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Landcare Research

MANAAKI WHENUA – LANDCARE RESEARCH

Cyclone Gabrielle ecosystem impact assessment

EXTREME WEATHER RESEARCH PLATFORM
Te Rāngai Rangahau Āhuarangi

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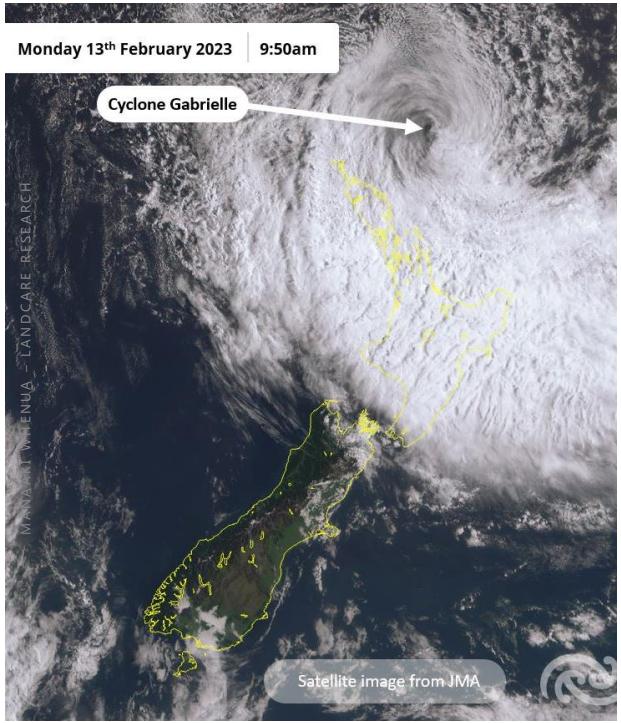
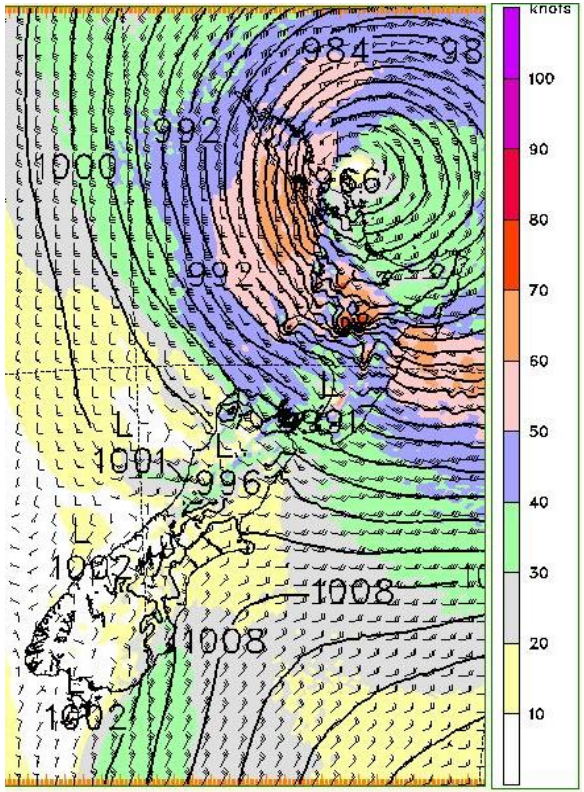
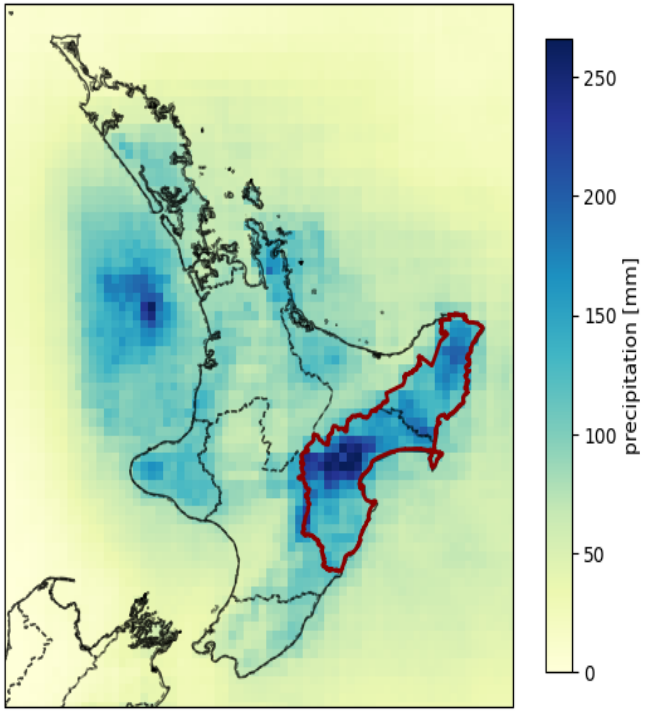
Cyclone Gabrielle



