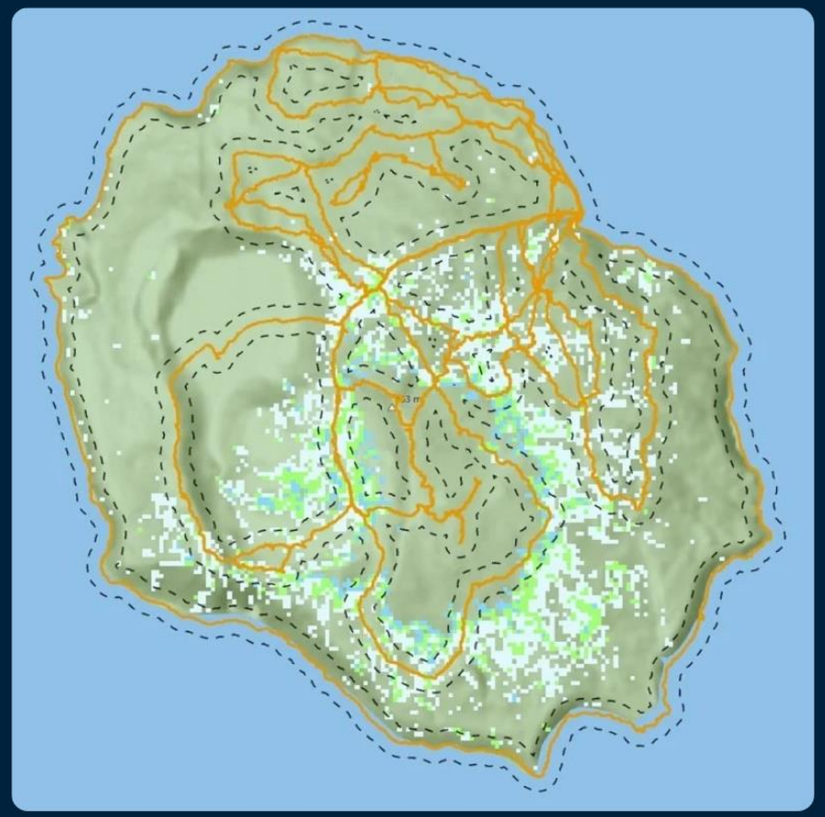


03 CASE STUDY

Comparable habitat informed release site selection

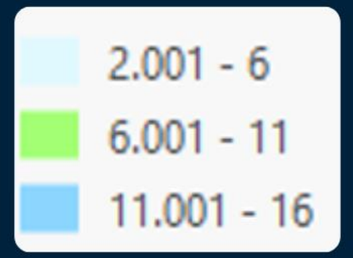


Tree Cover (%)



Landsat Optimal TC for Group 3

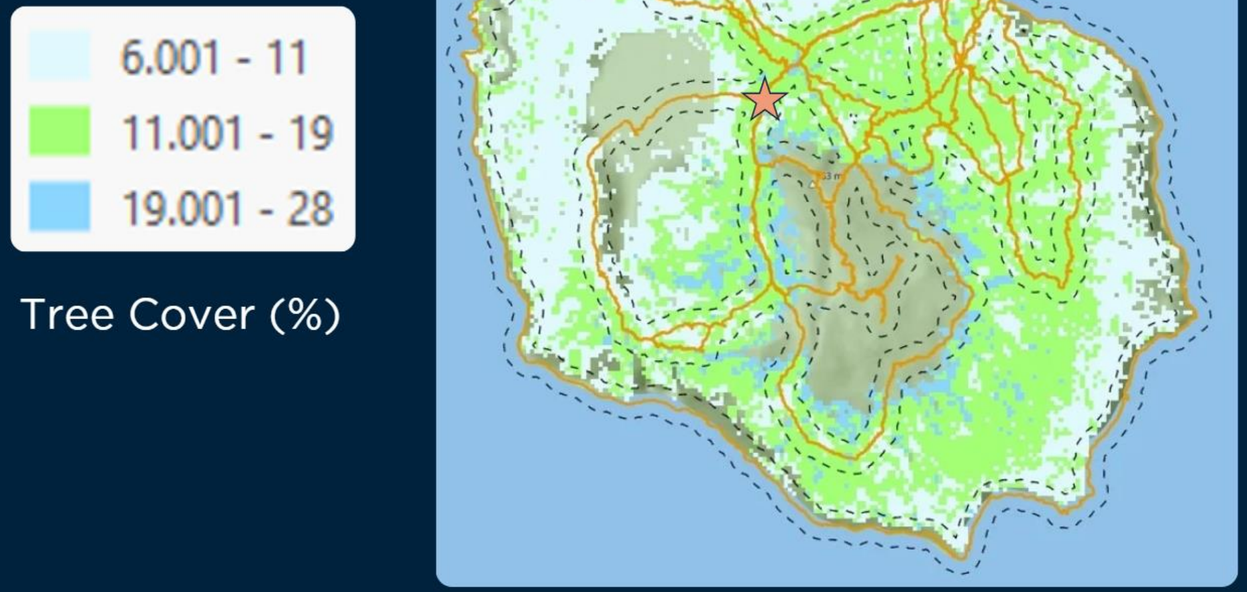
Landsat Optimal TC for Group 4



Tree Cover (%)

