

WEBINAR:

Reducing Future Extreme Weather Impacts in Aotearoa New Zealand

Extreme Weather Research Platform key findings



**EXTREME WEATHER
RESEARCH PLATFORM**
Te Rāngai Rangahau Āhuarangi



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Tom Wilson
Chief Science Advisor
NEMA



Richard Smith
Director
Resilience to Nature's
Challenges



Belinda Storey
Managing Director
Climate Sigma

Jochen Schmidt
NIWA

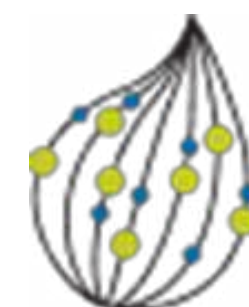


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National Environmental Data Centre

- Initiated in early 2019 by Science New Zealand
- CRI Governance Group established in 2022 to support ongoing maintenance and further developments
- NEDC webpage as landing page to CRI data sources launched 2022
- Directions / Developments: Data Quality Framework; Science Data Archive; Work towards integrated CRI data services

nedc.nz



National
Environmental
Data Centre



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Extreme Event Data Catalogue



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HĪKINA WHAKATUTUKI

- Catalogue that enables **quick** sharing of data during extreme events to support response, recovery etc.
- Current supported through NEDC / Science New Zealand
- **Further discussions on governance / process**

Gill Jolly, MBIE

Mark Rattenbury, GNS

Lynley Smith, GNS

Nick Spencer, Manaaki Whenua

Mike Cochran, Manaaki Whenua

Jochen Schmidt, NIWA



eedc.nedc.nz



**EMERGENCY
EVENT
DATA CATALOGUE**



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A CATALOGUE OF EMERGENCY EVENT DATA FOR AOTEAROA NEW ZEALAND

Many agencies and organisations collect and provide data that may assist response and/or recovery following a large earthquake, cyclone, biosecurity outbreak or other major emergency event impacting Aotearoa New Zealand. Search this catalogue to link to data relating to current and past emergency events.

Due to the impact that emergency events can have on communities, these datasets must be used respectfully and appropriately, with consideration for those who have been adversely affected by the event.

[Learn More](#)

Current Events



Cyclone Gabrielle

February 2023

Severe Tropical Cyclone Gabrielle was a severe tropical cyclone that devastated the North Island of New Zealand and affected parts of Vanuatu and Australia in February 2023.



Cyclone Hale

January 2023

Cyclone Hale was classified as a medium-scale event in the Tairāwhiti and extended to the Wairarapa after storm damage to the eastern coastline of the region.



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Kerry Leith
GNS Science



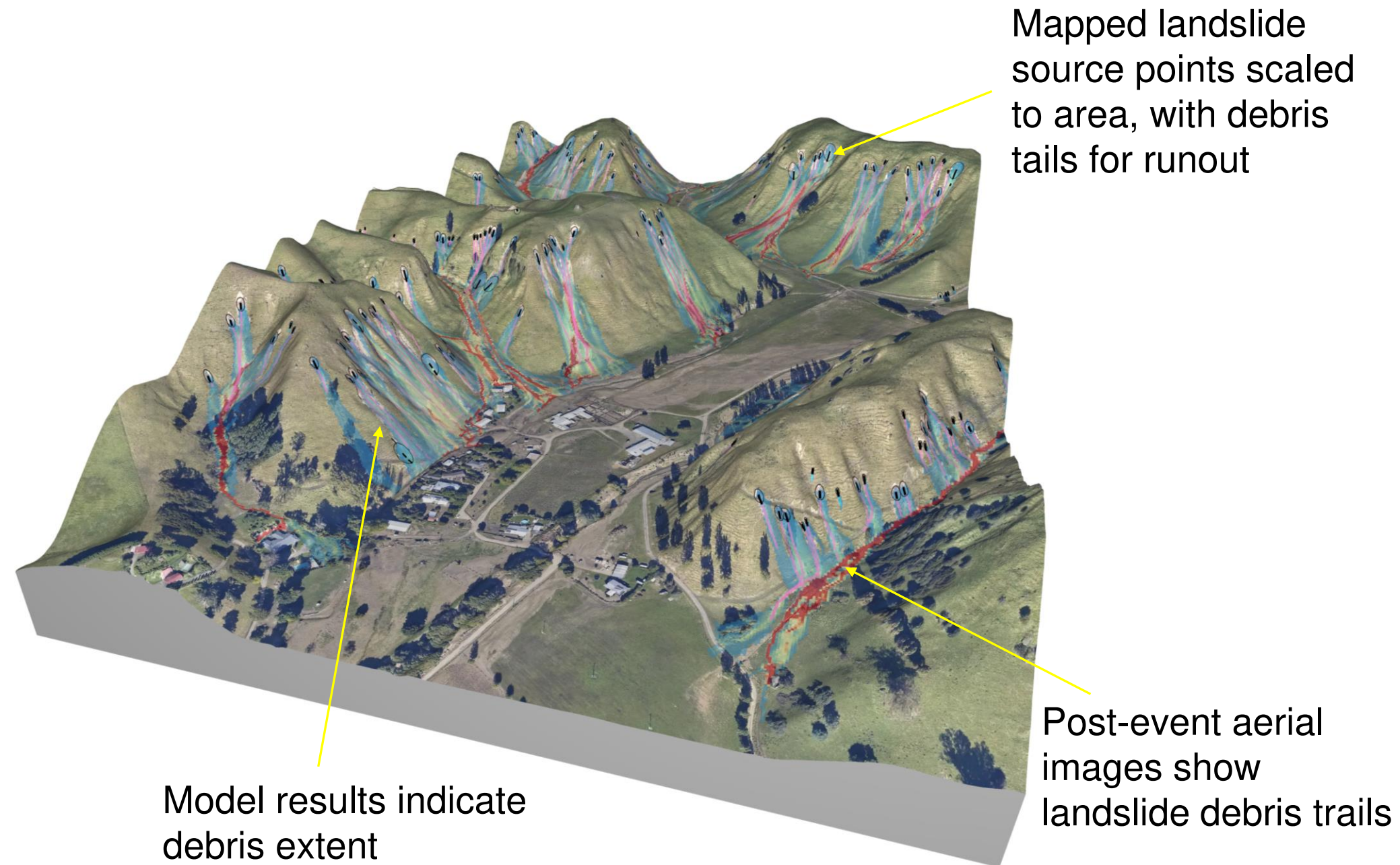
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Introduction: Why map landslides

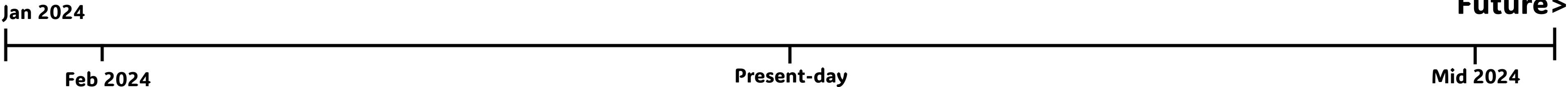
Approximately 830,000 landslides were triggered by Cyclone Gabrielle – destroying infrastructure and lives across the North Island.

End users wanted to know where these landslides occurred, and where the debris they generated travelled after they initiated.

Providing valuable underpinning data for development of rainfall induced landslide (RIL) forecast tool, and hazard and risk models

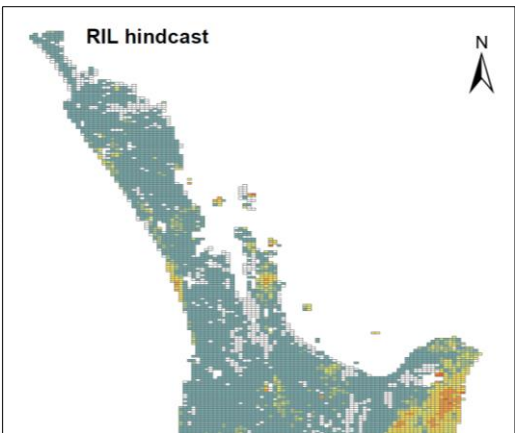


Outcomes and stakeholders

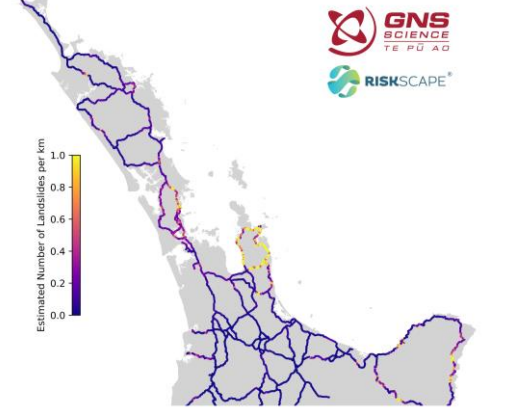


Stakeholders know exactly where landslides occurred in the hardest hit regions, and the relative impact of landsliding across the whole of the North Island

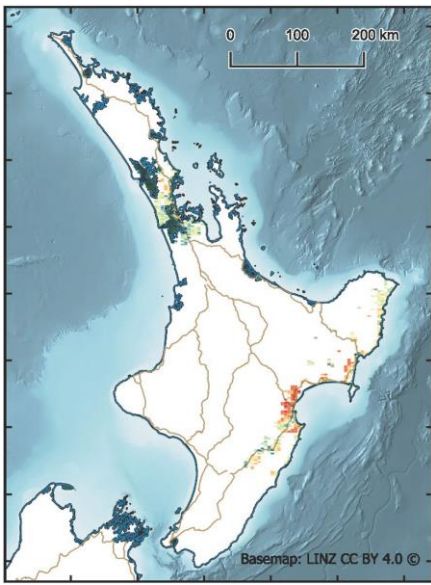
Release of the largest single-event landslide dataset ever captured.
New forecast models are now available for use.



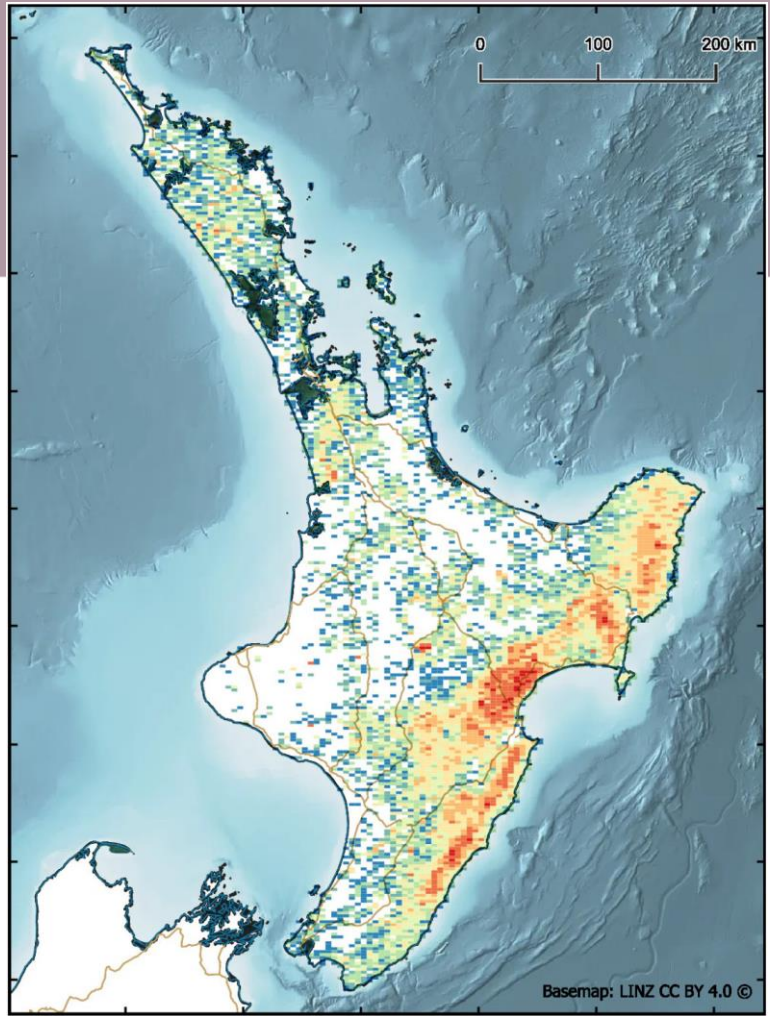
Rainfall-induced landslide tool output – landslide probability



