

Ngā Ngaru Wakapuke

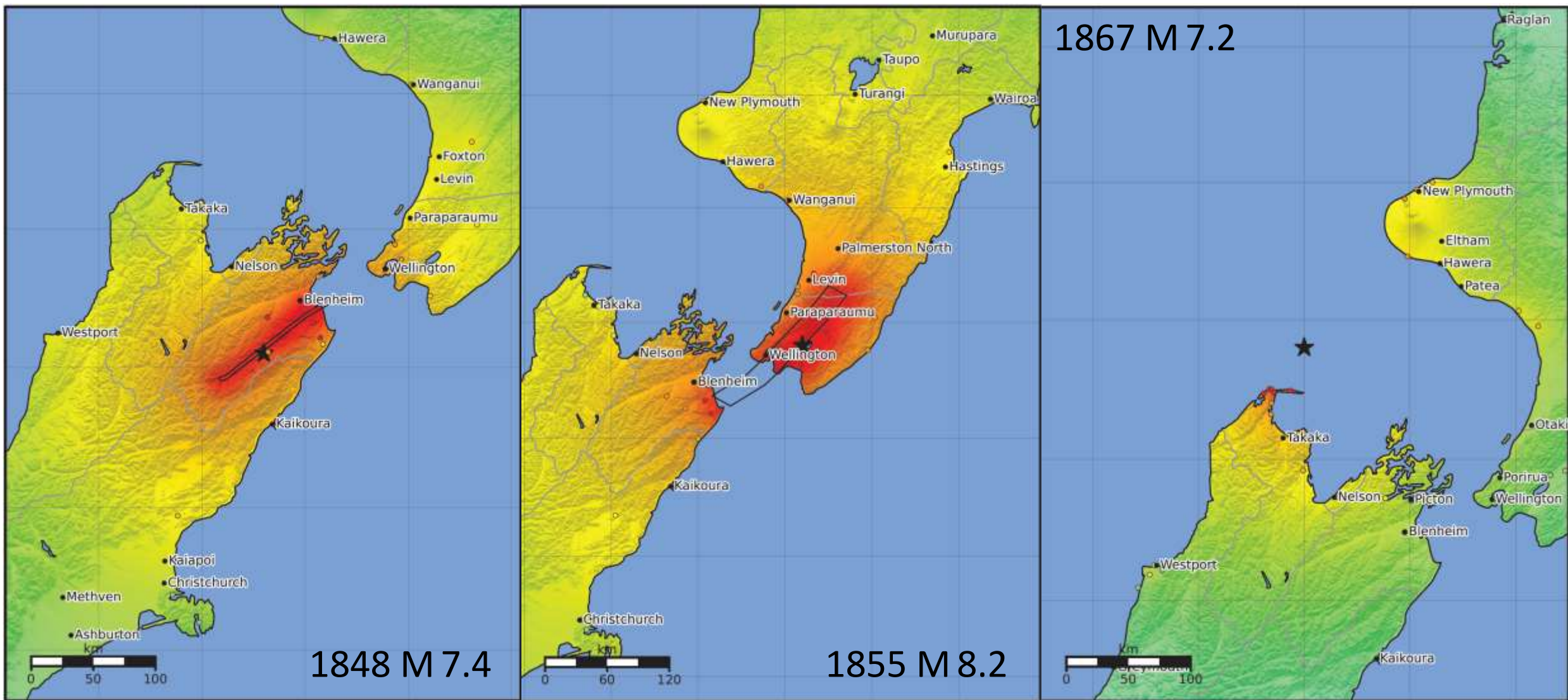
Building resilience to future earthquake sequences

Endeavour Programme funding (2024-2029)

Co-leads: Jamie Howarth (VUW) and Caroline Orchiston (OU)

