Earth Sciences
New Zealand

It’s Our Fault: Nō Mātau Te Hapa programme update

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Programme science leader

IT'S OUR FAULT
NŌ MĀTOU TE HAPA

Increasing Our Resilience
TE WHAKAPIKI MANAHAU

WELLINGTON EARTHQUAKE RESEARCH PROGRAMME

- Started in 2006
- **Vision:** To make the Wellington Region more resilient to earthquakes and related hazards
- **Funders:**

Natural Hazards Commission
Toka Tū Ake

Absolutely Positively **Wellington** City Council
Me Heke Ki Pōneke

WELLINGTON REGION EMERGENCY MANAGEMENT OFFICE
CIVIL DEFENCE

IT'S OUR FAULT
NŌ MĀTOU TE HAPA

Increasing Our Resilience
TE WHAKAPIKI MANAHAU

WELLINGTON EARTHQUAKE
RESEARCH PROGRAMME

- Topics studied over the last 20 years:
  - Active faults, Hikurangi Subduction Zone, Geodesy, Seismology, Tsunami, Liquefaction, Landslides, Fire-Following Earthquakes, Geotechnical properties, Engineering and Risk, Social Science, Planning and Policy
- Typically host:
  - 1 Science to Practice workshop and 2 Wellington Collab workshops per year
- Currently in year 2 of the 3-year phase 3


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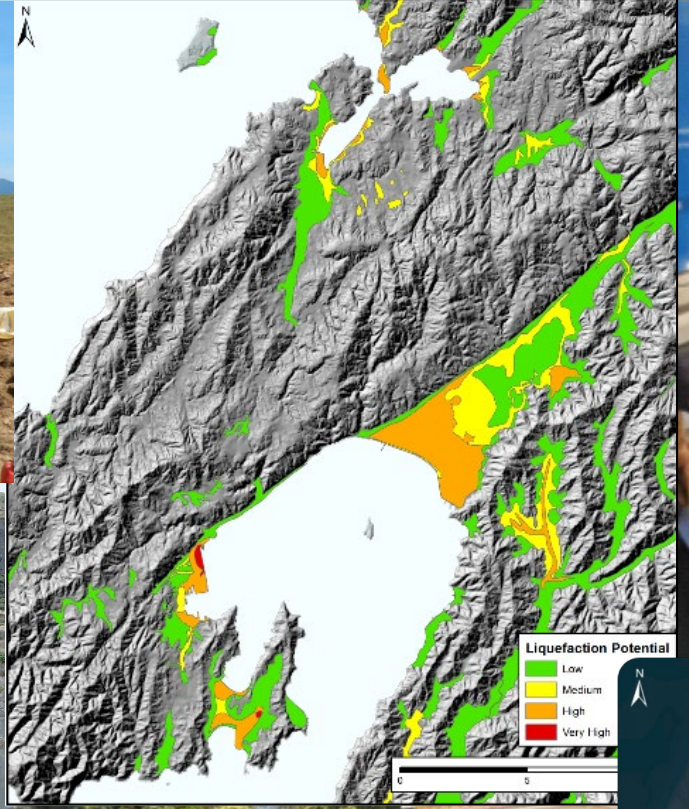
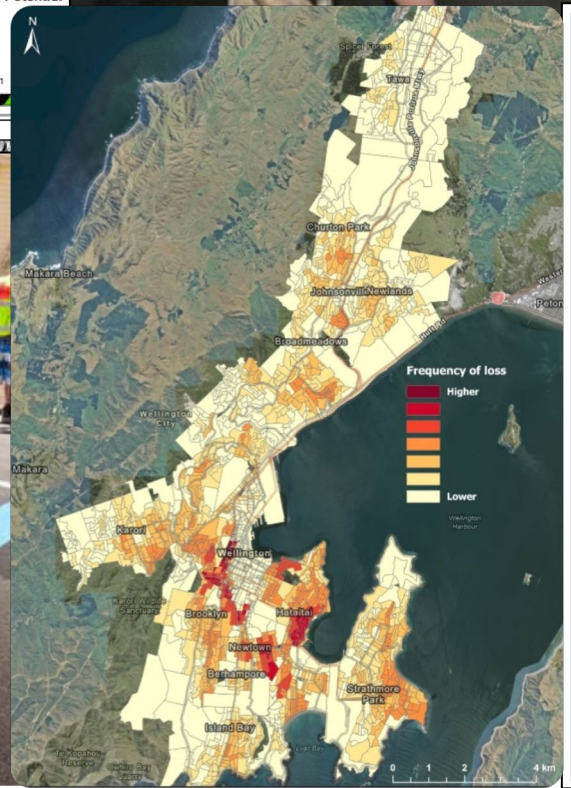
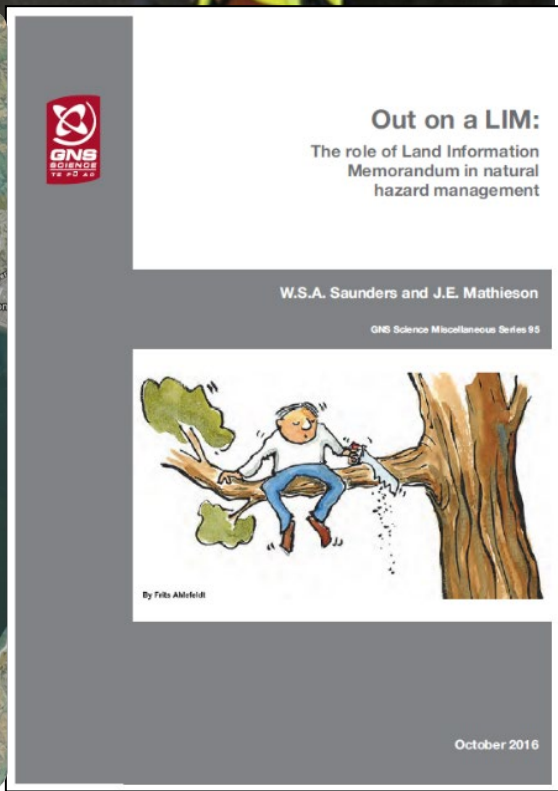