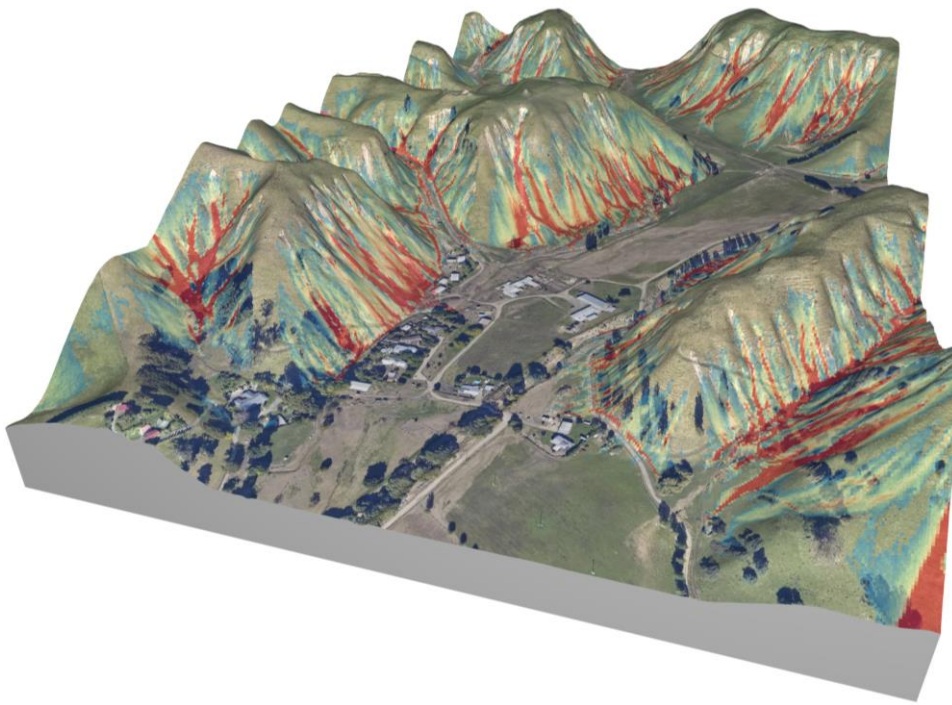
Rainfall-induced landslide tool output – landslide impact on roads



150,000 landslides have been mapped across 10% of the worst affected area.



Map showing the density of landslides across the North Island.
Red areas have > 200 landslides / km²



Improved model outputs for increased accuracy

Stakeholders:
National rail, road & electricity network agencies; affected local government agencies

Outputs and timelines

Output	Date/timeline
Quality checked mapping data showing locations of landslides with given volume and type triggered by Cyclone Gabrielle.	Raw data available now. Fully published at completion of project (mid 2024)
Methodological report to aid future response, and scientific articles outlining the impacts of the event.	Fully published at completion of project (mid 2024)
Landslide susceptibility & rainfall-induced landslide forecast models	Improved accuracy models are now in use

Project lead:

Chris Massey (c.massey@gns.cri.nz)

Project co-lead:

Kerry Leith (k.leith@gns.cri.nz)

Project manager:

Janine Bidmead (j.bidmead@gns.cri.nz)

Tom Robinson (UC), Liam Wotherspoon (UofA) & Hugh Smith and Harley Betts (Manaaki Whenua) + 15 students and 10 GNS scientists.



Precise maps created from airborne lasers (lidar) are now being used to track debris from 150,000 mapped landslides.

This will help us understand the cause of the failures, and how the debris impacted people, property, and the environment.



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Charlotte Brown

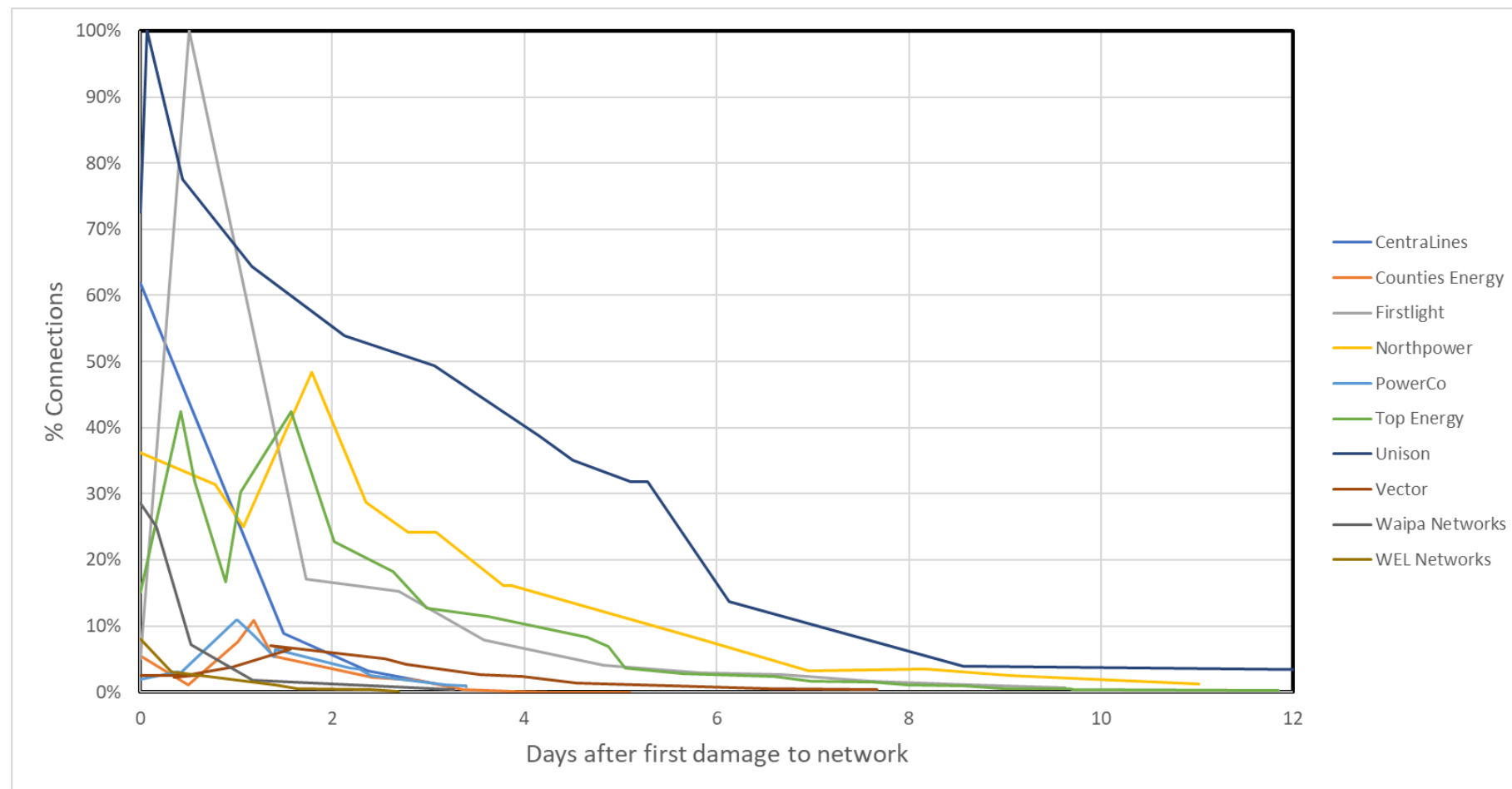
Resilient Organisations



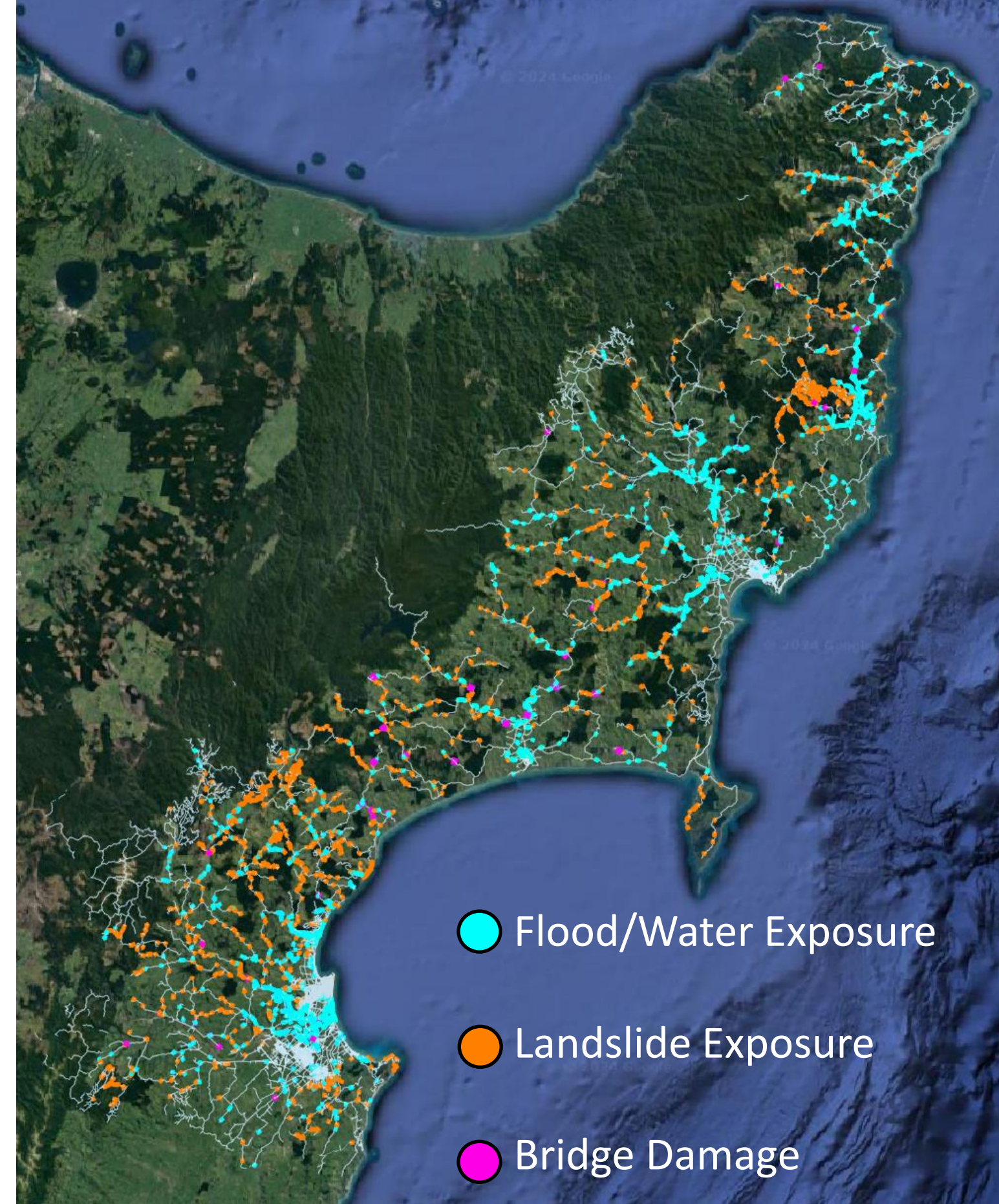
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Supporting critical infrastructure recovery

Development of a spatio-temporal database of critical infrastructure performance



Electricity service disruption



Supporting critical infrastructure recovery

MBIE Extreme Weather Science Response Funding
Supporting Critical Infrastructure Recovery

Critical infrastructure recovery:
Key lessons

Resilient ORGANISATIONS
www.resorgi.org.nz

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RESILIENCE TO NATURE'S CHALLENGES
Kia Māhiorahia - Kia Kaitiaki
Te Ao Tūroa

National SCIENCE Challenges

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MBIE Extreme Weather Science Response Funding
Supporting Critical Infrastructure Recovery