MetService



MetService

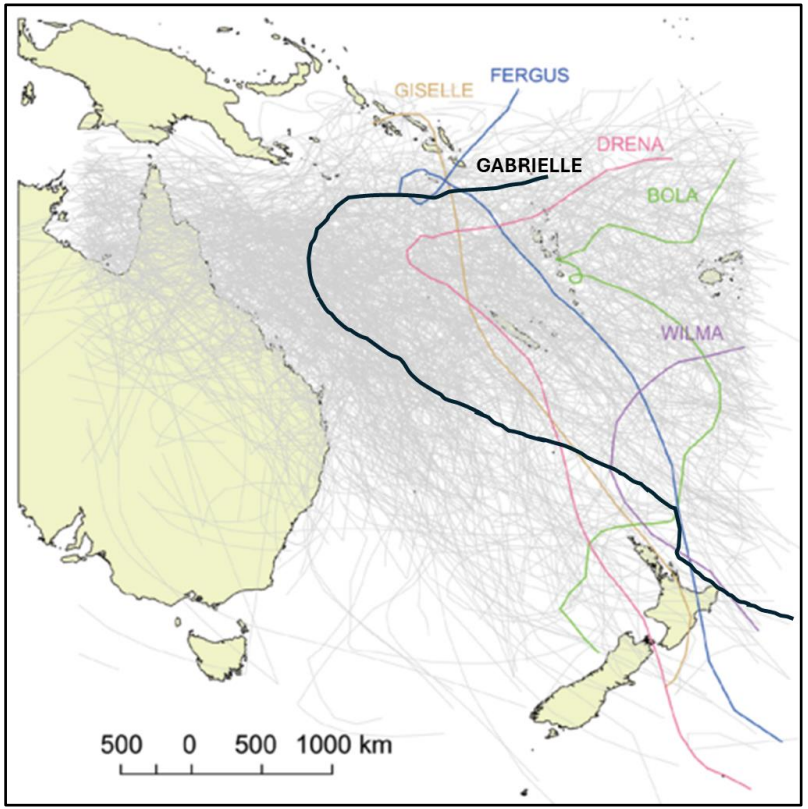


Harrington et al. 2023

- $9-14.5 billion damage

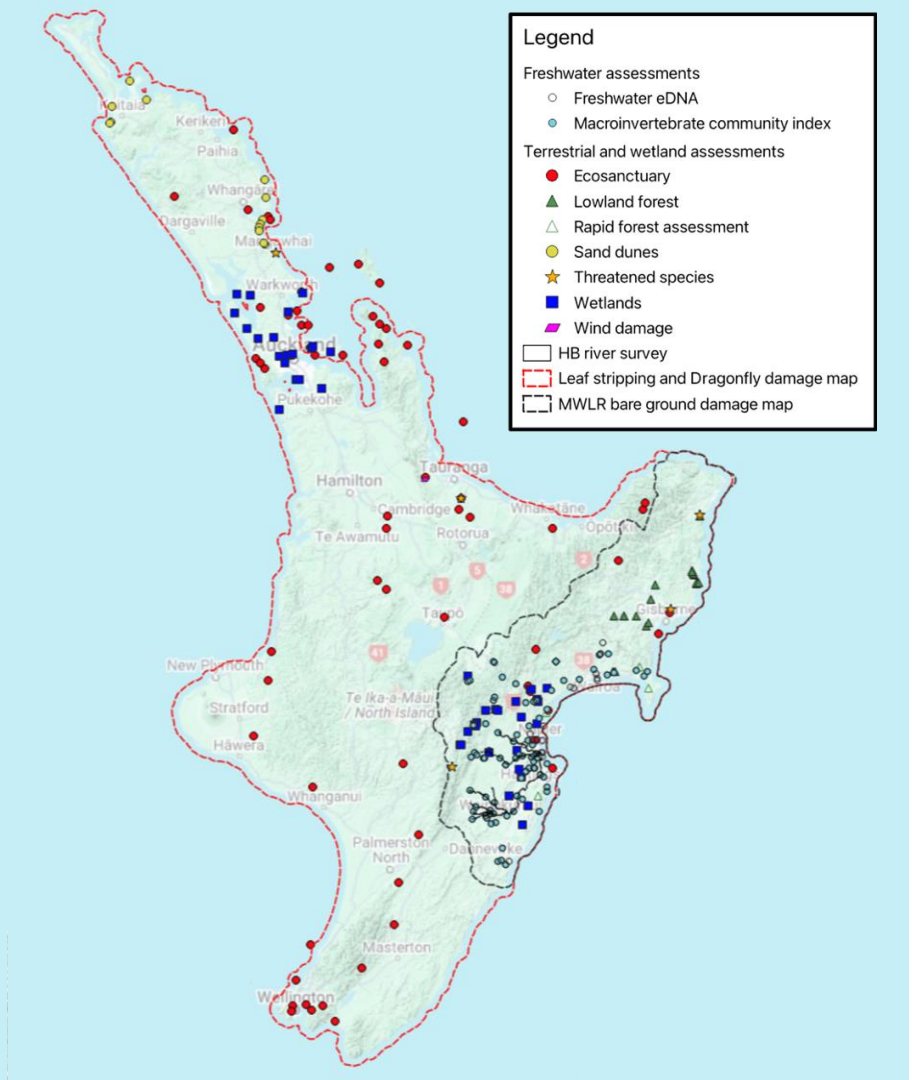
An extreme weather future?

- Cyclones shifting polewards and of higher intensity
- To prepare for future extreme weather, we must identify the ecosystems and species most at risk



Research objectives

- Identify changes in the extent and condition of vegetation cover
- Evaluate impacts on wetlands and naturally uncommon ecosystems
- Assess resilience of freshwater fish and invertebrate communities



Regional coverage

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HAWKES BAY REGIONAL COUNCIL
TE KAUNIHERA Ā-ROHE O TE MATAU-A-MĀUI

QEII NATIONAL TRUST
Ngā Kairauhi Papa Forever protected

RONGOWHAKAATA
IWI TRUST

Northland REGIONAL COUNCIL
Te Kaunihera ā rohe o Te Taitokerau

Ministry for the Environment
Manatū Mō Te Taiao

Te Kaunihera o Te Tairāwhiti
Gisborne District Council

Aongatete FOREST PROJECT

Department of Conservation
Te Papa Atawhai

Auckland Council
Te Kaunihera o Tāmaki Makaurau

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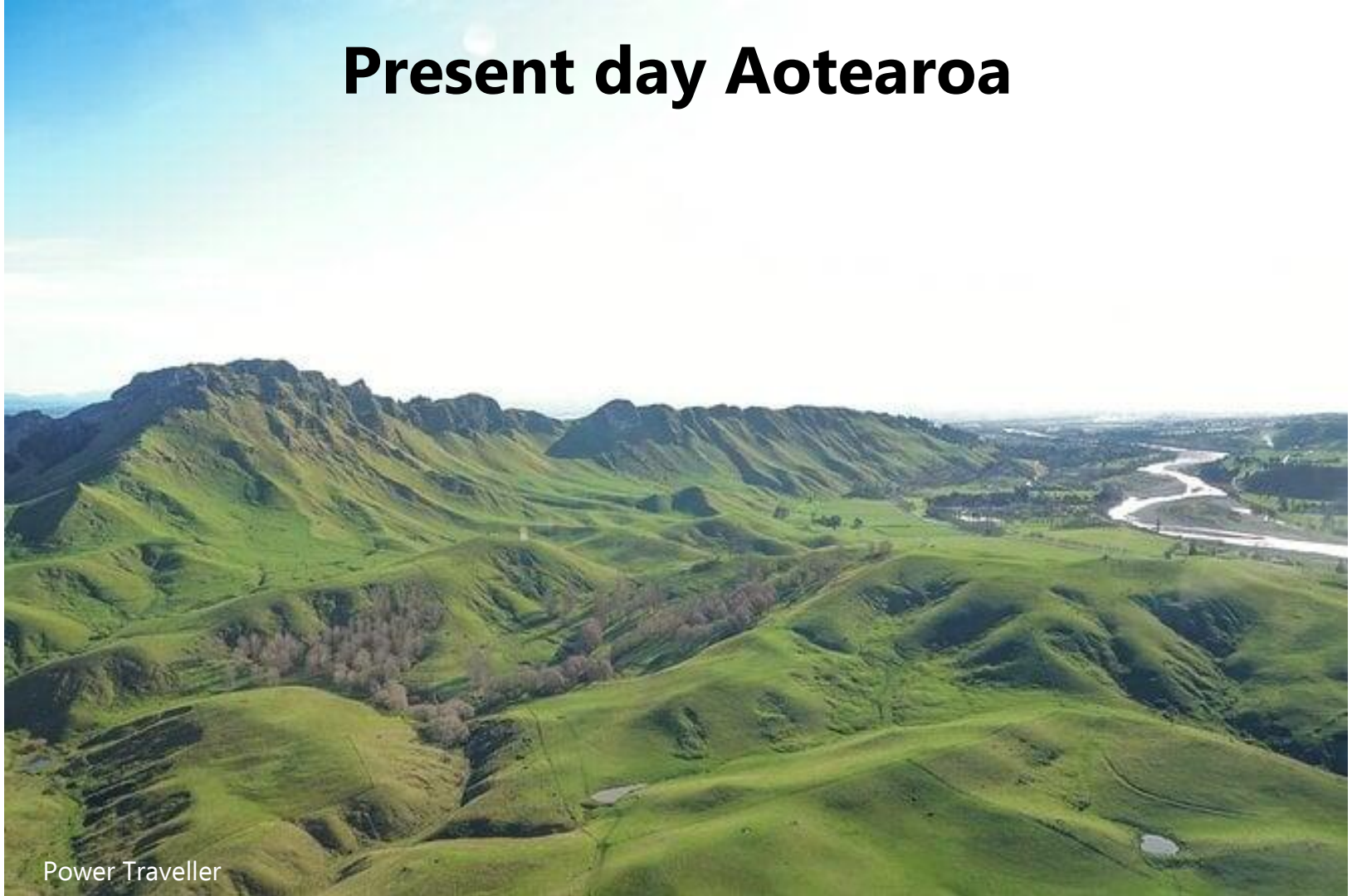
Identify changes in the extent and condition of vegetation cover