N
Liquefaction Potential
Low
Medium
High
Very High
0
5


Science New Zealand
National Awards 2019
New Zealand's Crown Research Institutes
Science New Zealand National Awards
sciencenz.org


STOP
Tsunami safe zone


N
Frequency of loss
Higher
Lower
Makara Beach
Churton Park
Johnsonville
Newlands
Broadmeadows
Wellington City
Makara
Karori
Wellington
Brooklyn
Kelburn
Newtown
Berhampore
Strathmore Park
Island Bay
0
1
2
4 km


Out on a LIM:
The role of Land Information Memorandum in natural hazard management
W.S.A. Saunders and J.E. Mathieson
GNS Science Miscellaneous Series 95
By Felix Ahlefeldt
October 2016

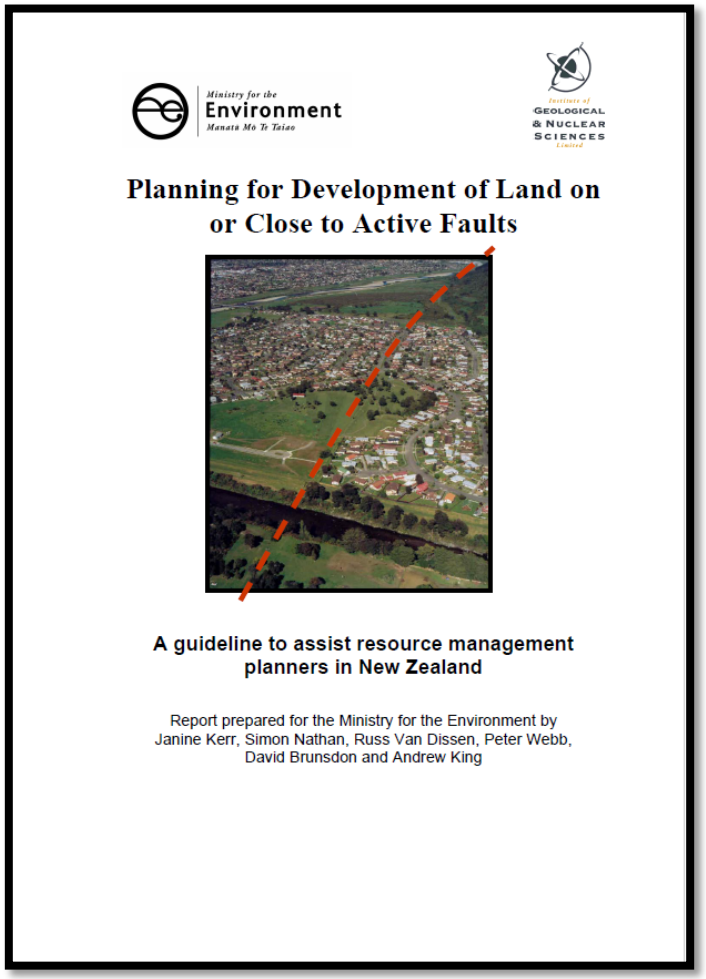
Policy and Planning: Review of resource consents

- Reviewed decision-making regarding natural hazards for 15 resource consents by several TA's

- Most were in relation to active faults (13) and coastal hazards (2)

- **Recommendations include:**
- Updating the Active Fault Guidelines
- Responding to changing hazards information
- Geotechnical investigations
- Use of mitigation and relocatable buildings

Buxton and Kelly (2024)