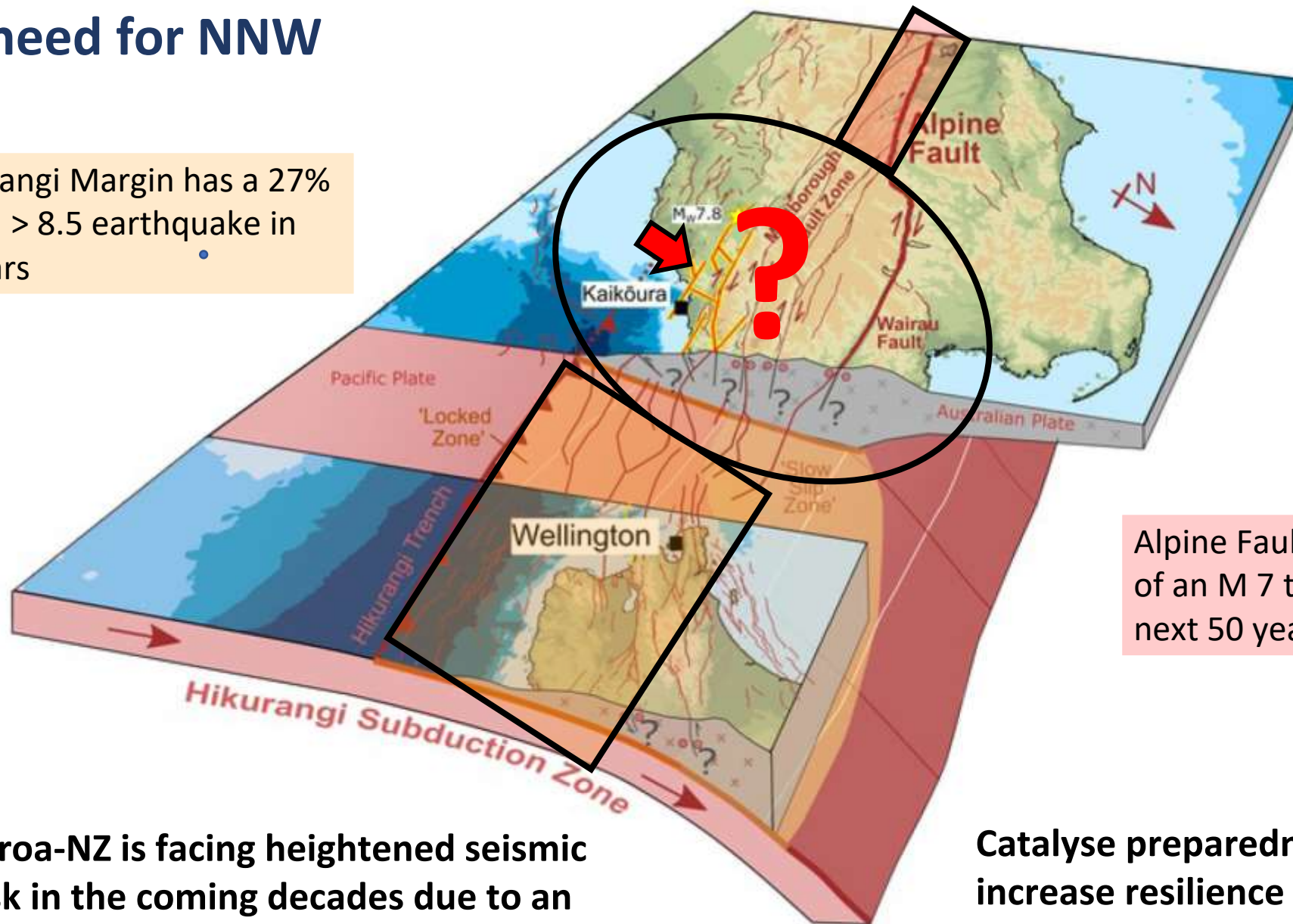


Earthquake Sequences and the Transition Zone



Critical need for NNW

Southern Hikurangi Margin has a 27% chance of an $M > 8.5$ earthquake in the next 50 years



Alpine Fault has a 75% chance of an $M 7$ to 8 earthquake in the next 50 years

Central Aotearoa-NZ is facing heightened seismic hazard and risk in the coming decades due to an impending sequence of large earthquakes

Catalyse preparedness action that will increase resilience to clusters of large ($>M7$) earthquakes in the future.

Team



Co-PI VUW
Jamie Howarth



Ngā Ngaru Wakapuke
Building resilience to
future earthquake sequences

Research Aim 1.1 THE FUTURE


Research Aim 1.2 THE FORECAST

Research Aim 1.3 THE PAST

Research Aim 1.4 THE FOUNDATIONS



Iwi partners



Te Tau Ihu

Top of te Waipounamu

Ngāti Tama ki te Waipounamu
Ngāti Rārua
Te Ātiawa ki te Waipounamu
Ngāti Koata
Ngāti Kuia
Rangitāne
Toa Rangatira
Ngāti Apa
Matāwaka*

Iwi guidance
Barney Thomas
(Ngāti Tama, Te Ātiawa)