Pre-human Aotearoa

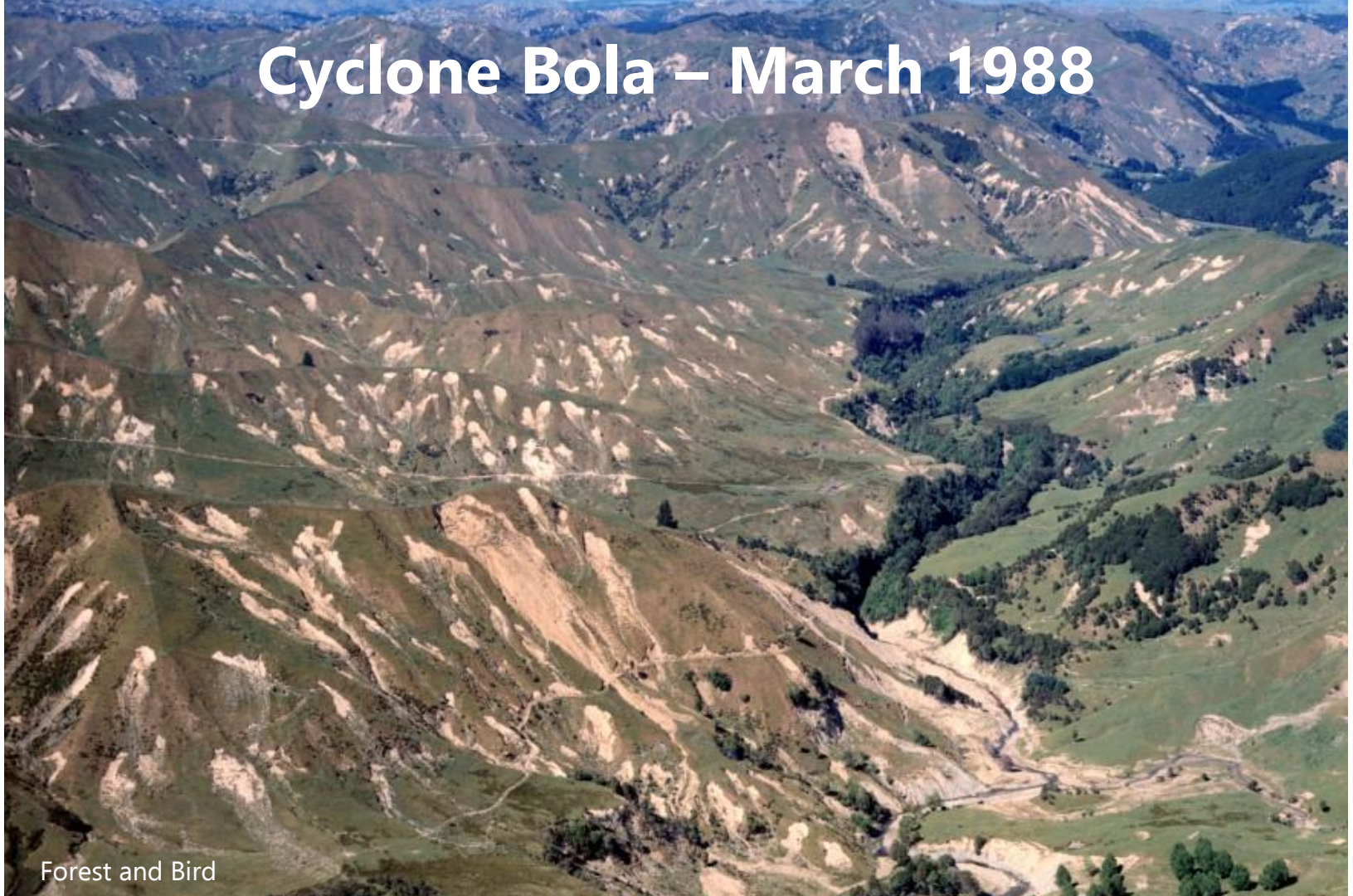
NZ Geographic

Present day Aotearoa



Power Traveller

Cyclone Bola – March 1988



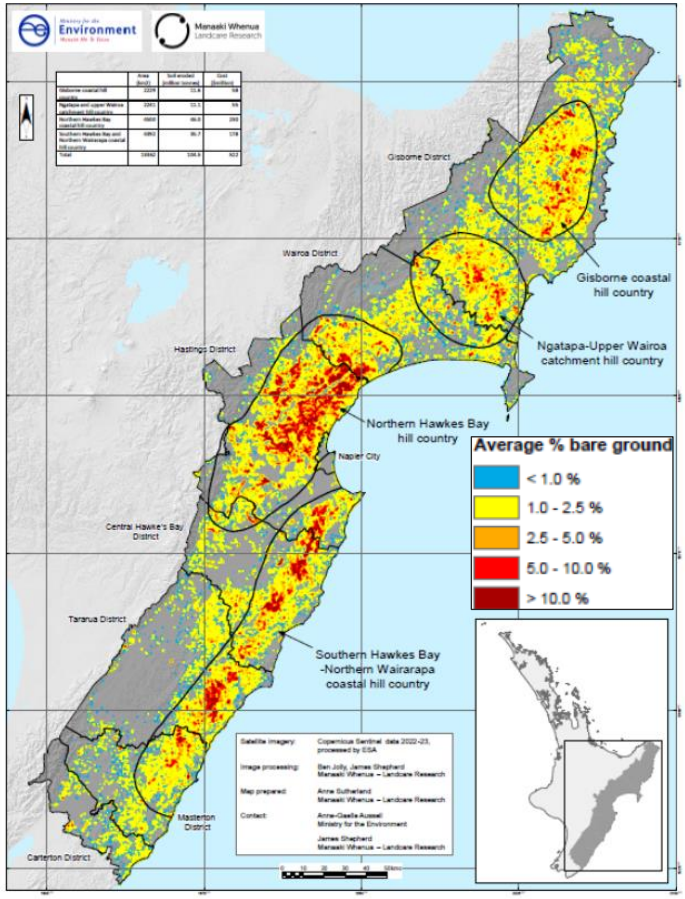
Forest and Bird

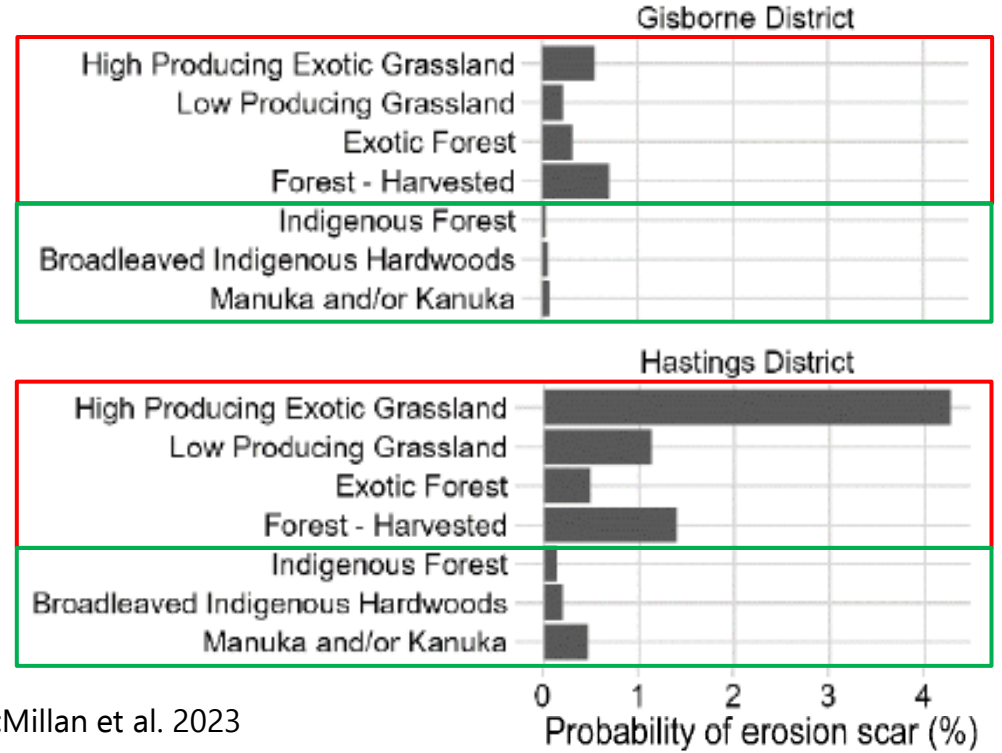
Rinse and repeat: Cyclone Gabrielle

NZ Herald

Where did damage to land occur?

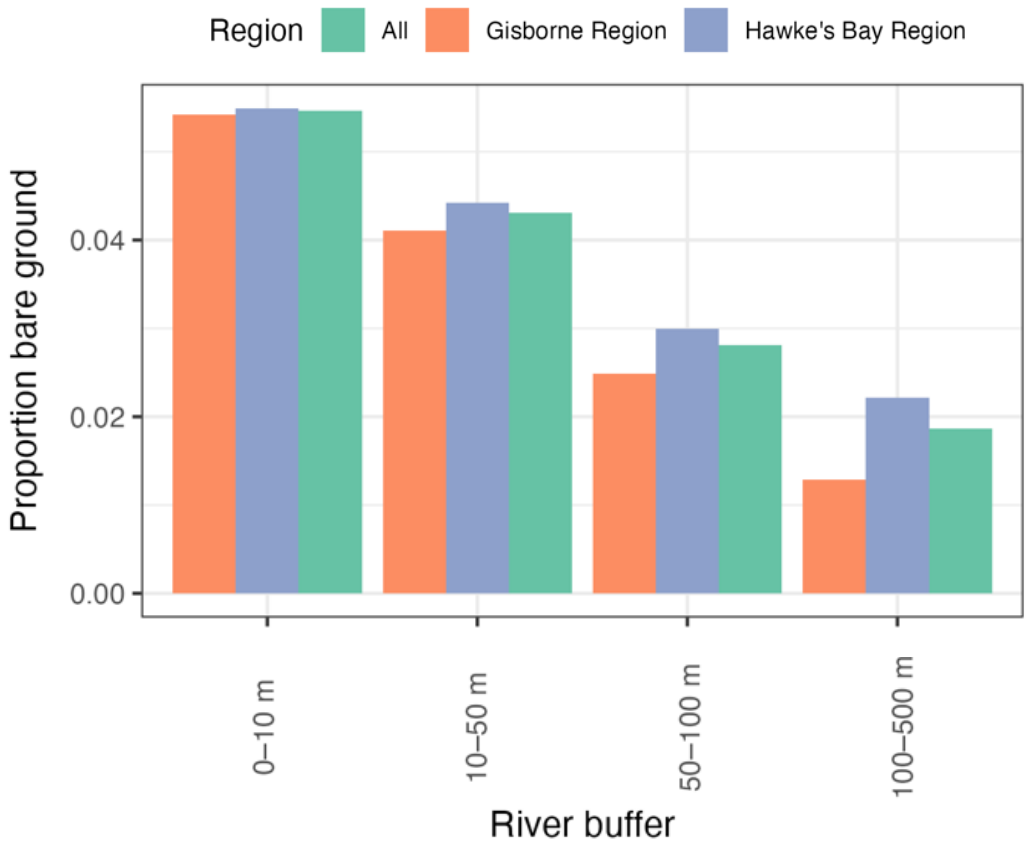
- ~300 million tons of sediment





McMillan et al. 2023

New bare ground was highest near rivers



Sediment impacts on lowland forest

November 2023

Photo: QEII / Malcolm Rutherford

April 2025

Photo: QEII / Malcolm Rutherford

February 2021

Photo: QEII / Malcolm Rutherford

September 2023

Photo: QEII / Malcolm Rutherford

April 2025

Photo: QEII / Malcolm Rutherford

Te Tairāwhiti lowland forest

- Regionally rare ecosystem facing multiple pressures
- <u>Aim:</u> quantify cyclone impacts and recovery of Te Tairāwhiti lowland forest

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QEII NATIONAL TRUST Ngā Kairauhi Papa Forever protected