Building resilience through recovery:
investment decision-making

Resilient ORGANISATIONS
www.resorgi.org.nz

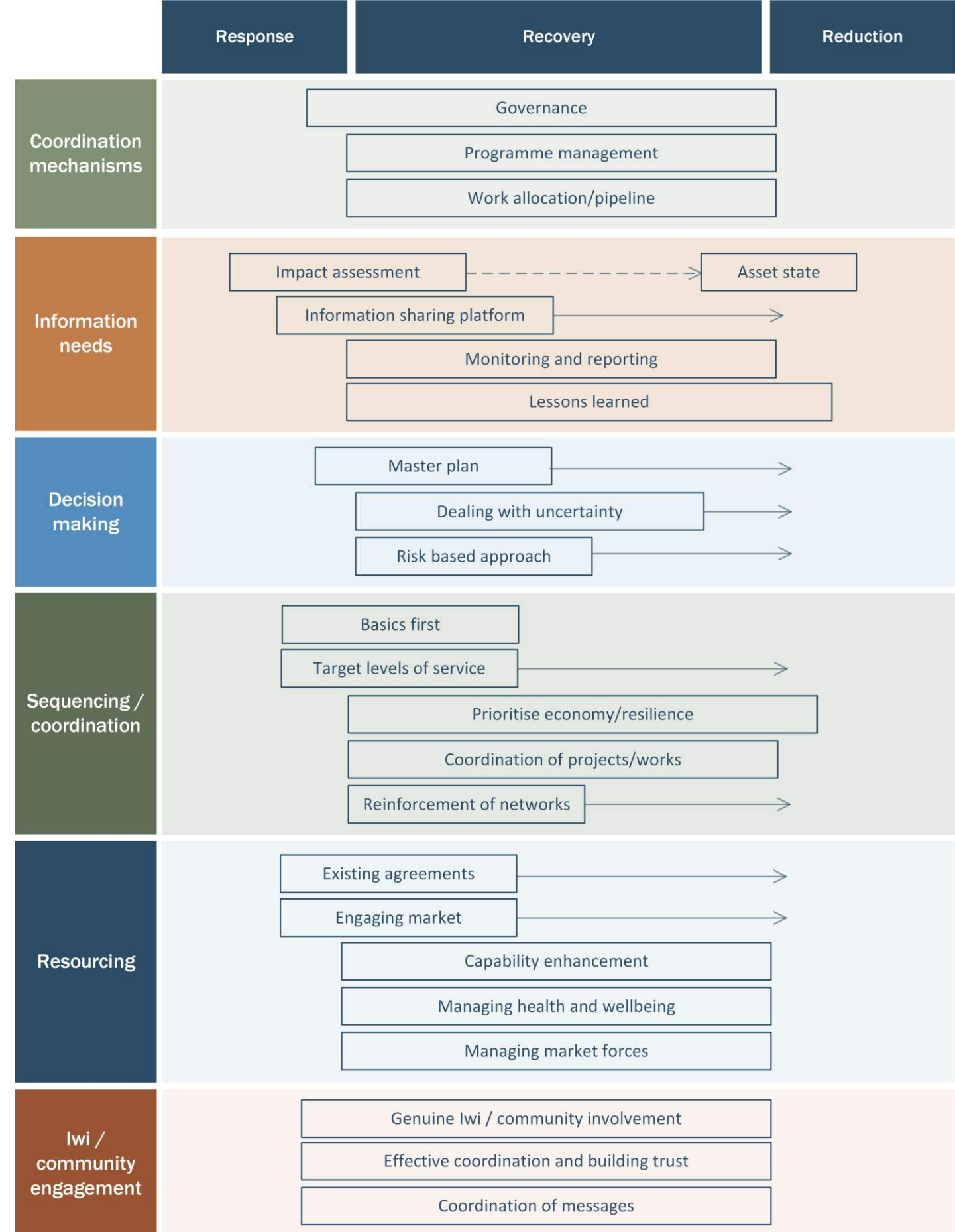
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Outputs and Data

Key outputs	Link
<i>Critical infrastructure damage and disruption database</i>	Not currently published.
<p><i>Policy briefs and supplementary reports</i></p> <ol style="list-style-type: none"> 1. Key lessons and learnings for critical infrastructure recovery projects based on international experience. 2. Best practice principles for resilient infrastructure investment decision making. 	https://www.resorgs.org.nz/critical-infrastructure-recovery/

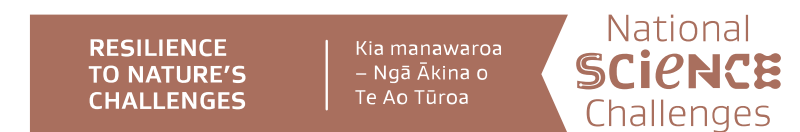
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Research team across multiple organisations:



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Nick Horspool
GNS Science



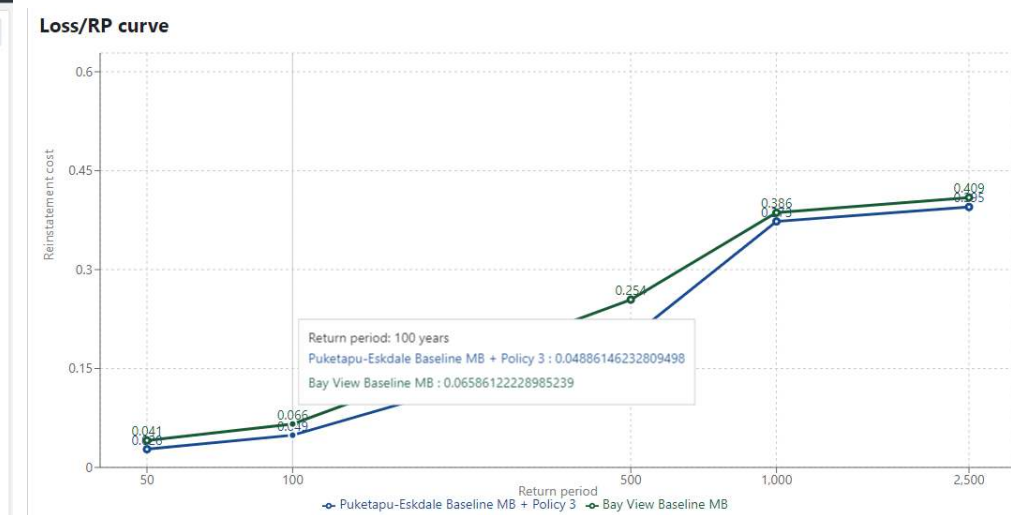
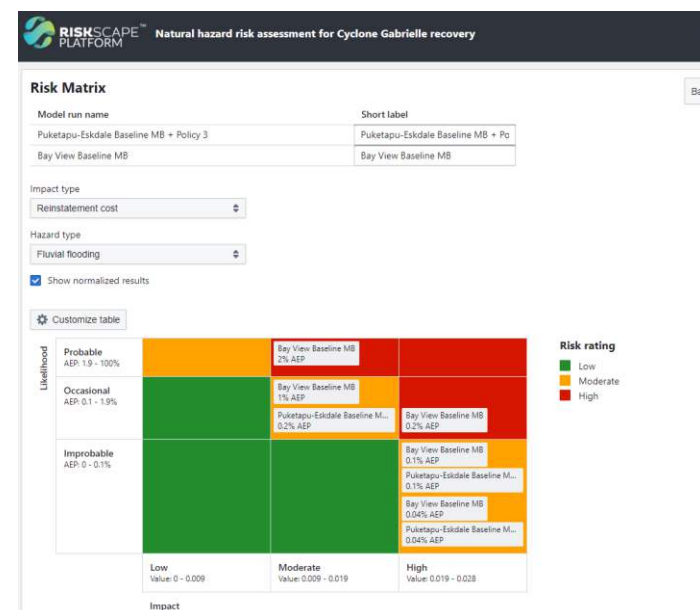
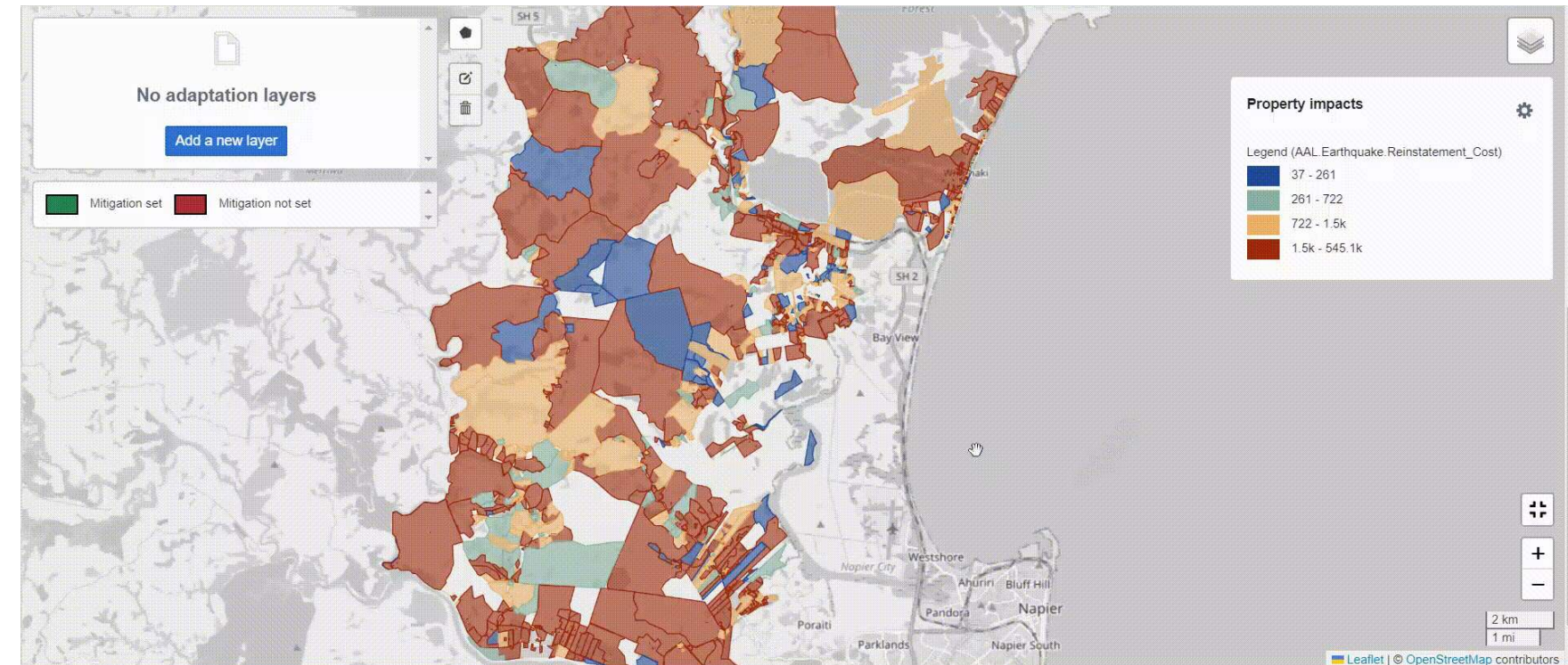
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Enhanced Natural Hazard Risk Assessment for the Recovery from Cyclone Gabrielle

Accelerate development of a multi-hazard risk model and information sharing platform for Cyclone Gabrielle recovery agencies and researchers to enable:

Risk based recovery decisions informed by quantitative information on multiple natural hazards

Decision makers have capacity to investigate present and future community risks to multiple hazard impacts under different redevelopment and growth scenarios, climate change scenarios, and land use planning intervention options such as avoid, mitigate and adapt



NIWA
Taihoro Nukurangi



catalyst
expert open source solutions

m.e
market economics
research & consulting



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Outcomes and stakeholders/end users

The RiskScape Platform as a cloud-based multi-hazard risk model is available as a risk information sharing platform for Cyclone Gabrielle recovery agencies

Central Government (Department of Prime Minister and Cabinet; National Emergency Management Agency; Ministry for the Environment; EQC Toka Tū Ake ; Ministry for Primary Industries; Ministry for Education; Te Puni Kōkiri; Ministry for Housing and Urban Development)