03 CASE STUDY

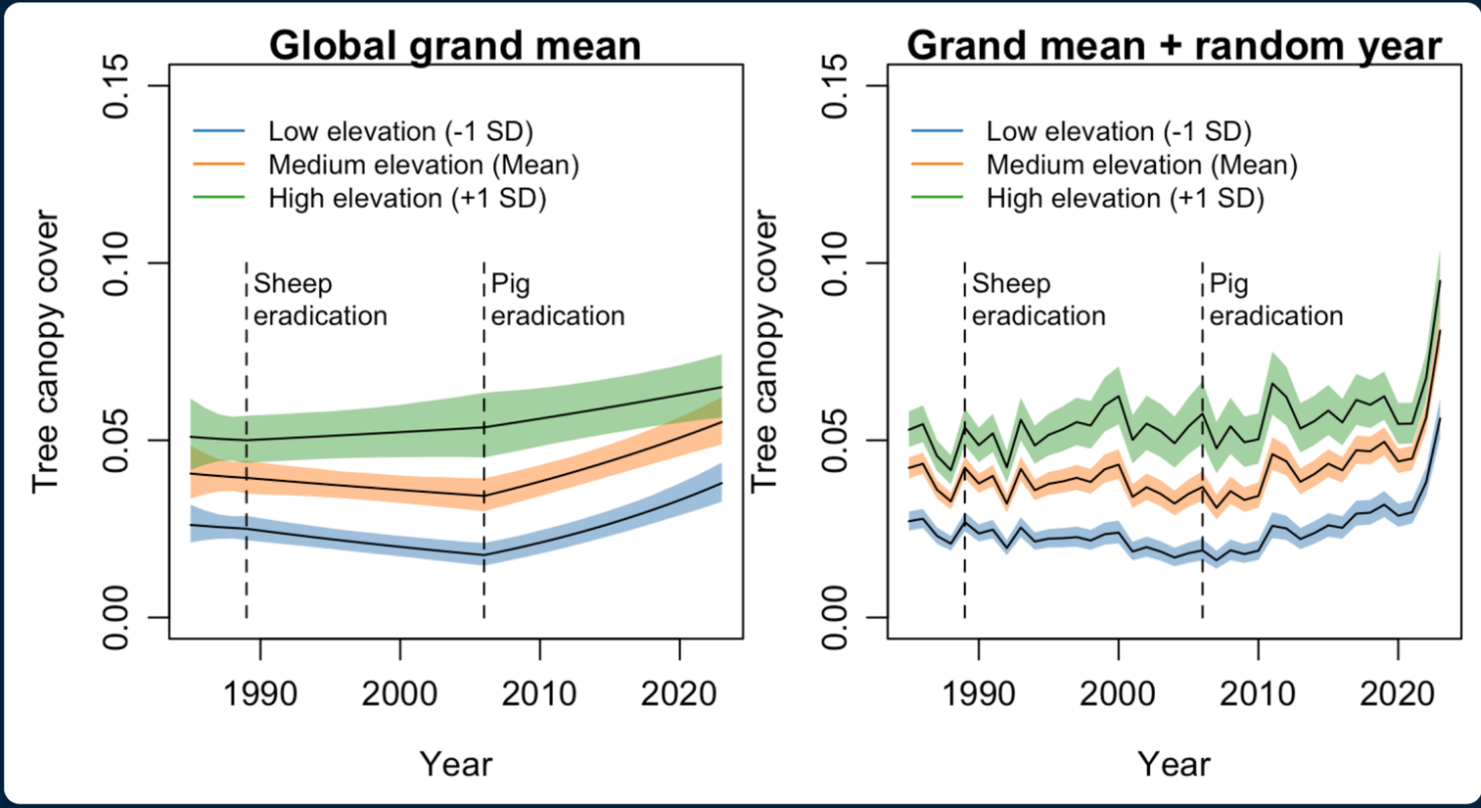
Comparable habitat informed release site selection



Landsat Optimal TC for Group 1

04 Future Directions

We are exploring how ecological factors moderate changes



Global mean time series by DEM on Santa Cruz (US) (with 95% credible intervals)

Our vision is a dynamic end-user decision support tool to make data openly available

Learn More

LETTER • OPEN ACCESS

Toward the quantification of the climate co-benefits of invasive mammal eradication on islands: a scalable framework for restoration monitoring

Miroslav Honzák[1,*], Geoffrey Roberts[2], Bradley J Cosentino[3], Joseph O Sexton[4], Harrison McKenzie-McHarg[2], John W Wilson[4], Min Feng[4], Alison Thieme[4], Neha Hunka[5] and David J Will[6,*]

Published 3 October 2024 • © 2024 Island Conservation. Published by IOP Publishing Ltd

Environmental Research Letters, Volume 19, Number 11

Citation Miroslav Honzák *et al* 2024 *Environ. Res. Lett.* **19** 114018

DOI 10.1088/1748-9326/ad77b7

Island Conservation

Nature. Oceans. People.

Thank you!

Contact us

Elke Windschitl
Island Conservation
Conservation Impact Data Specialist
elke.windschitl@islandconservation.org
+1 (319) 631 8691 (WhatsApp)

David Will
Island Conservation
Director of Impact and Innovation
dwill@islandconservation.org
+1 (925) 963 7483 (WhatsApp)