Whareponga

Te-Aitanga-a-Hauiti

RONGOWHAKAATA IWI TRUST

Te Kaunihera o Te Tairāwhiti Gisborne District Council

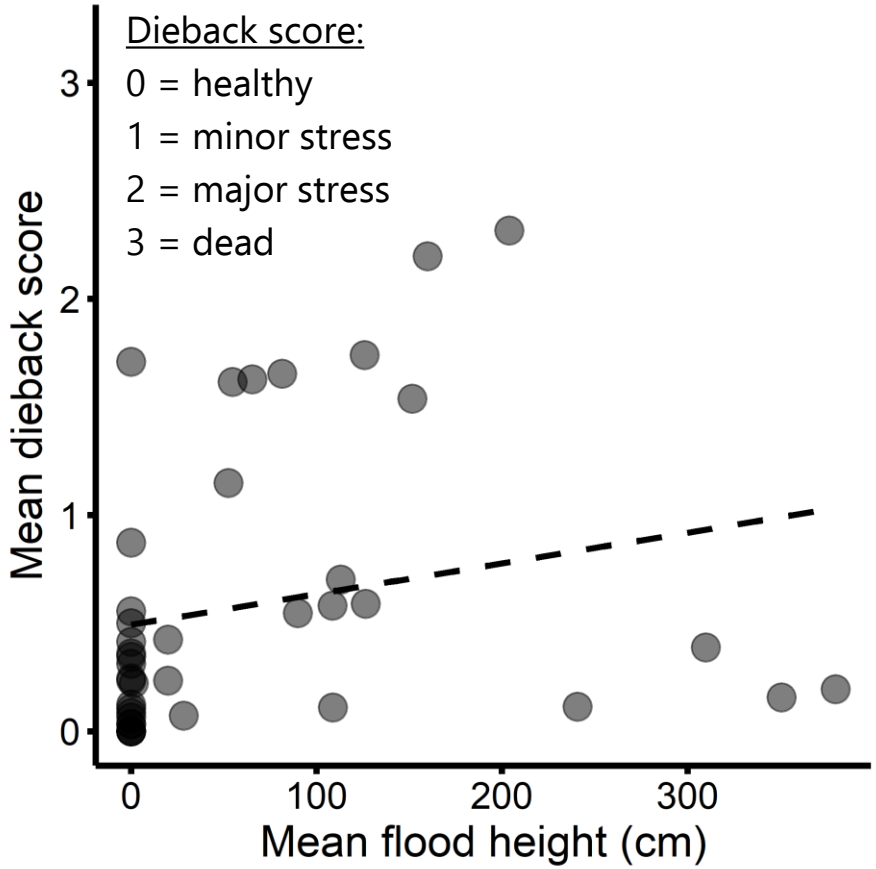
Whareponga


photo: Strike Photography

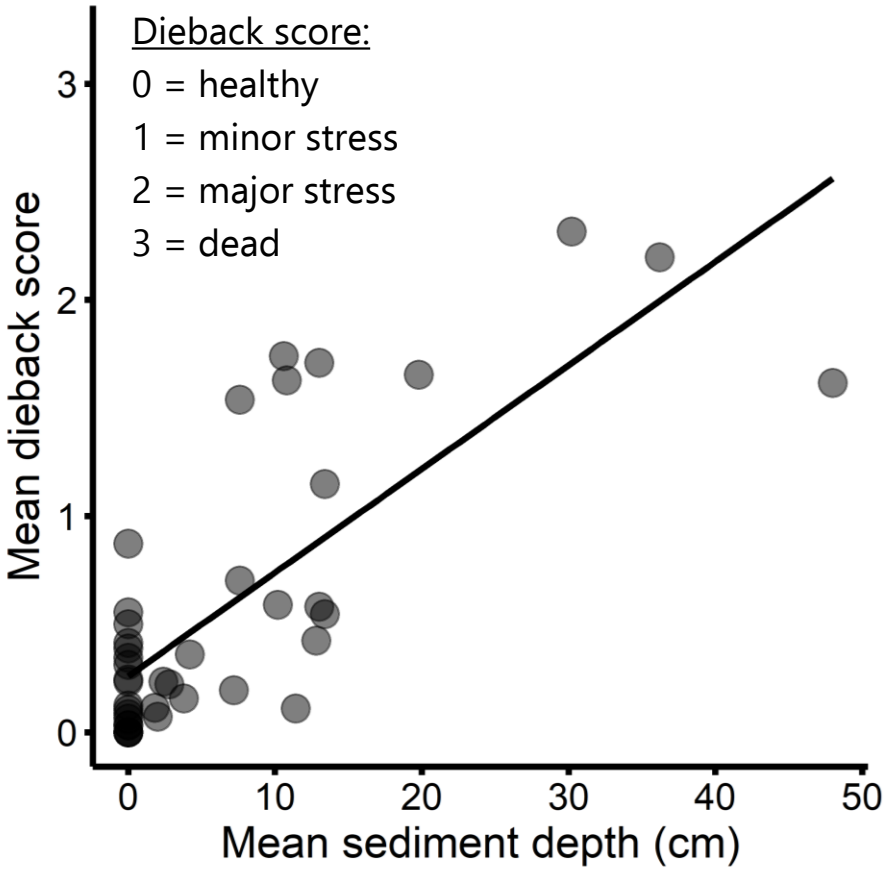

photo: Paula Godfrey


photo: Gretchen Brownstein