A customised RiskScape Platform dashboard is available for modelling multi-hazard impacts and cost-benefits of different development futures and land use planning options for Cyclone Gabrielle community and sector recovery

Local Government (Hawkes Bay Regional Council; Gisborne District Council; Wairoa District Council; Napier City Council; Hastings District Council; Central Hawkes Bay District Council)

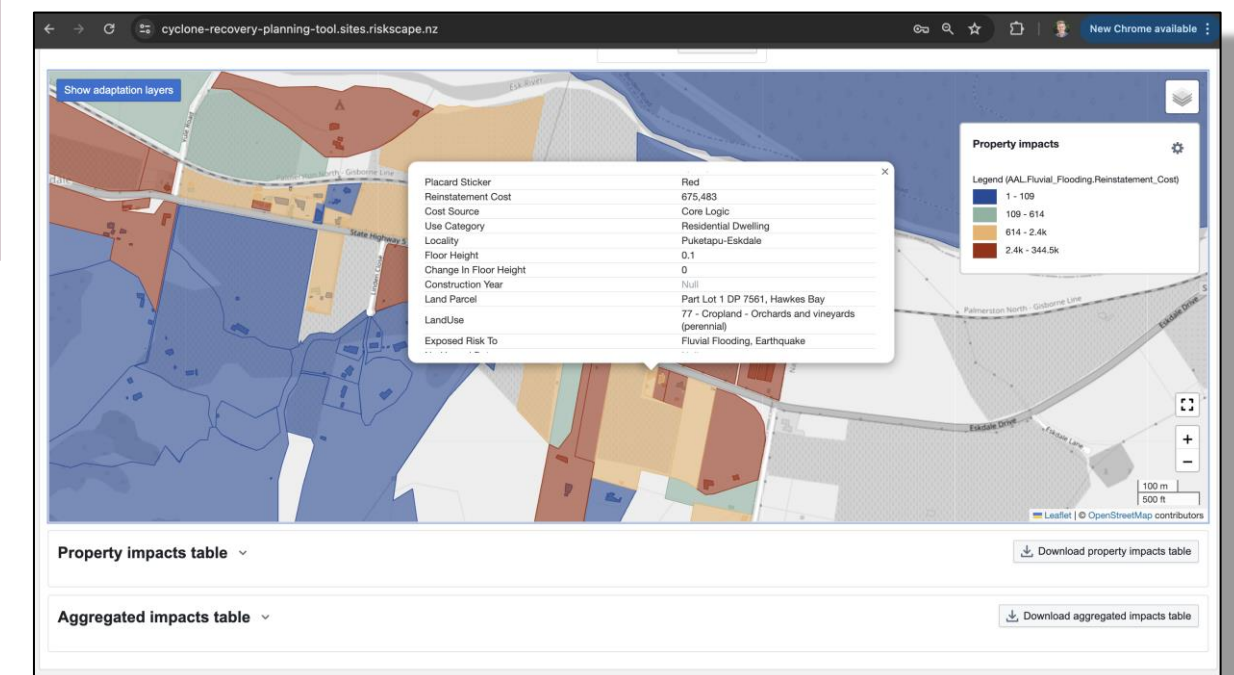
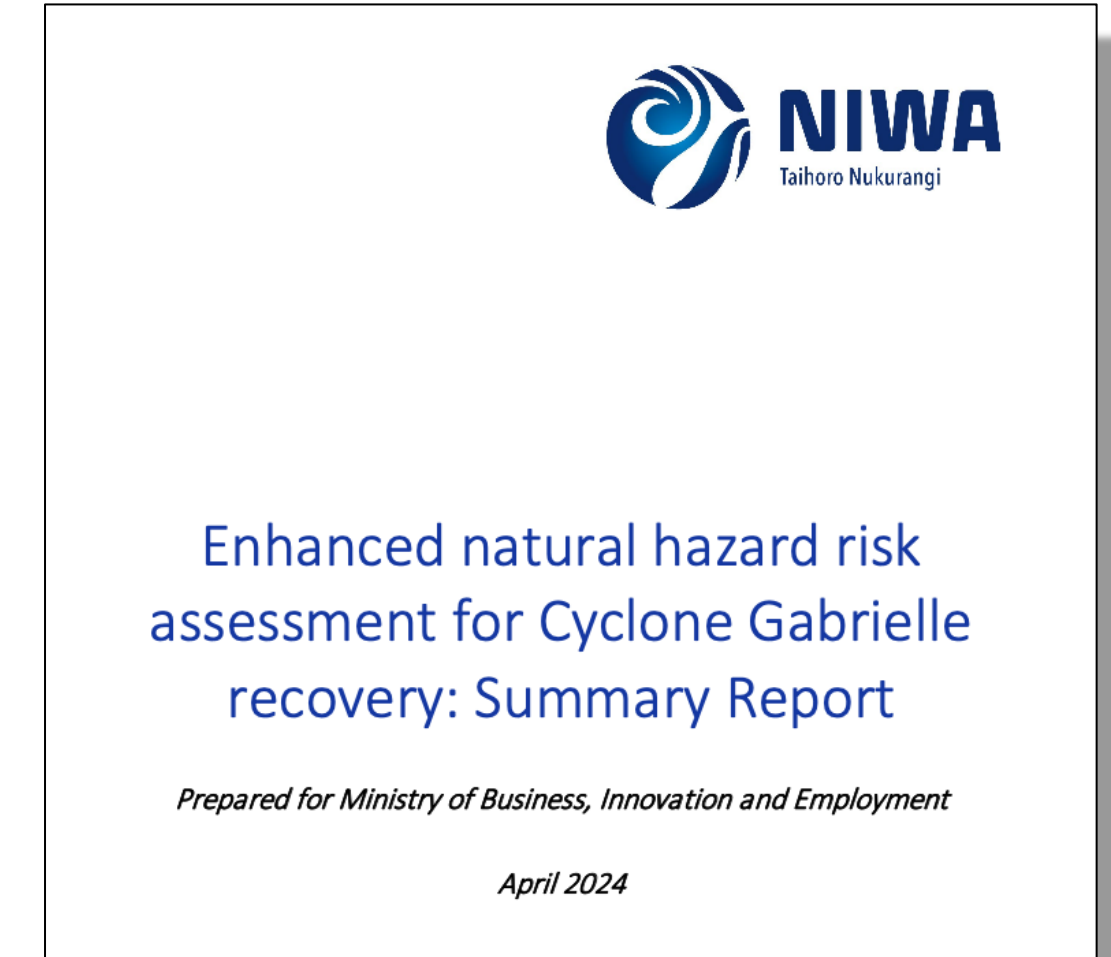
Outputs

Project Report	Paulik, R., and Horspool, N. 2024. Enhanced natural hazard risk assessment for Cyclone Gabrielle recovery: Summary Report. NIWA Report No. 2024092WN
Website (Risk Dashboard)	https://riskscape.nz *

* Requires login – please contact for access

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Ryan Paulik (NIWA) rpaulik@niwa.co.nz





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Warwick Allen
Manaaki Whenua Landcare Research

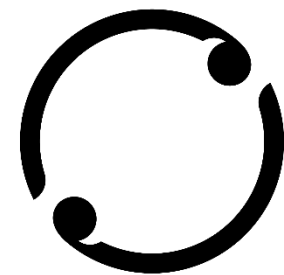


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Cyclone Gabrielle ecosystem impact assessment

Project objectives:

- Identify changes in extent and condition of vegetation cover
- Evaluate impacts on wetlands, naturally uncommon, and threatened ecosystems
- Quantify resilience of resident fish and macroinvertebrate communities and recolonisation of migratory fish species



Manaaki Whenua
Landcare Research

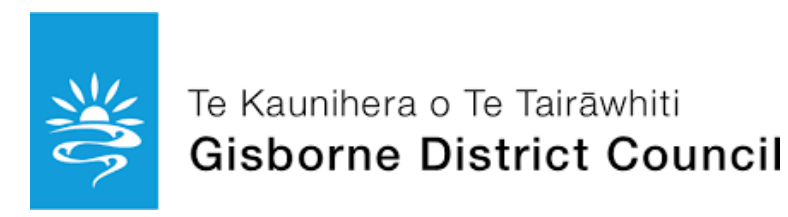
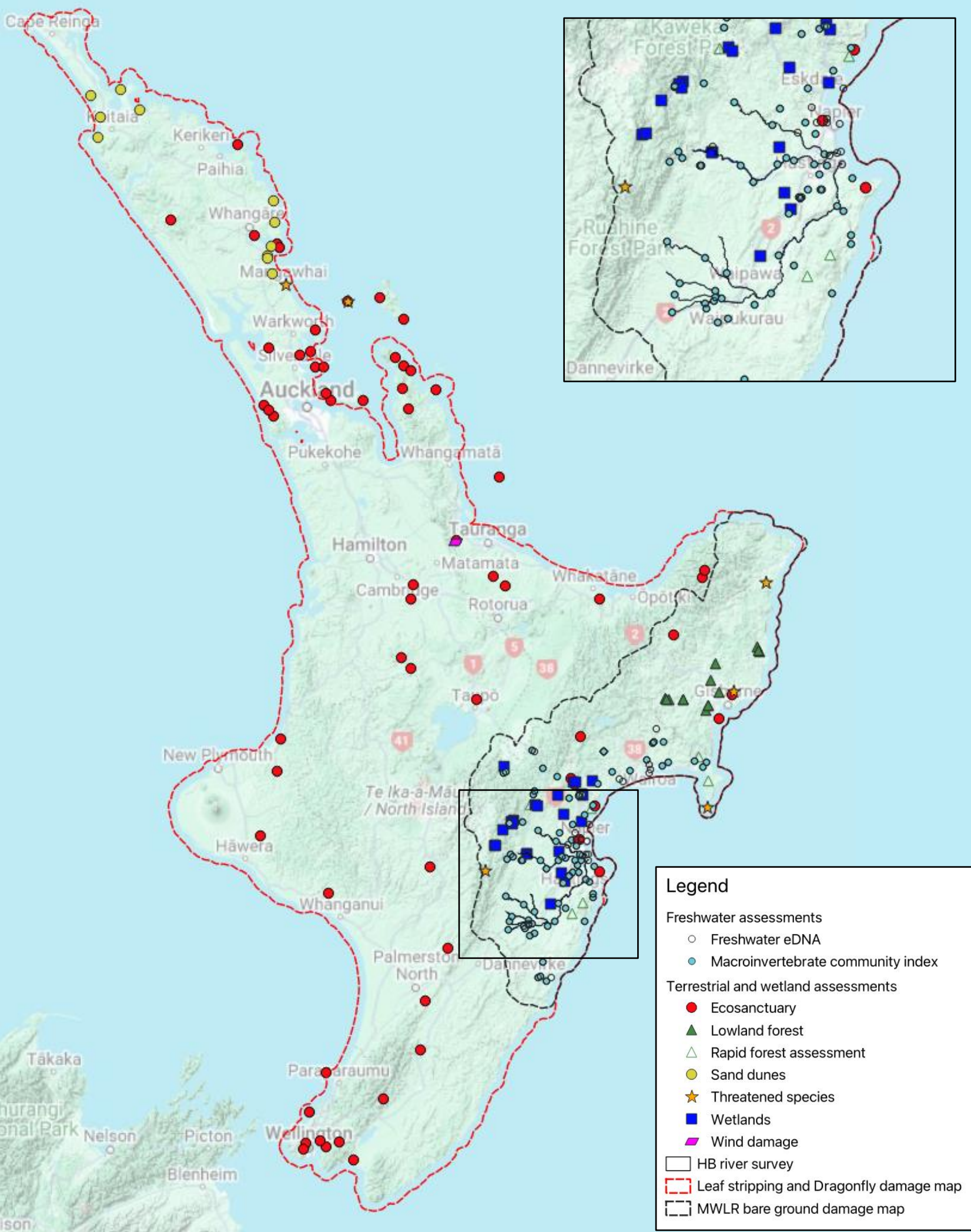