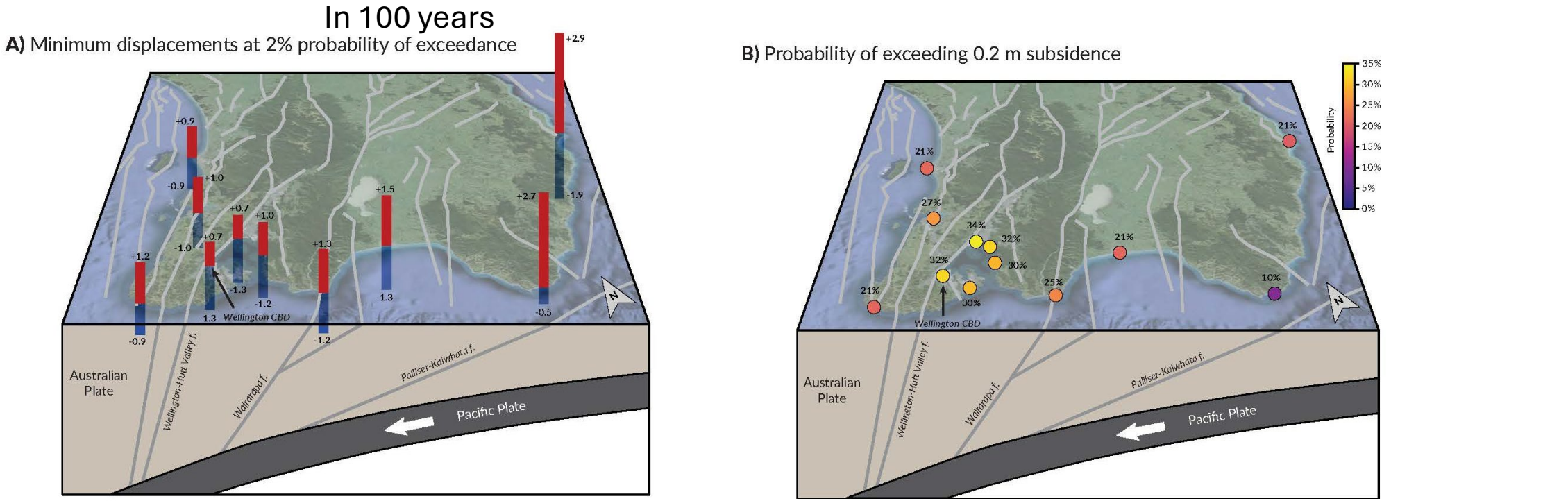


Policy and Planning: Science to Practice Workshops

- To connect policy and planning practitioners with scientists to disseminate latest research and research needs
- 2019 Multi-Council (2 days)
- 2020 Multi-Council
- 2021 Wairarapa Councils
- 2022 Hutt City Council
- 2022 Wellington City Council
- 2023 Multi-Council
- 2025 Multi-Council
- *2026 Kāpiti Coast District Council*

Gunnell (2019); Bretherton et al. (2024)

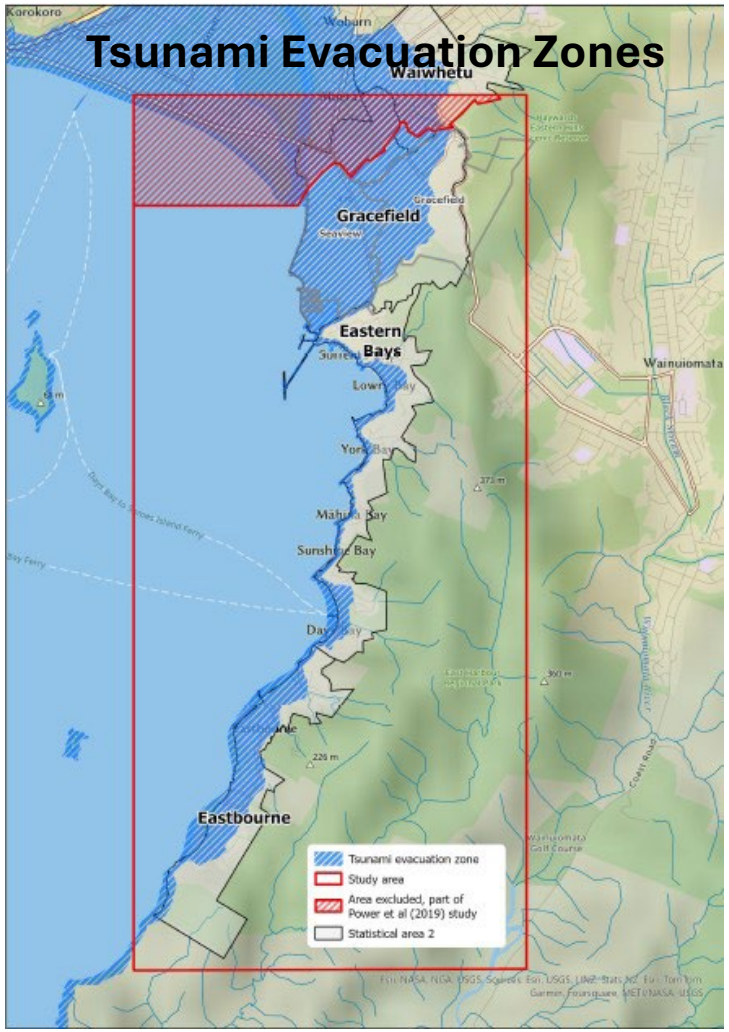
Probabilistic coastal vertical land movements