Tree dieback was unrelated to flood height

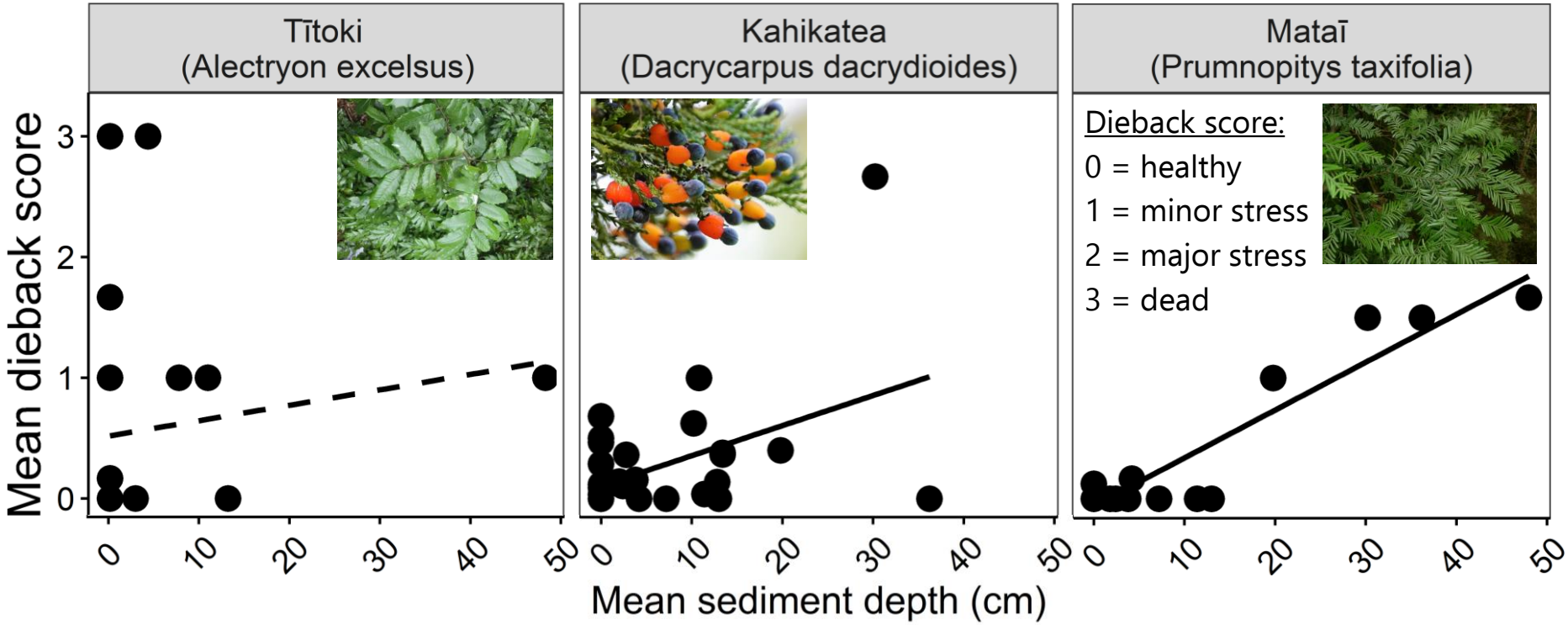


Tree dieback increased with sediment depth



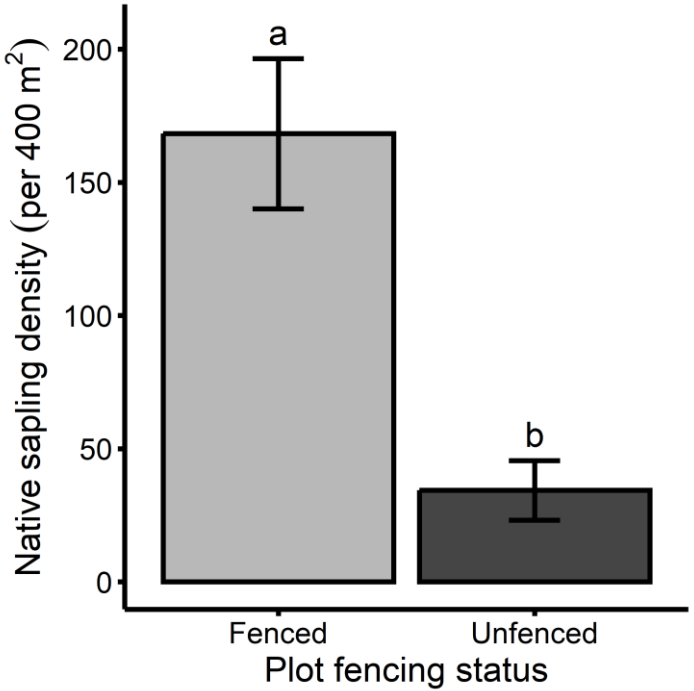
Sediment impacts varied among species

- Long-term impacts remain unknown

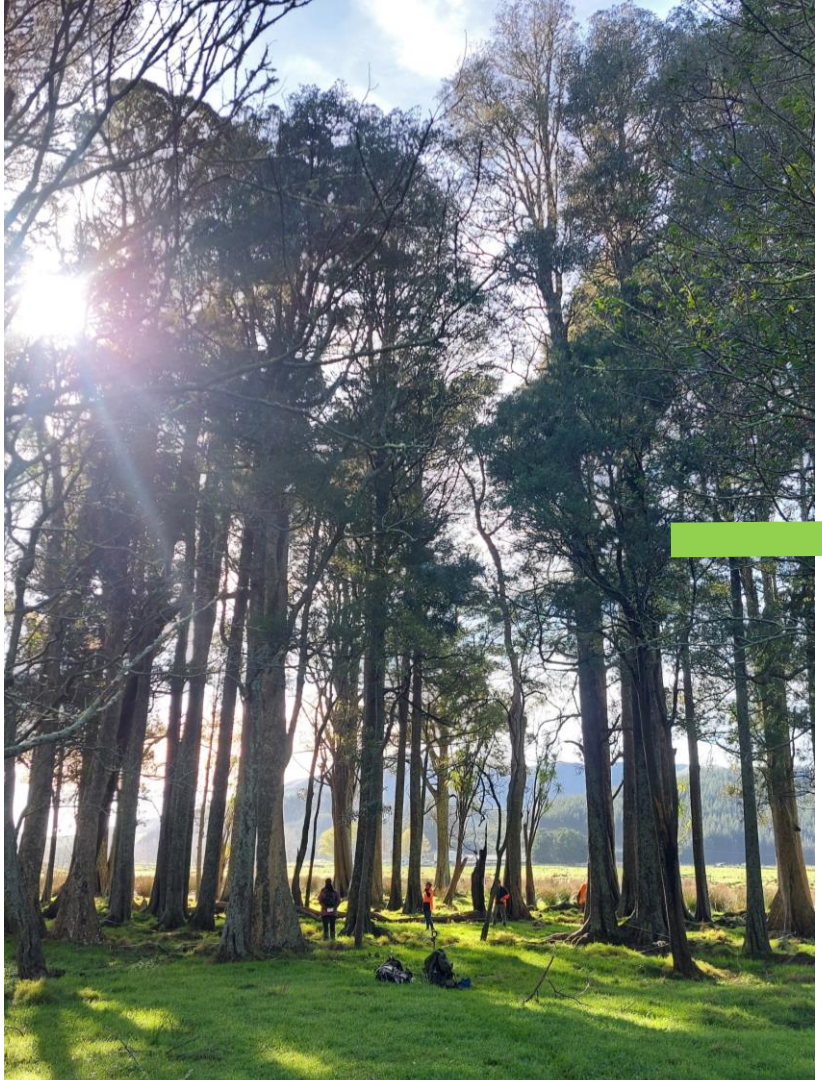


Is forest regeneration occurring?