NIWA
Taihoro Nukurangi



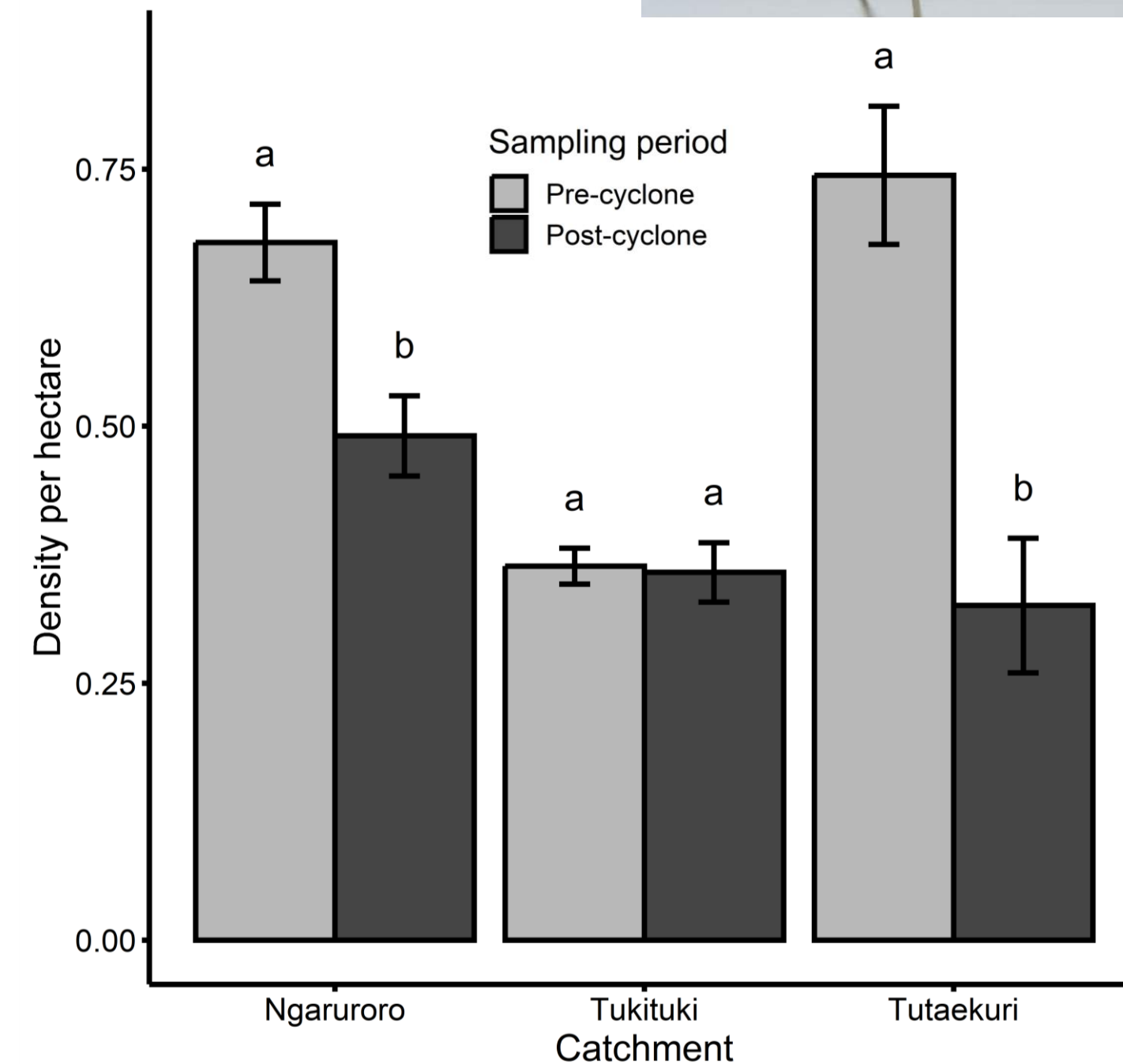
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Data collected



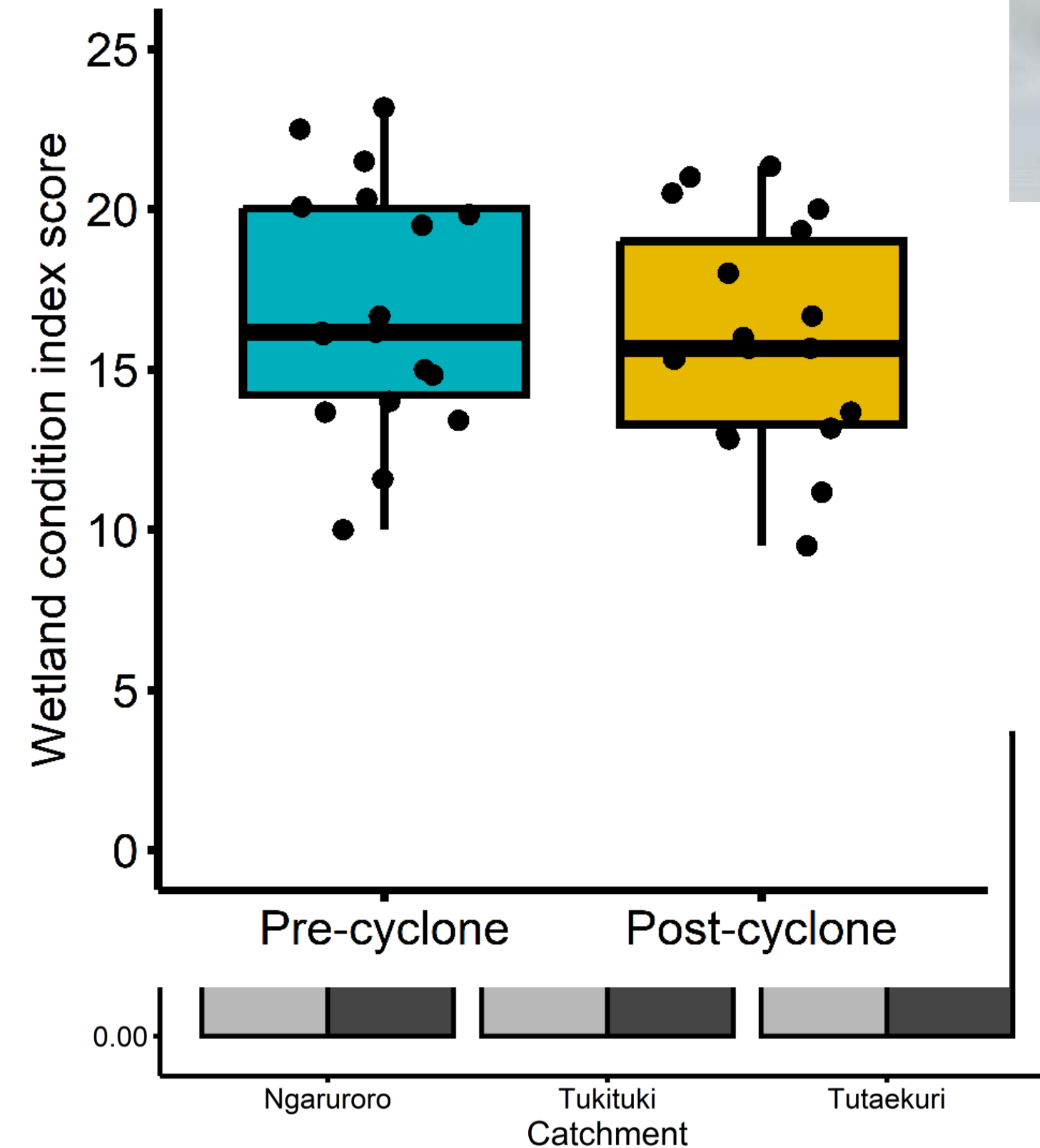
Key findings and outputs

- Native vegetation and freshwater fish species were largely resilient to cyclone damage
- Uncommon ecosystems, threatened species, and conservation infrastructure especially at risk
- Good baseline data is critically important
- Long-term impacts remain uncertain: recovery?
- Report at end of September



Key findings and outputs

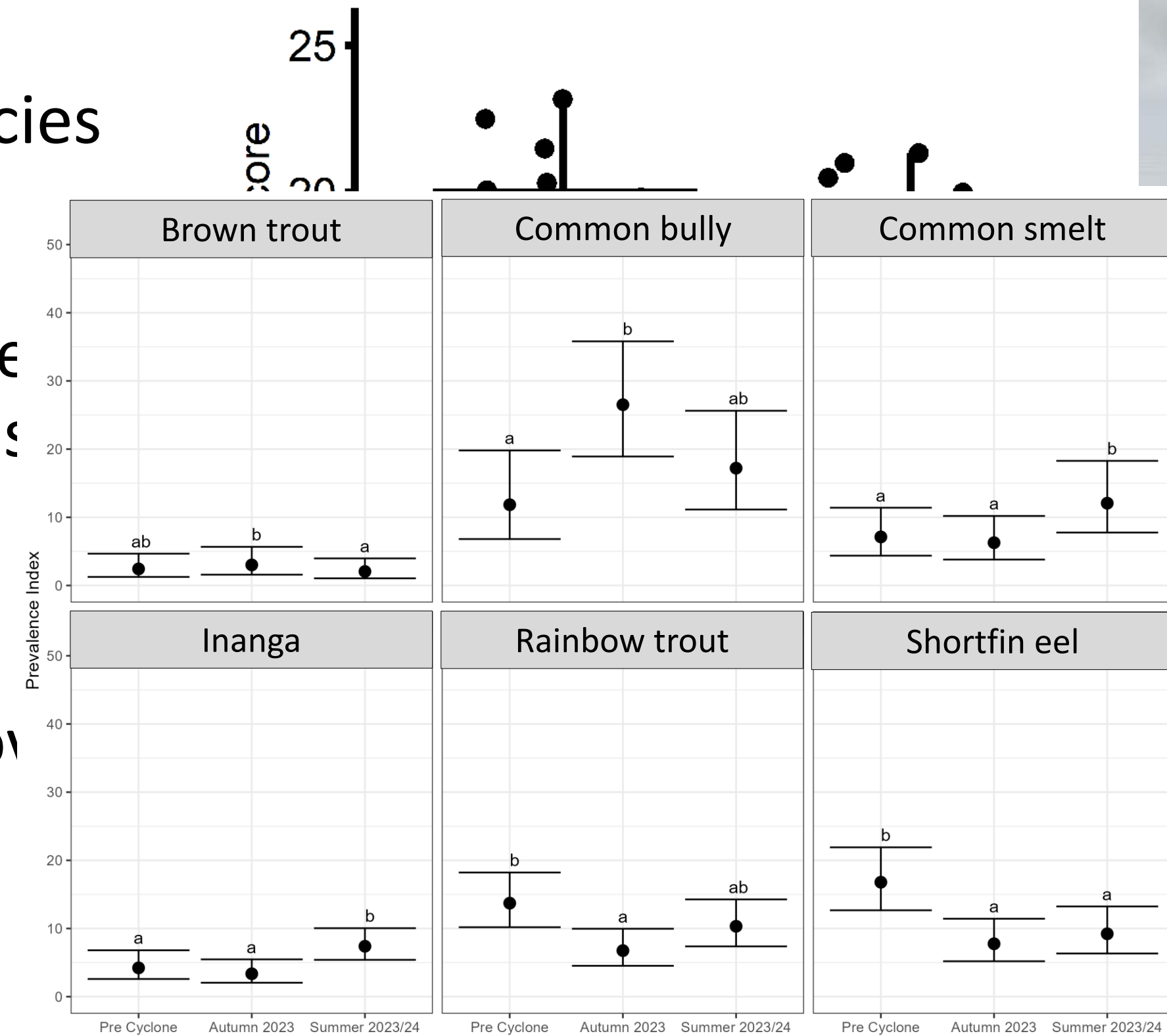
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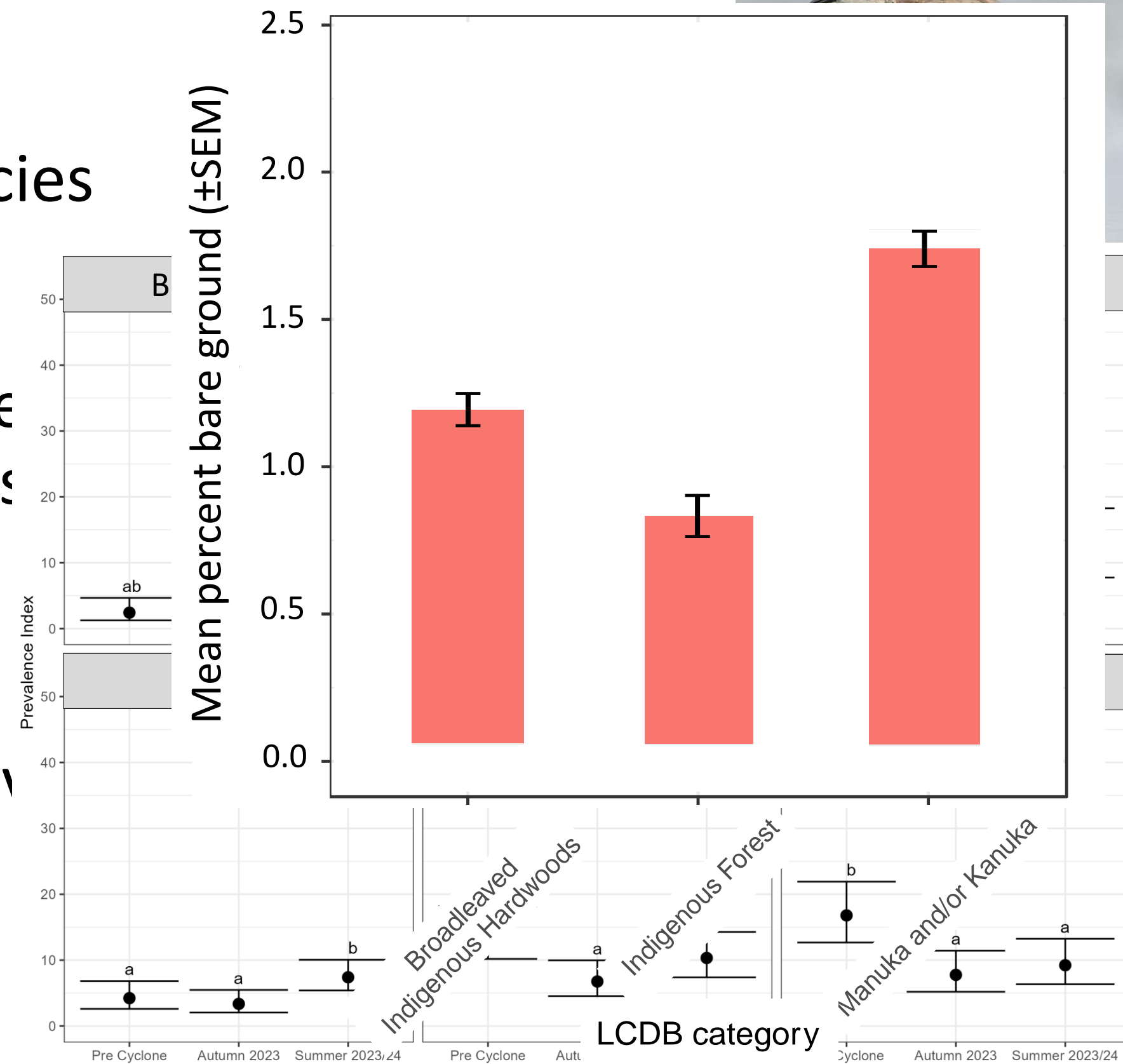
Warwick Allen (AllenW@landcareresearch.co.nz), James McCarthy, Simon Planzer, Ben Jolly, Rowan Sprague, Sarah Richardson: **Manaaki Whenua – Landcare Research**
Cindy Baker, Shad Mahlum, Elizabeth Graham: **NIWA**