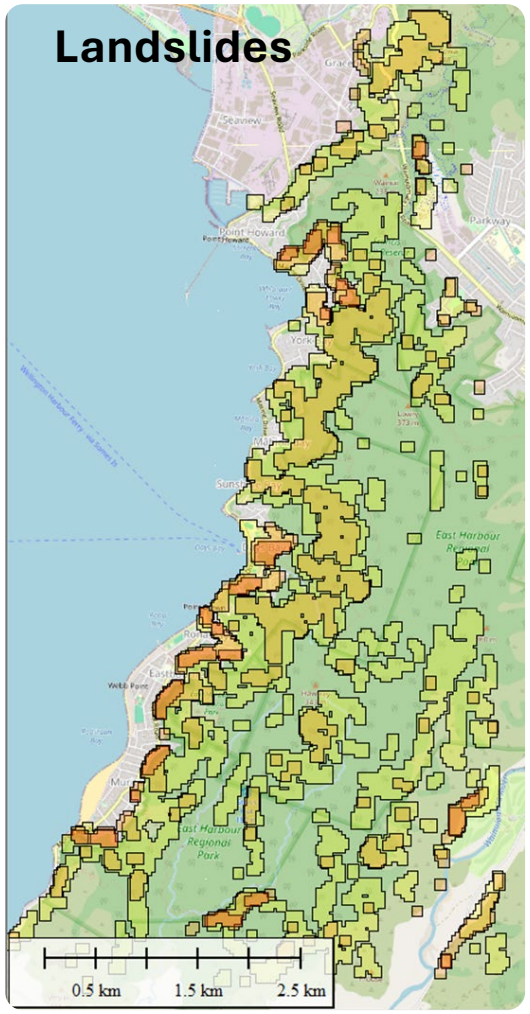


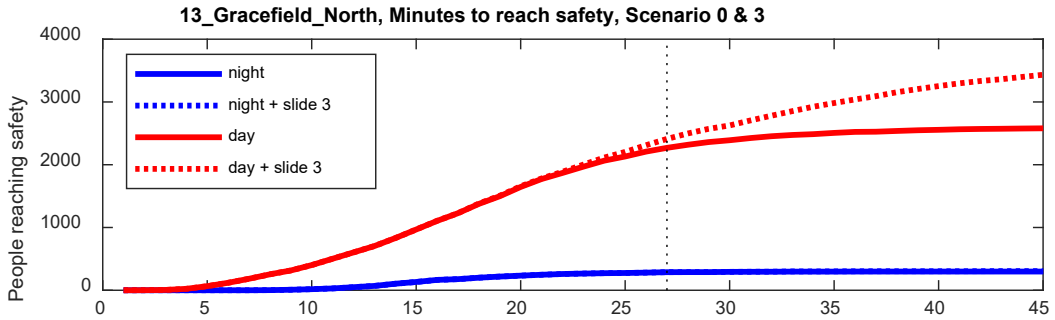
Howell and Delano (2024); Delano et al. (2025)

- All sites could go up or down >0.2 m in an earthquake the next 100 years
- Both the Hikurangi subduction zone and crustal faults can cause VLMs
- Probabilities are relatively high around Wellington Harbour from both the Wellington Fault and the HSZ