Iwi Connector
Rebecca Mason (Ngāti Kuia)
Meihana Consulting



Te Upoko o Te Ika

Te Whanganui-ā-Tara ki te Tonga

Toa Rangatira
Ngāti Tama ki Te Whanganui-ā-Tara
Te Ātiawa ki Te Whanganui-ā-Tara
Ngāti Kahungunu ki Wairarapa
Rangitāne
Ngāti Raukawa ki te Tonga
Te Ātiawa ki Waikanae
Ngā Matāwaka* ki Whanganui-ā-Tara

Iwi guidance and connector
Hinemoa Katene
(Toa Rangatira)

* Urban/Pan Tribal Māori living outside their tribal jurisdiction

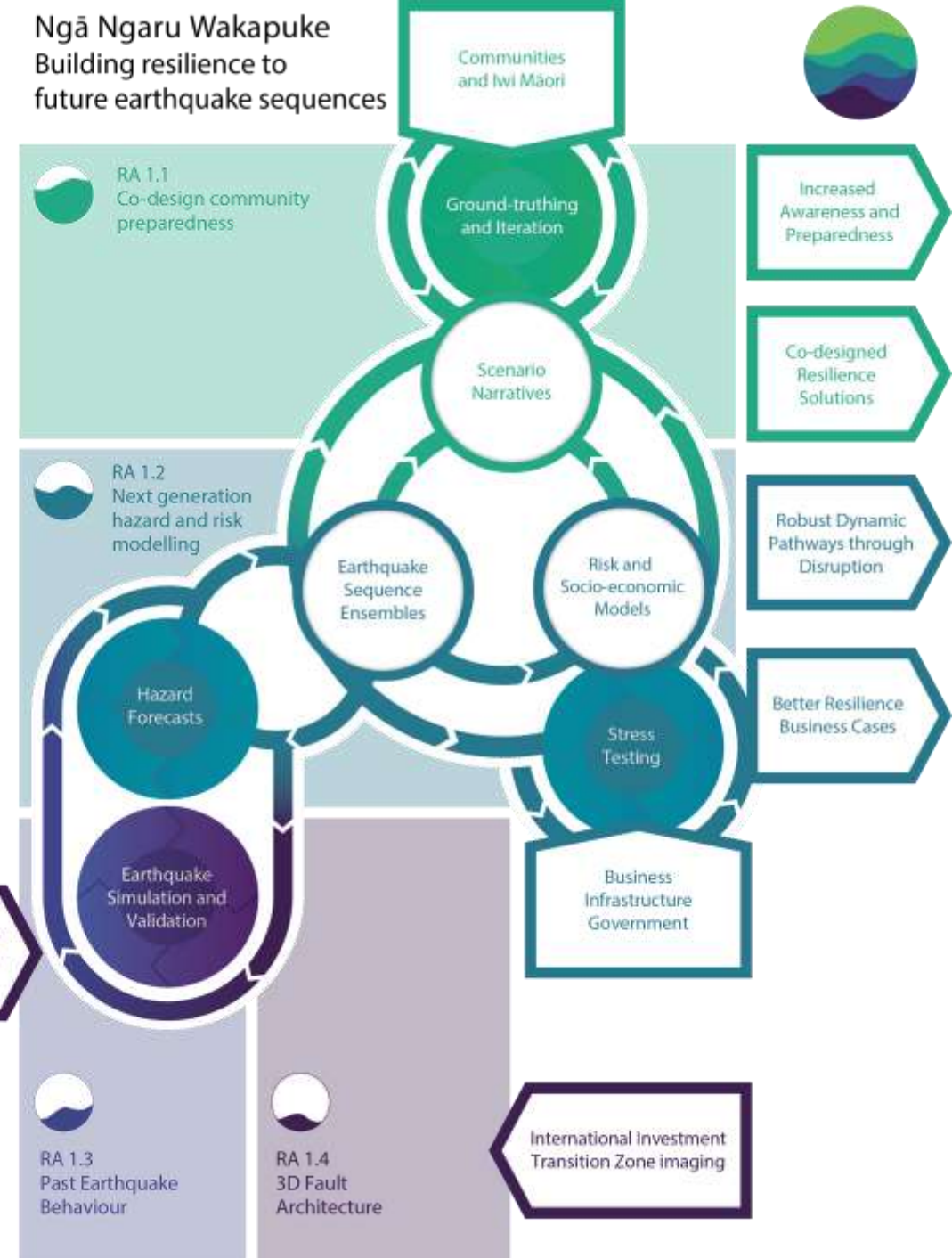
Programme structure

RA1: Co-designing culturally responsive, community-led scenario narratives that weave together our new science and local knowledge, to inform resilience initiatives.