- 5 times more native saplings in fenced forests



- Weeds a problem in some sites, especially with canopy dieback



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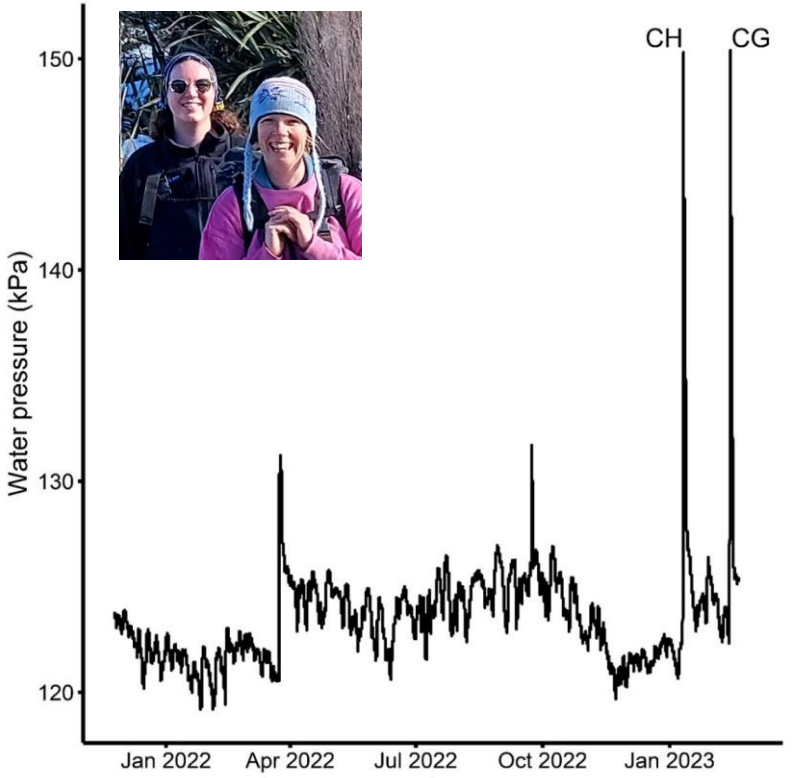
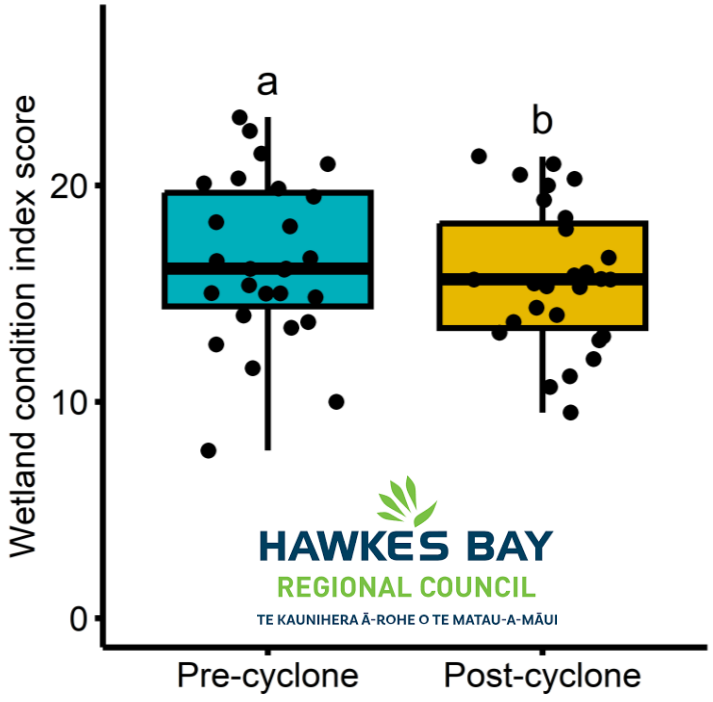
Evaluate impacts on wetlands and naturally uncommon ecosystems

Wetlands held huge volumes of water…



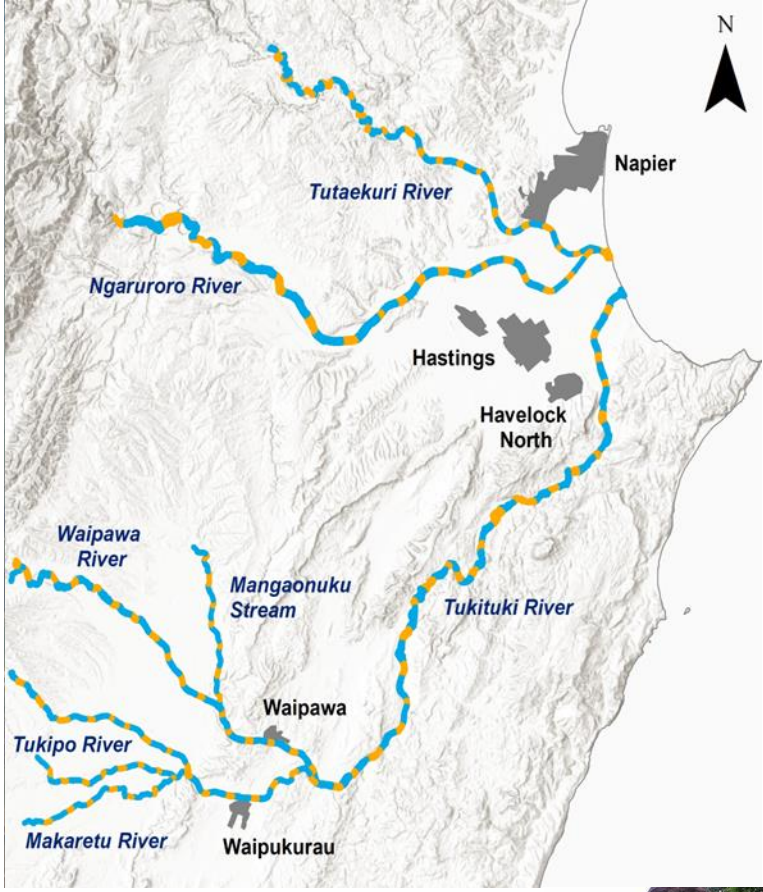
… and were largely resilient

- Hawke's Bay wetland condition declined by 4%
  - Driven by sedimentation and vegetation damage