Eastbourne tsunami evacuation modelling





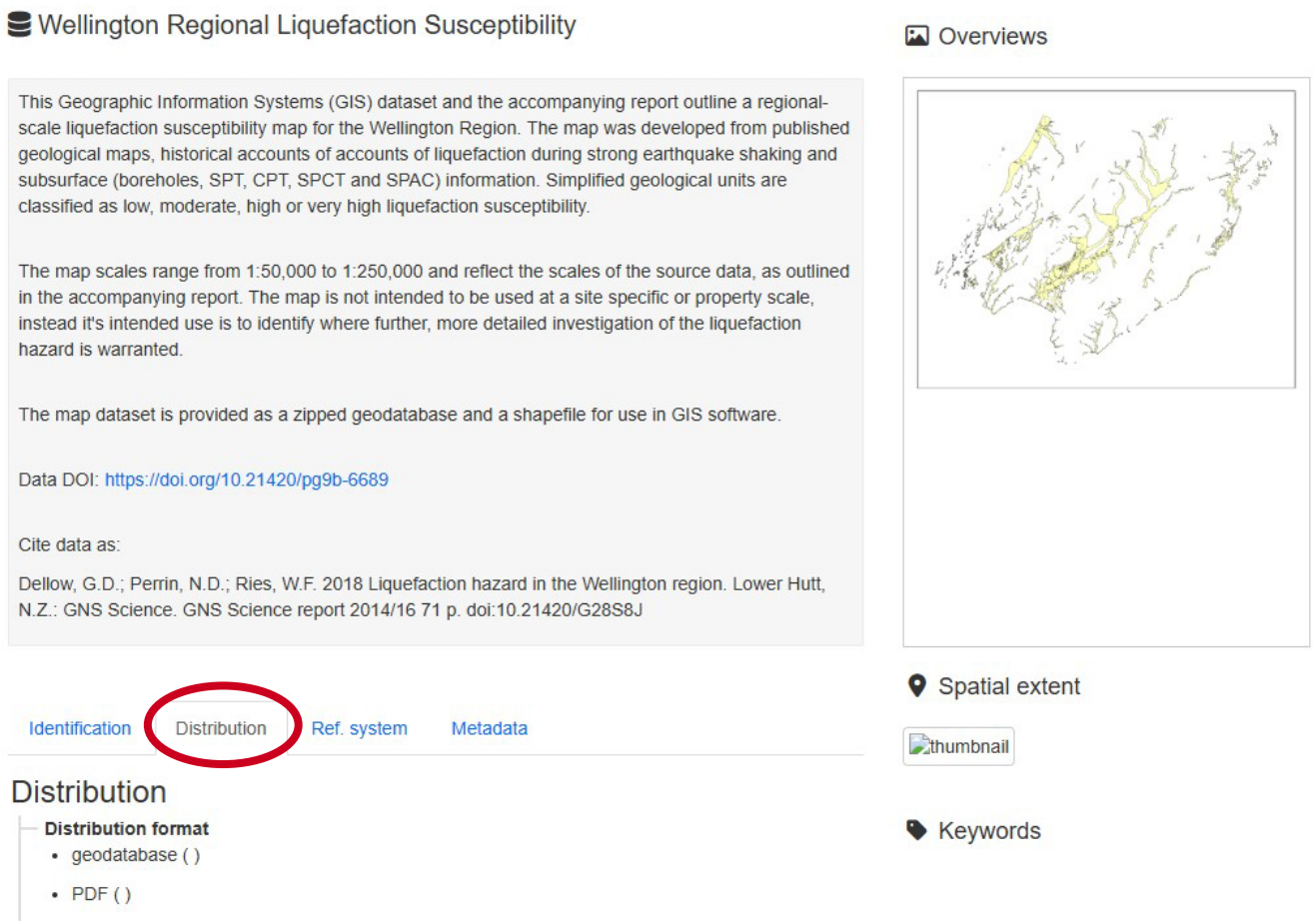


- Models identified potential landslide blockages and narrow evacuation routes
- Recommendations for alternative evacuation routes

Power et al. (2024)