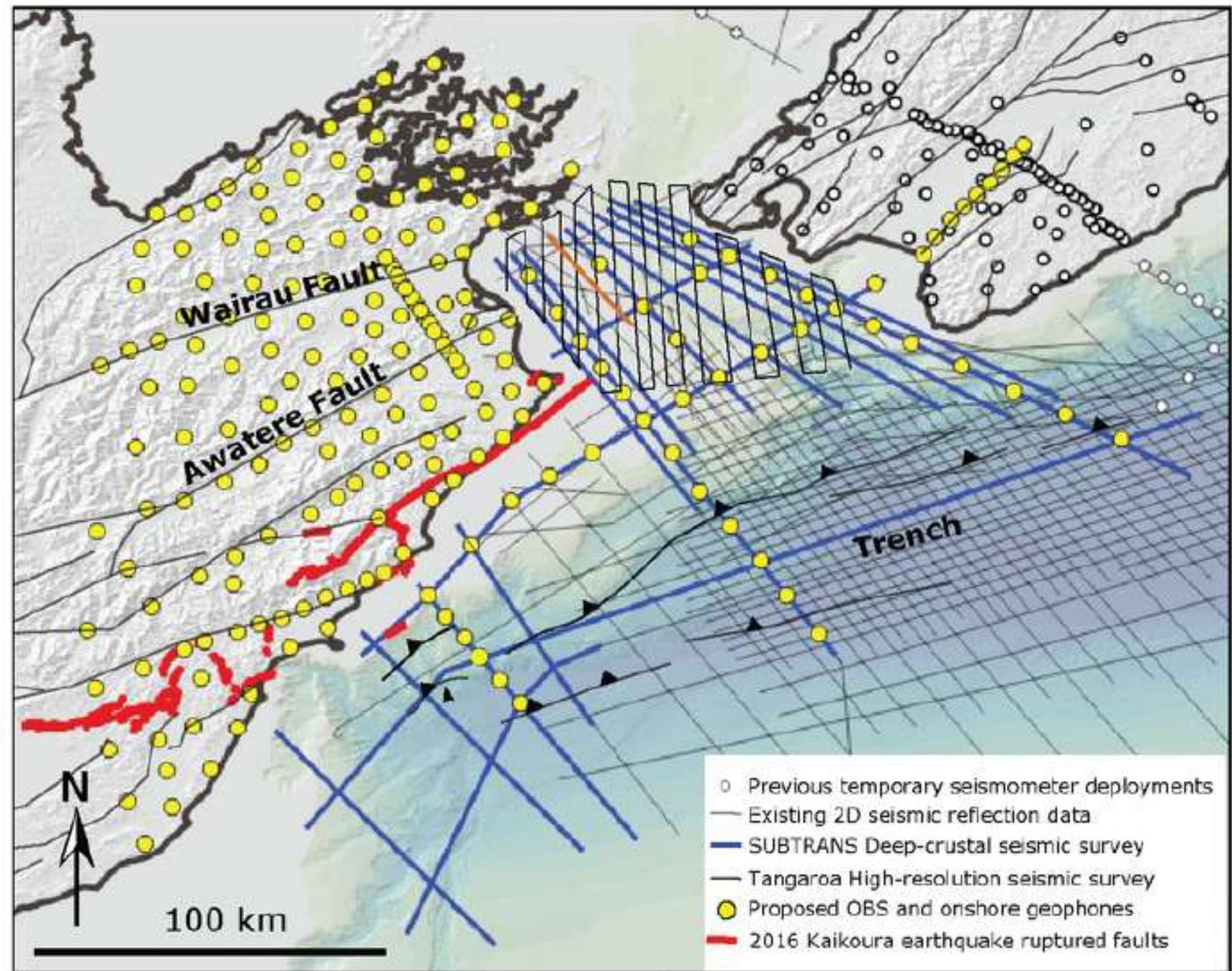
RA2: Develop innovative tools for quantifying time-varying hazard, risk and socio-economic consequences caused by earthquake sequences utilizing state-of-the-art physics-based computer simulations

RA3: Determine the pattern and frequency of past large earthquake sequences with unprecedented spatial and temporal resolution, using novel paleoearthquake records from lakes