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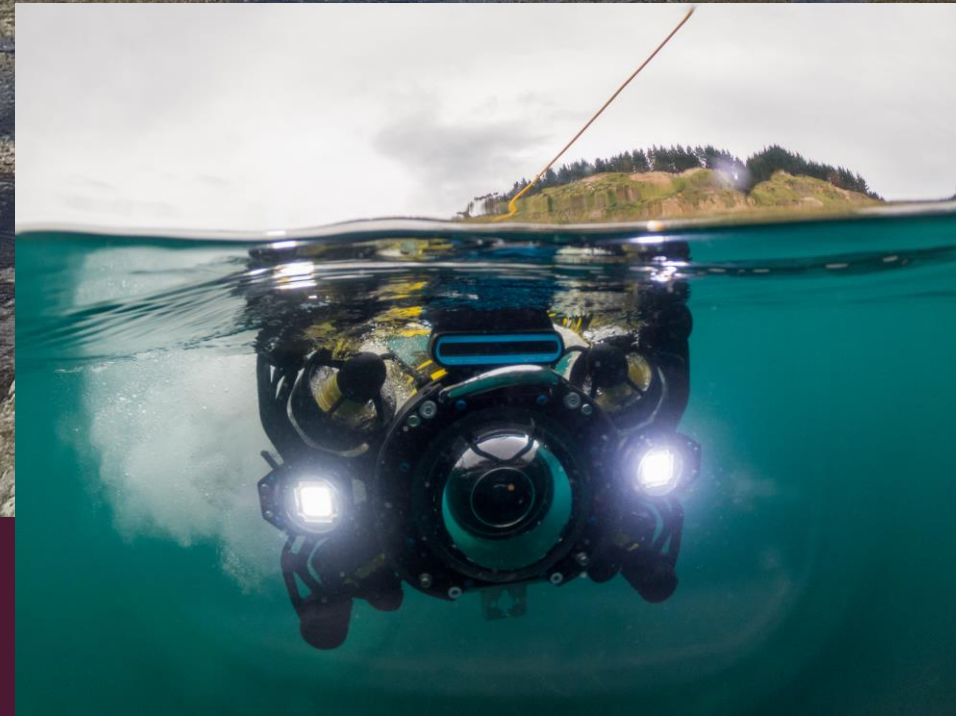
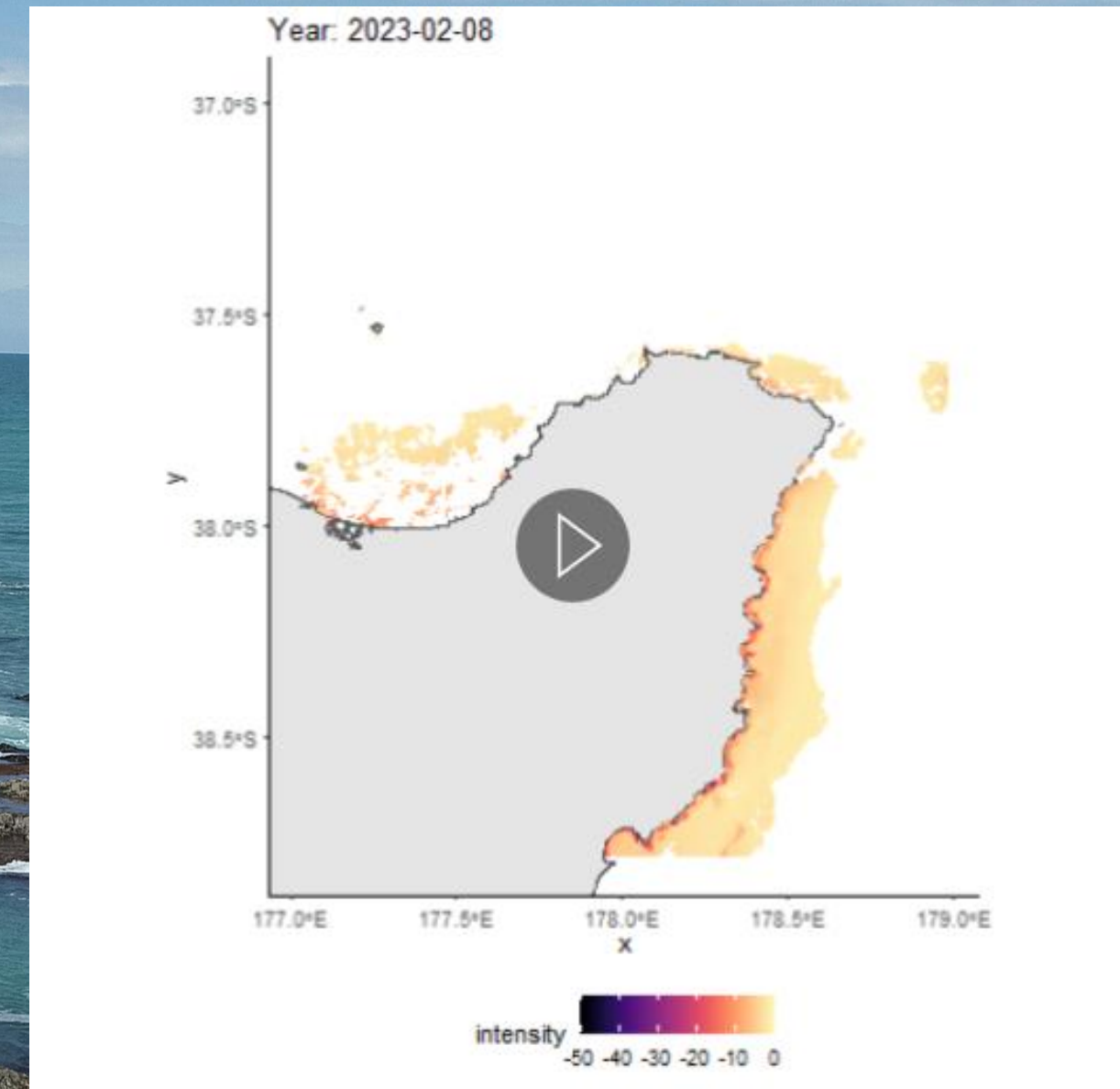
Leigh Tait
NIWA