IOF Datasets

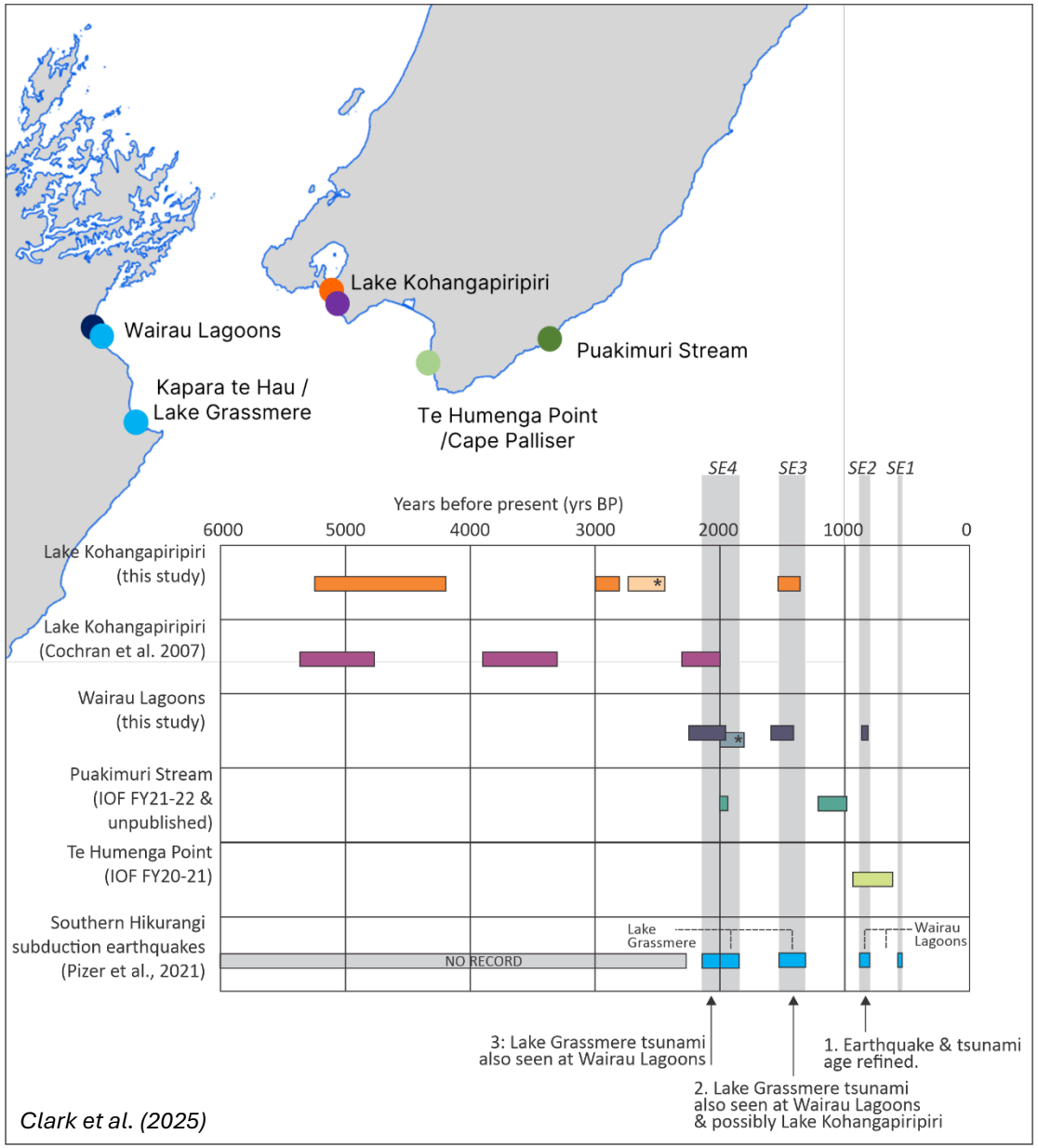
- Inventory and make accessible IOF datasets
- ~130 reports and papers on the website
- Only a handful of datasets (e.g., GIS maps) that are suitable to be made available
- Some are so technical (e.g., tsunami modelling) that are best made available upon request
- Others (e.g., active fault mapping and trenching) is available in other places
- Added regional liquefaction dataset to GNS Dataset Catalogue



https://www.gns.cri.nz/data-and-resources/gns-science-dataset-catalogue/

Hikurangi Subduction EQ's

- **Lake Kohangapiriri:** record goes back ~4500 years, and some disturbances but not clearly tsunami
- **Wairau Lagoons:** found clearer evidence for tsunami
- 850 year doesn't overlap a Wairarapa Fault earthquake and so likely a subduction earthquake



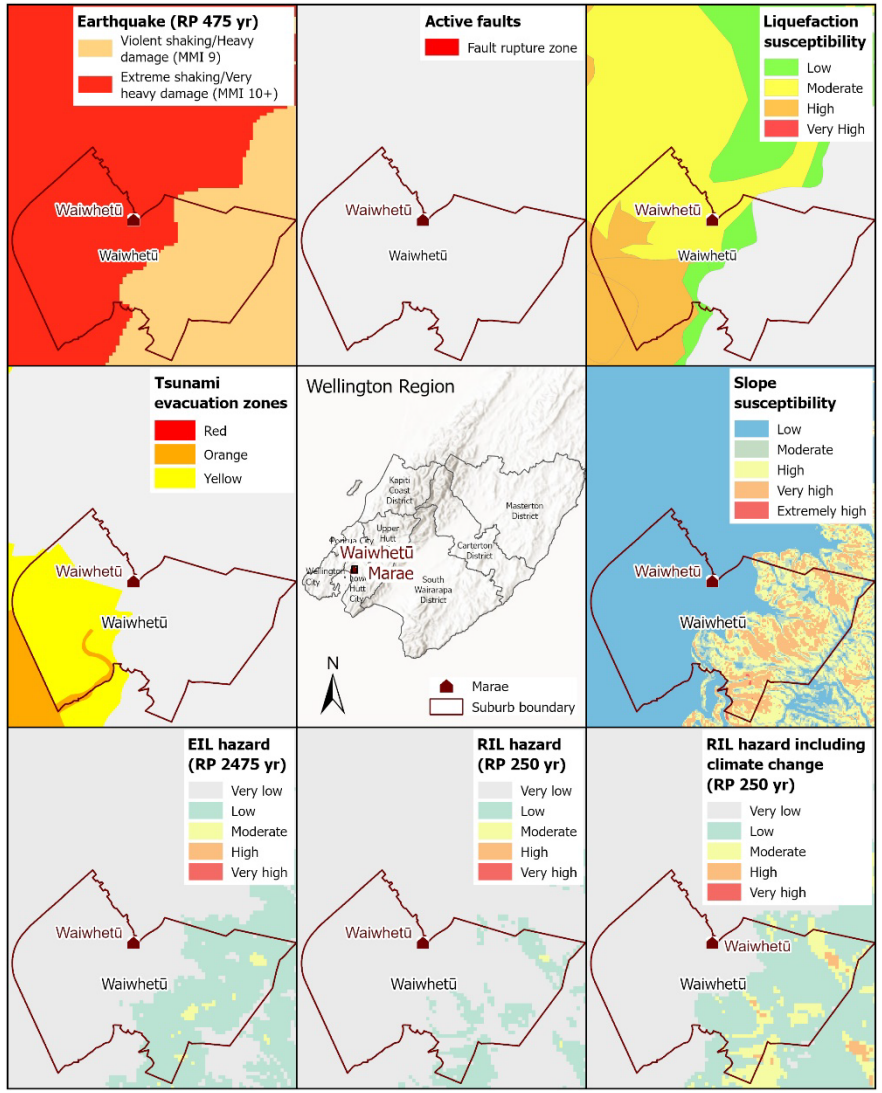
Geological hazards impacts on marae communities: Regional desktop assessment