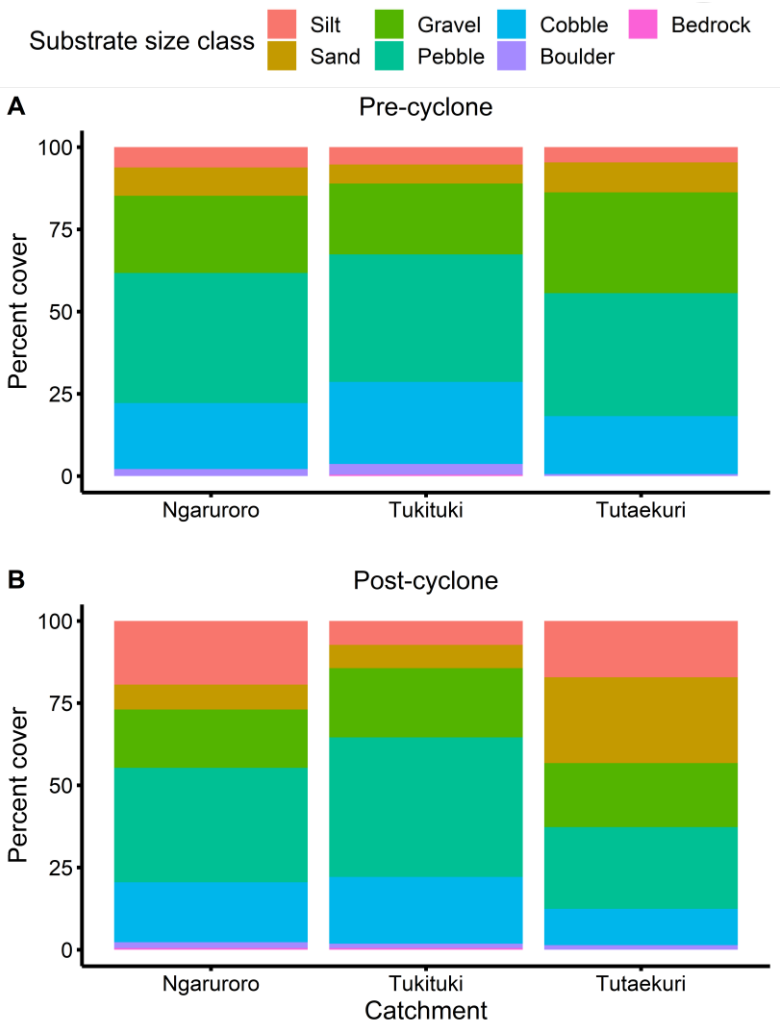
Hawke’s Bay braided rivers

- 292 km surveyed pre- and post-cyclone
  - Bird counts
  - Vegetation and substrate cover



HAWKE'S BAY REGIONAL COUNCIL
TE KAUNIHERA Ā-ROHE O TE MATAU-A-MĀUI

Fine substrate increased



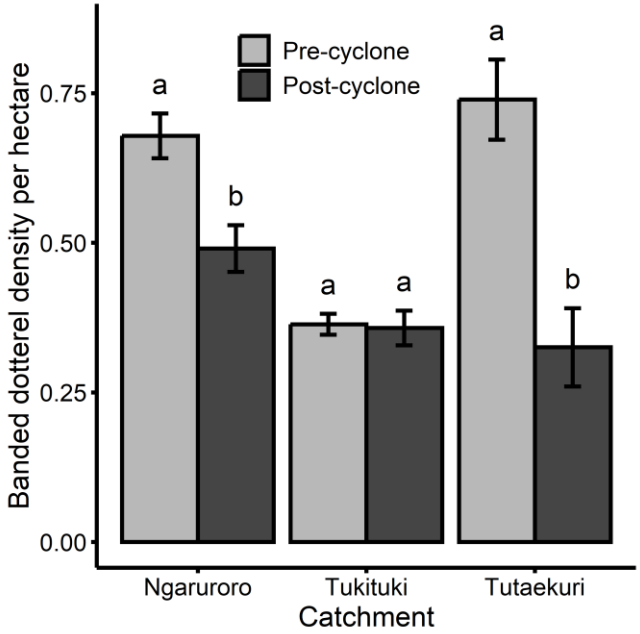
Shorebird density declined

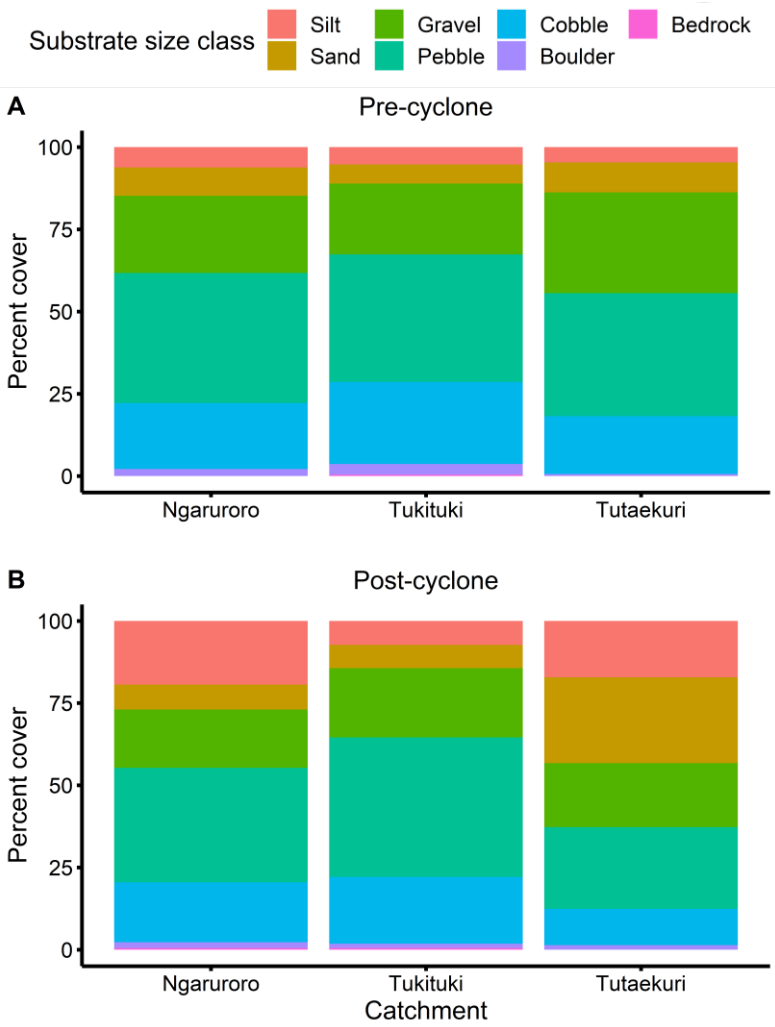

-15%


-30%


-16%


-43%





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Assess resilience of freshwater fish and invertebrate communities

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Freshwater ecosystems

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Marine ecosystems

Leigh Tait, Daniel Leduc, et al.
Leigh.Tait@niwa.co.nz, Daniel.Leduc@niwa.co.nz

Key conclusions

- Cyclone Gabrielle was characterised by extreme rainfall, erosion, and sediment deposition
- Its ecological impacts were likely exacerbated by historical land use change and current management practices
- Additional pressures like invasive weeds and animals could alter, delay, or prevent recovery of affected ecosystems
- Long-term monitoring data crucial for quantifying impacts and recovery

Whole catchment resilience

- Protect and restore wetlands for flood and erosion mitigation
- Protect and restore native vegetation to stabilise landslides and reduce future erosion and downstream sedimentation
- Fence to exclude stock and feral ungulates and promote natural regeneration
- Monitor for weeds and act swiftly to prevent their establishment and spread

Ngā mihi nui

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- Stakeholders: mana whenua, QEII, Regional Councils, DOC, MBIE, MfE, Ecosanctuaries, private landowners, advisory group
- Report authors: James McCarthy, Simon Planzer, Ben Jolly, Rowan Sprague, Sarah Richardson, Cindy Baker, Shad Mahlum, Elizabeth Graham, Mike Hickford, Brian Smith, Rachel Crawford, Nikki McArthur, Annabel Beattie
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For more information

- Report summary and infographics
- Full report:
- allenw@landcareresearch.co.nz