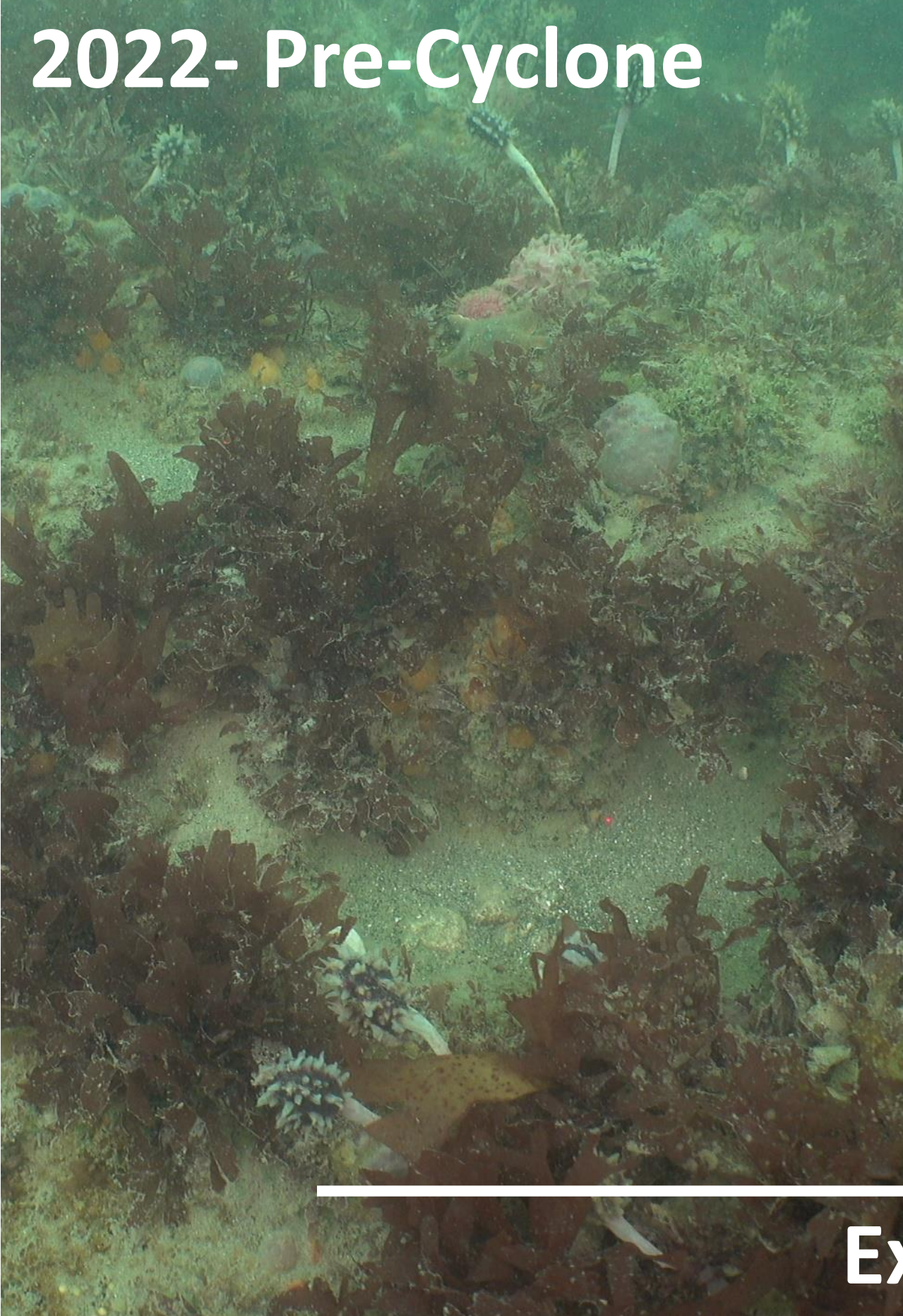


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Nearshore marine ecosystems

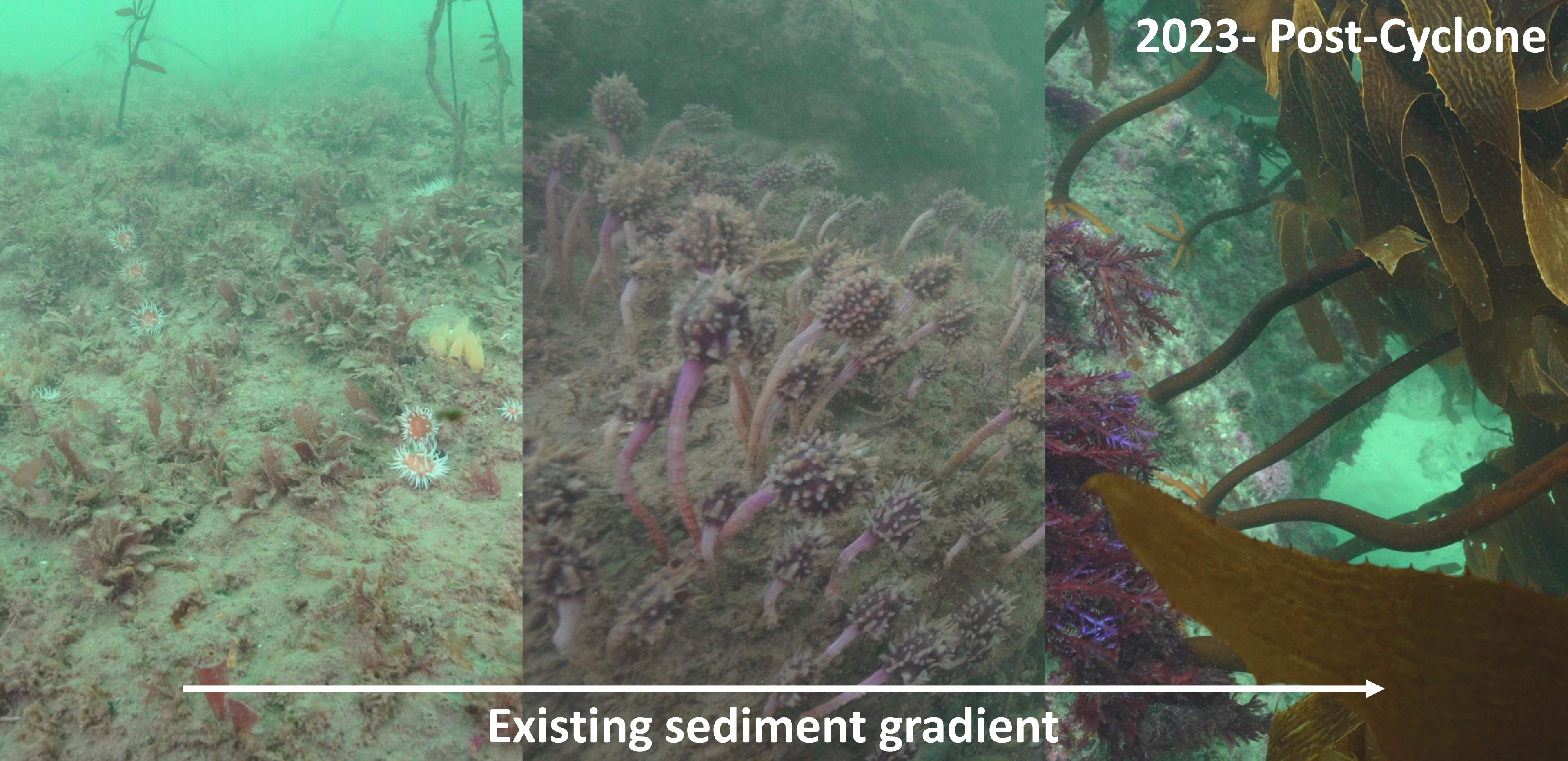
- Sediment inputs major stressor for marine ecosystems
- Smother and bury animals and plants
- Reduce light to photosynthetic organisms





Existing sediment gradient

2023- Post-Cyclone

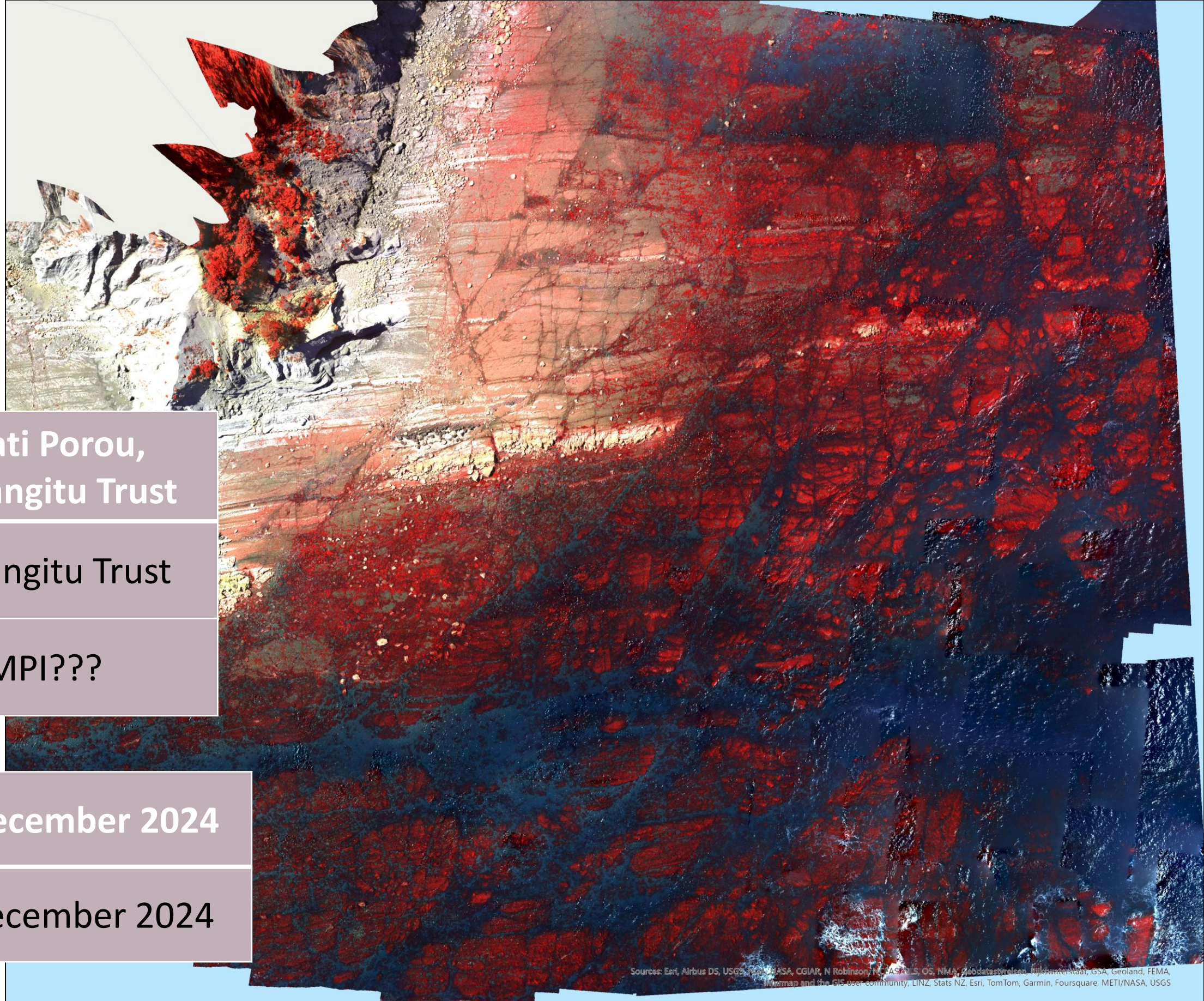


Existing sediment gradient



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Stakeholders, Outcomes & Outputs



Baseline maps of nearshore ecosystems

Nga Hapu o Ngati Porou,
Maungaharuru Tangitu Trust

Quantified impacts of flooding

Maungaharuru Tangitu Trust

Coast-wide gradients of impacts

GDC, HBRC, MPI???

ESRI Storymap

TBC, Available December 2024

Coastal gradient analysis

TBC, Available December 2024



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Sources: Esri, Airbus DS, USGS, NOAA, NASA, CGIAR, N Robinson, GEAS, VLS, OS, NMA, #Abdastvralan, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community, LINZ, Stats NZ, Esri, TomTom, Garmin, Foursquare, METI/NASA, USGS



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Murray Ford
University of Auckland



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Mapping cyclone driven coastal erosion



RNC Coastal change team

Murray Ford, Mark Dickson, Emma Ryan and Megan Tuck.
University of Auckland

Background

- Coastal change around NZ being assessed as part of the RNC National Science Challenge.
- The focus of that work is multi-decadal time scales.