Mana whenua marae:

- All are at risk from earthquake shaking
- Landslides are generally not a big risk
- Some marae are at risk from active faults (1), liquefaction (3), tsunami (4) or landslide debris and deposition (1)

Marae communities:

- Percentage of households at risk from multiple hazards
- Total number of households at risk
- *Waiwhetū*, Alicetown, *Te Ore Ore* and Riversdale Beach communities are the most affected overall



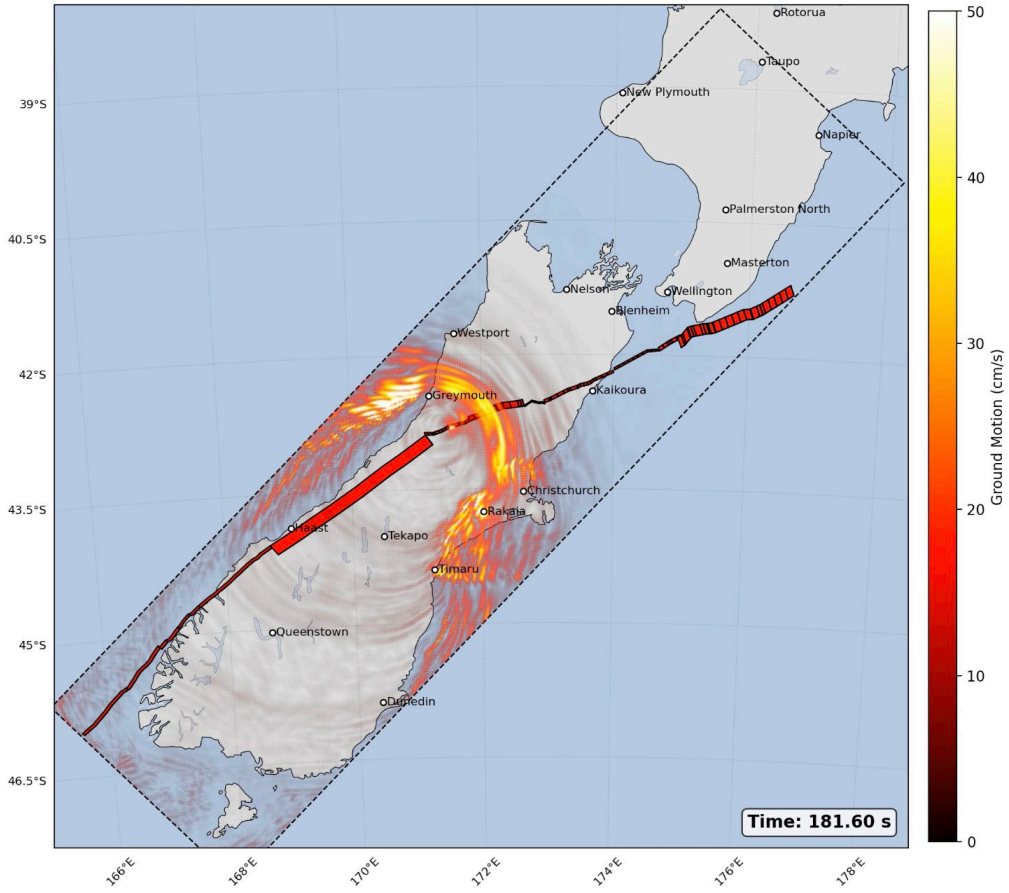
Lin et al. (2025)