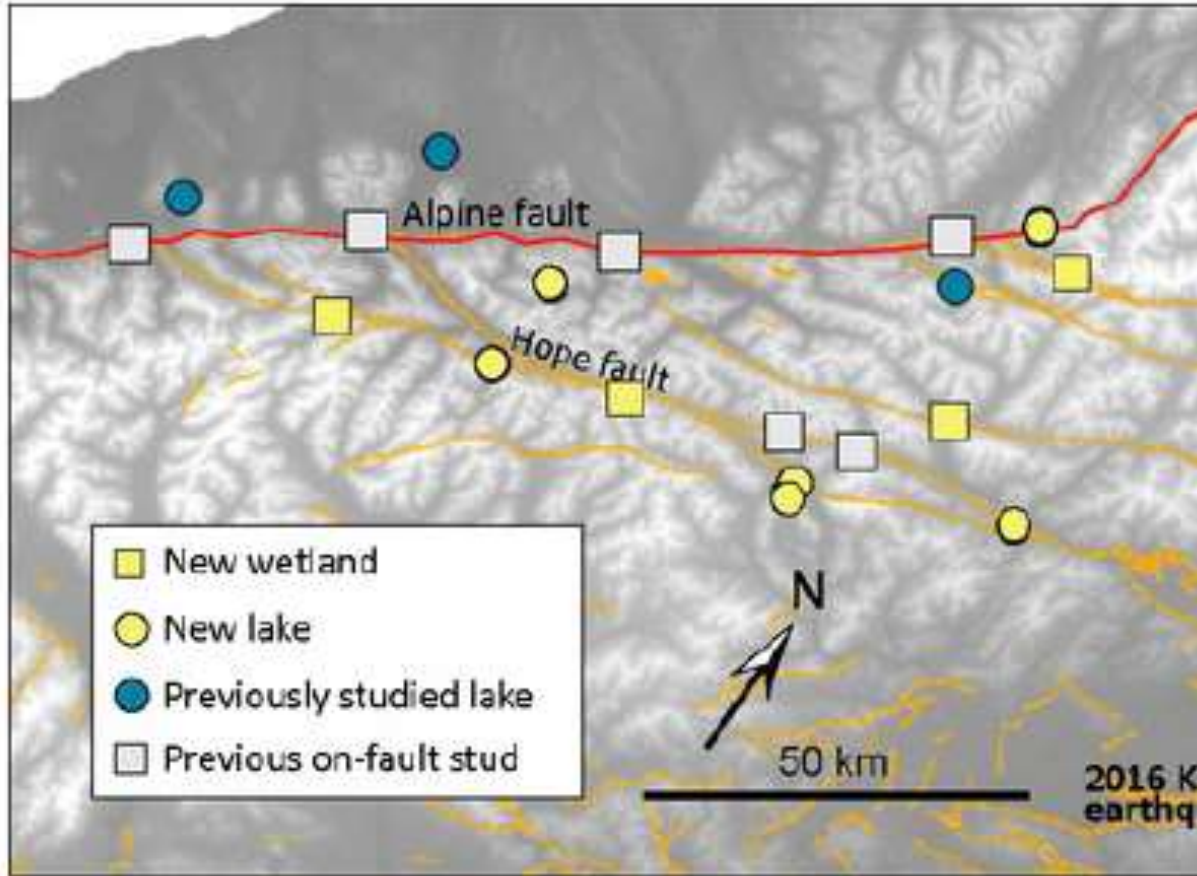
RA4: Revolutionise our understanding of Transition Zone 3D fault architecture using novel geological and geophysical data that parameterizes our earthquake simulations and hazard models.



Seismic surveys



Paleoseismic evidence



Implementation pathway

Ngā Ngaru Wakapuke

Building resilience to future earthquake sequences

The Forecast
top-down dynamic hazard forecasts, risk, and socio-economic modelling



NEMA
Toka Tū Ake EQC
Local Government

The Past
scientific evidence of past earthquake sequences



NIWA, GNS Science
QuakeCoRE
Marsden Projects

The Foundations
three-dimensional architecture of the Transition Zone



International and national research collaborations

Māori Advisory Group
Stakeholder Advisory Group

The Future
bottom-up iwi-led kaupapa
Māori-based community resilience planning



Communities & EM Groups
Iwi Māori
Plate Boundary Network

OUTPUTS

OUTCOMES

IMPACTS

Scenario narratives, Public education initiatives,
Future-thinking under deep uncertainty in communities

Risk-informed decision-making tools,
Socio-economic models, Dynamic hazard forecasts

Dynamic hazard scenarios
Informed decision-making under deep uncertainty
Geospatial and temporal datasets
Effective response and recovery
Multi-hazard risk-informed decision-making
Probabilities for earthquake sequences in Central NZ
Better business cases
Regionalising national plans
Improved risk literacy
Enabling community resilience

Enduring community resilience for earthquake sequences
Adaptive and agile responses to disruption
New time-dependent risk capability
Rangatahi capability in multi-hazard contexts

Partners, end-users stakeholders



Timeframes