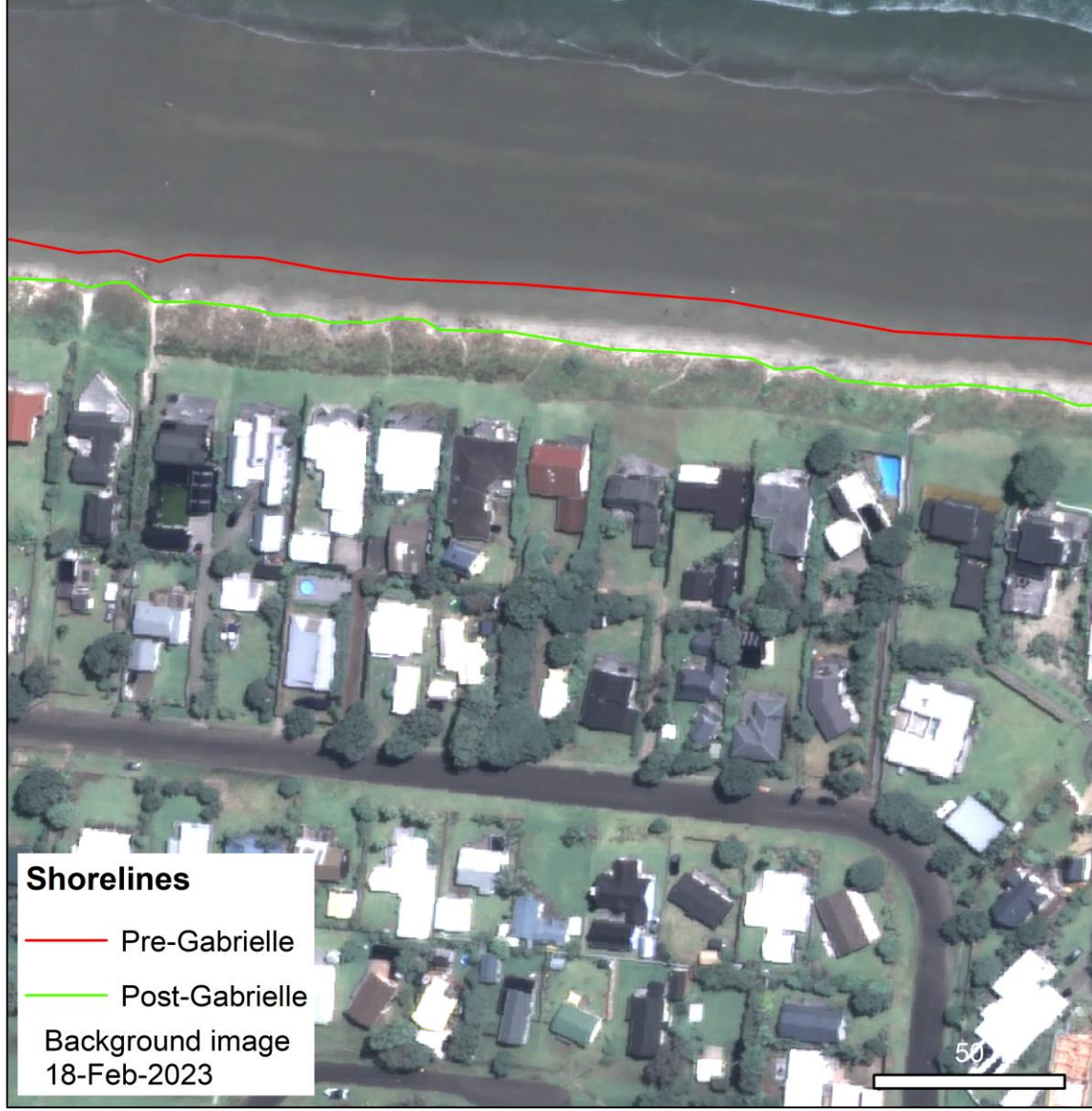
Embedding short-term change within a long-term record

- Immediate need to add pre/post storm record.
- Better guidance for setback zone calculation.
- Monitor recovery over year to decades

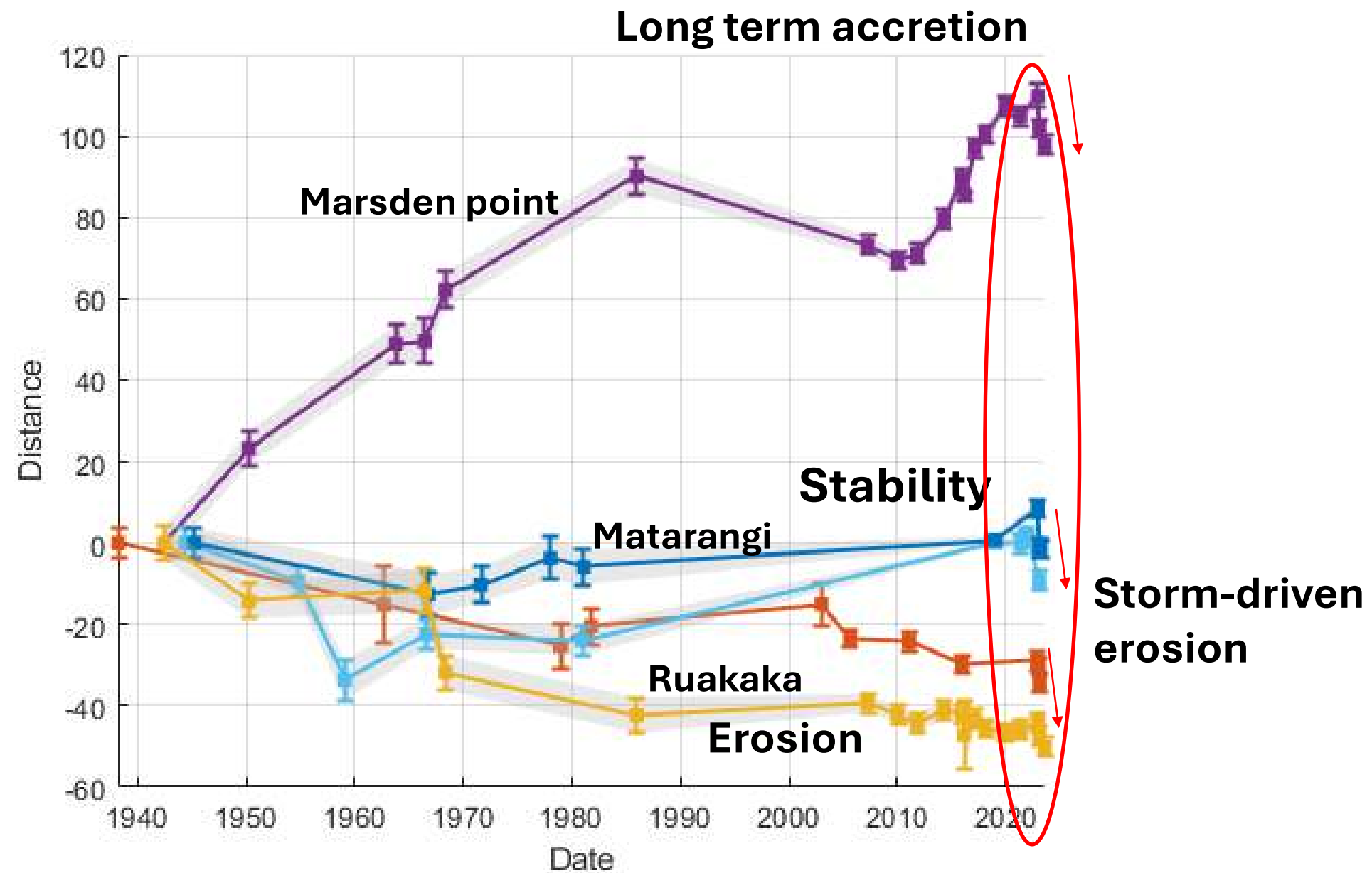
Approach

Background

- Mapping change using commercial high resolution satellites.



Outcomes



Findings

- Impacts of Gabrielle are an episodic shock within the context of long-term coastal change signals.
- Typical erosion of between 5-15 m
- Considerable local variability.
- In places it may have triggered a change in state, i.e. stability to erosion. We're monitoring change over next 12-24 months.
- Dataset combined in the RNC data which will be published mid-2024.





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Sarah-Jane Paine
University of Auckland
Growing Up in New Zealand (GUINZ)

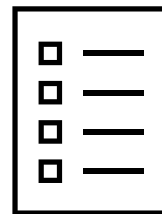


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Understanding how the extreme weather events have impacted rangatahi and whānau wellbeing

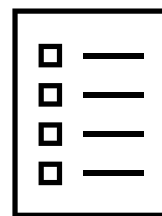
August 1 2023

September 3 2023



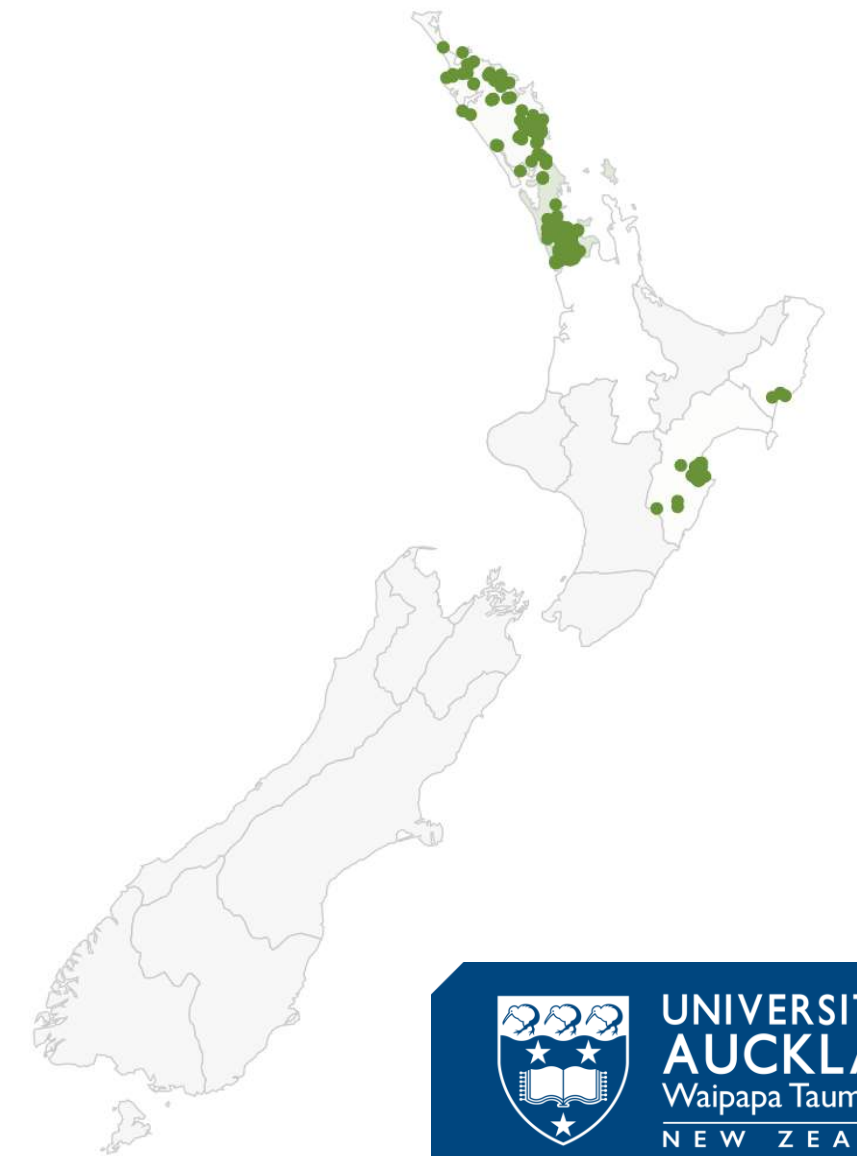
Young person

- 90 questions via online questionnaire
- 15 minutes



Mother/primary caregiver

- 237 questions via online questionnaire
- 30 minutes



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Key findings

- Over 50% of participants did not receive enough information or advice
- Disruptions to essential services lasted several days, important regional differences
- Unmet need for support services, including finances, health care, food and other necessities
- People who reported being affected by the weather events reported worse mental health outcomes
- Rangatahi need targeted support and they want to support others in their communities

“Make sure kids can get home if there is bad weather while at school ... Or if kids can’t get home there is plan in place to be looked after at school and they feel safe”

(Young person from Te Tai Tokerau/Northland)

“Give us younger generation the opportunity to participate and support those in need, find ways that we can as young people to help our community”

(Young person from South Auckland)



Outputs and Data

<p>Quantitative and qualitative insights into the human experience of Cyclone Gabrielle and Auckland Anniversary Flood events</p>	<p>Local communities, local and regional councils, policy makers</p> <p>https://www.growingup.co.nz/extreme-weather-survey-2/extreme-weather-survey-overview-list</p> <p>Regional snapshots of key findings (Auckland, Northland & East Coast/Hawkes Bay) available from dataaccess@growingup.co.nz</p>
<p>Dataset available for further cross-sectional or longitudinal analyses</p>	<p>Researchers and Policymakers</p> <p>Extreme Weather Survey dataset available for external researchers: https://www.growingup.co.nz/available-data</p>
<p>Resources by and for rangatahi and their communities</p>	<p>The Uncivil Defence Guide for rangatahi is available for download at: https://www.growingup.co.nz/the-hub</p> <p>The 'Mokoboy's' short film available from Toi Matarua https://www.toimatarua.com/mokoboy's</p>





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Q&A



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