Earthquake risk modelling: Alpine Fault and (Hikurangi Subduction Zone?) earthquakes

- Alpine Fault earthquake ground motions – Brendon Bradley talk this afternoon

Impacts to be modelled:

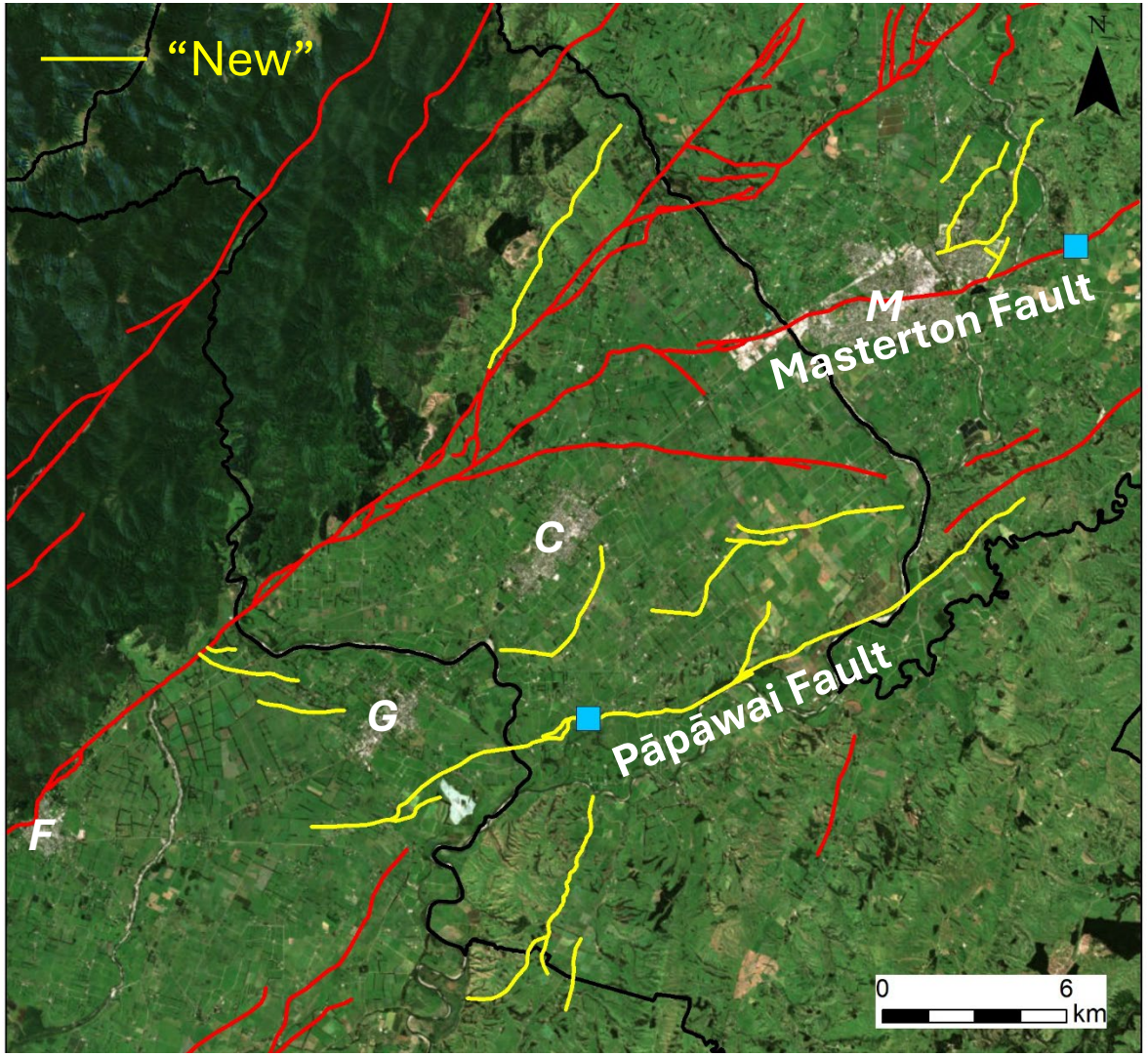
- Building damage / direct loss
- Household impacts / displacement / demographics (over time)
- Human casualties (by time of day)
- Infrastructure outage zones / restoration times (electricity / water)
- Road access disruption
- Household isolation from services



Bradley et al. (in prep.)

Active Fault paleoseismology: central Wairarapa

- Several “new” faults identified near towns in the central Wairarapa *Litchfield et al. (2022)*
- Preliminary slip rates and recurrence intervals may be similar to the Masterton and Carterton Faults *Coffey et al. (2023, in press NZJGG)*
- 2 year project trenching to obtain EQ records



www.itsourfault.org.nz

Thank you